DEVELOPING CONTEXTUAL BASED TEACHING MATERIALS TO ENHANCE SELF EFFICACY AND MATHEMATICS ACHIEVEMENT IN ALGEBRA OF GRADE 7 STUDENTS AT JUNIOR HIGH SCHOOL

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ABSTRACT

MAISEA TUICORO MALANICAGI: *Developing Contextual Based Teaching Materials to Enhance Self Efficacy and Mathematics Achievement in Algebra of Grade 7 Students at Junior High School*. **Thesis. Yogyakarta: Graduate School, State University of Yogyakarta, 2014.**

The aim of this study is to develop contextual based teaching materials to enhance students self efficacy and mathematics achievement in algebra at a junior high school. The developed product consisted of students textbook, teachers lesson plan and student worksheet which were valid, practical, and effective.

This is a research and developement (R&D) study which consisted of 4 steps: (1) preliminary investigation, (2) design, (3) realization/construction and (4) validations, evaluations, test and revsion. The subjects of this research were 32 students of class 7C with their mathematics teacher at SMPN 2 Mlati, in Yogyakarta. The instruments used were validation sheets, the practicality evaluation sheets and the effectivity instruments. The validation sheets included the validation sheets for the developed products as well as the students self efficacy questionnaire and the achievement test. The praticality instruments which were evaluated by the teachers and the students included the teachers evaluation sheet about the developed product, teachers and students questionnaire about the teaching and learning process of the CTL approach. The effectivity instruments included students self efficacy questionnaire, the short tests and the achievement test conducted during and after the treatment respectively.

The results revealed that the developed products were valid, practical and effective in students learning. Validation results analysis shows that the teacher's lesson plan and students worksheet were categorized as 'excellent' or graded A, whilst the students textbook was categorized 'very good' or graded B. Teachers evaluation on the ST, TLP and SW and students evaluations on the teaching and learning process were categorized as the 'most feasible' or graded B, whilst teachers evaluation on the teaching and learning process was categorized as 'very feasible' or graded A. The achievement test analysis revealed that 63% of the students met the MCC of 75% . Self efficacy data revealed an increase in learning capabilities after the intervention.

Keywords: *development, developed products, contextual teaching and learning, self efficacy.*

ABSTRAK

MAISEA TUICORO MALANICAGI: *Pengembangan Bahan Ajar Berbasis Kontekstual Untuk Meningkatkan 'Self Efficacy' dan Prestasi Belajar Matematika pada Materi Aljabar Kelas 7 SMP.***Tesis. Yogyakarta: Program Pascasarjana, Universitas Negeri Yogyakarta, 2014.**

Tujuan dari penelitian ini adalah untuk menghasilkan bahan ajar berbasis kontekstual untuk meningkatkan'self efficacy'dan prestasi belajar matematika siswa pada materi aljabar di sekolah menengah pertama kelas 7. Produk yang dikembangkan terdiri dari Buku Siswa (BS), Rencana Pelaksanaan Pembelajaran (RPP), dan Lembar Kegitan Siswa (LKS) yang valid, praktis, dan efekif.

Penelitian ini merupakan penelitian pengembangan, model pengembangan yang digunakan terdiri dari 4 langkah yaitu, (1) pemeriksaan awal, (2) desain, (3) realisasi/konstruksi, dan (4) validasi, evaluasi, pengujian dan revisi. Ada 32 siswa yang digunakan sebagai subjek coba. Subjek penelitian ini adalah siswa kelas 7C dengan guru matematika mereka di Sekolah Menengah Pertama Negeri 2 Mlati di Yogyakarta. Instrumen yang digunakan adalah lembar validasi, lembar penilaian kepraktisan dan instrument keefektifan. Lembar validasi yang digunakan adalah lembar validasi untuk memvalidasi produk yang dikembangkan serta lembar kuesioner'self efficacy'siswa dan tes prestasi belajar. Instrumen kepraktisan dinilai oleh guru dan siswa terdiri atas lembar penilaian guru dan lembar penilaian siswa terhadap produk yang dikembangkan, lembar kuesioner guru dan siswa tentang proses belajar mengajar dengan menggunakan pendekatan CTL. Instrumen efektivitas yang digunakan adalah kuisoner 'self efficacy siswa, tes singkat dan tes prestasi yang dilakukan selama dan setelah pembelajaran.

Hasil penelitian menunjukkan bahwa produk yang dikembangkan itu valid, praktis dan efektif. Analisis hasil validasi menunjukkan bahwa rencana pelaksanaan pelajaran guru dan lembar kegiatan siswa dikategorikan 'sangat baik' atau dinilai A, sementara penilaian guru tentang buku teks dikategorikan 'baik' atau B. Penilaian guru terhadap BS, RPP dan LKS dan penilaian pada proses belajar mengajar dikategorikan sebagai 'paling layak' atau bernilai B. Sementara penilaian guru pada proses pengajaran dan pembelajaran dikategorikan sebagai 'sangat layak' atau bernilai A. Analisis tes prestasi singkat mengungkapkan bahwa 63% siswa memenuhi KKM dari 75%. Data 'self efficacy' menunjukkan peningkatan pada kemampuan belajar sebelum dan setelah tindakan.

Kata Kunci: *pengembangan, produk pengembangan, pembelajaran kontekstual, self efficacy.*

DECLARATION OF AUTHENTICITY

I, the undersigned,

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declare that this thesis is my original work, compiled and utilized to fulfil the requirements of this study, and has not been previously submitted to any other university for a higher degree. I would also like to certify that any assistance received during the research has been acknowledge and that all publications cited had been personally consulted.

Yogyakarta, 24 Juli 2014

Declarator,

Maisea Tuicoro Malanicagi.

RATIFICATION

DEVELOPING CONTEXTUAL BASED TEACHING MATERIALS TO ENHANCE SELF EFFICACY AND MATHEMATICS ACHIEVEMENT IN ALGEBRA OF GRADE 7 STUDENTS AT JUNIOR HIGH SCHOOL

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Psalm 117:1-2

Praise the Lord, all nations! Praise him, all people! His love for us is strong and his faithfulness is eternal.

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Maisea Tuicoro Malanicagi.

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CHAPTER I
INTRODUCTION

A. Background of the Study

Mathematics is an important area of study that plays a major role in adolescents' academic development and career planning, servicing as a defining subject for adolescents' present and future lives (Choi, 2011:15). Designing teaching materials to facilitate students learning to correspond with the current demands of the education system and expectations of students, parents and other stakeholders of the school has to become an essential strategy for many education systems. Developing contextualized teaching and learning materials ought to be a strategy that meets the latter demands and has been an effective method in the teaching and learning of mathematics, improving students interests and motivation.

Methods of teaching that had existed over centuries can no longer be utilized in this current age of technology. Students in schools have reportedly found mathematics uninteresting due to excessive abstract materials taught by teachers. As students are becoming more ambitious and concerned of their future, they are at the same time becoming more critical of methods of teaching by teachers when displayed. Mathematics, thus, has often become the least favourite subject for most students.

Algebra seems to have always been a source of frustration to many in terms of understanding the meaning of signs and syntax of the algebraic language (Luis, & Luis 2007: 145). However, there is a need to consider that algebra is a prequisite for many other mathematics topics learnt in school as well as in higher education. The important question that mathematics educators may need to be aware of in the teaching and conveying of algebra, is the origin of algebra or what is it that makes algebra. Findings from Valderrama's (2008) research, in Coloumbia reveals that:

> Teachers suggests and recommends that school algebra represents important knowledge for understanding real life situations and in that without pupil's identification of connections between their daily life experiences and mathematics they would see no point in learning it (p.44).

Teachers in this era of technology need to be aware that students of this generation are far more informative and ambitious compared to their own years at middle school. They are more vocal and would often voice their concerns of what they learned in school in relation to their future. As teachers of this era, content knowledge of each subjects should only form the basis of the mathematical concept that we deliver in school. We ought to be more involved in contextualizing those mathematical concept to suit the learning demands of our students. Friedlander & Tabach (2009) argues that:

> Learning algebra at an almost exclusively abstract symbol level can cause many cognitive and affective difficulties, and that the provision of contextual meanings to algebraic objects, concepts and operations must occur already at the initial stages and accompany the whole process of learning-rather than presenting these meanings at more advanced stages, as possible applications. Their experiences with developing a context- based algebra curriculum shows that this approach provides an important bridge

between arithmetic and algebra and allows for a meaningful learning of algebraic concepts.(p. 5)

In the Indonesia Government Regulations, Year 2013, No. 68 (Peraturan Pemerintah, Tahun 2013, Nomor 68: 2), reports that, "national education can be influenced by external challenges associated with shifts in world economic power, impact of the science technologies and investment quality". As a consequence, Indonesia is modifying it's education system through cirriculums with teaching and learning materials to prepare it's future citizens towards these external influences. These shifts were then further reinforced due to Indonesian students performance in the *Trends in International Mathematics and Science Study* (TIMSS) and the *Program for International Student Assessment* (PISA). Since 1999, a number of test materials in TIMMS and PISA were yet to be included in the Indonesia's junior high school cirriculum. Results from TIMMS 2011 reveals that Indonesian's 8th graders knowledge in algebra needs to be reviewed and developed (Provasnik et al, 2012). Compared to Chineese Tapei, one of it's Asian counterparts, Indonesian students scored an average of 392 to 628 for Chineese Tapei as the highest in this domain of mathematics (Provasnik et al, 2012). According to report from the PISA 2012, Results In Focus, latest statistics revelas that Indonesia performed well below the OECD average of 494 obtaining a score of 375. The PISA results are summarized in Table 1. According to OECD 2013, one of the assessed affective domains in students drive, engagement and self beliefs is mathematics self-efficacy. There were three components of mathematics self-efficacy which was: (1) Mathematics Self-efficacy; (2) Score-point difference per unit of the index of mathematics self-efficacy and; (3) Gender gap in

mathematics self-efficacy among students of equal performance in mathematics. Please refer to Table 2 for a summary of the results of Mathematics Self Efficacy of Indonesian students as reveled from OECD, 2013.

Table 1

Mean scores of mathematical literacy of Indonesian samples in comparison to OECD average [From OECD 2000, Table 3.3., p.287; OECD; 2003, Table 2.5c, p.356; OECD, 2010, Table V.b.3.1.,p 156; OECD 2013, p 5]

Country	**Mathematics literacy mean scores (S.E)**				
	2000	2003	2006	2009	2012
Indonesia	367 (4.5)	360 (3.9)	391(5.6)	371 (3.7)	375
OECD Average	500 (0.6)	500 (0.6)	497 (0.6)	499 (0.6)	494

Table 2

Snapshot of Indonesian students self drive, engagement and self belief [From OECD, 2013: 19]

	Mathematics Self Beliefs	
Mathematics Self Efficacy	**Score of the unit of index of Mathematics Self Efficacy**	**Gender gap**
Mean Index – Below OCDE Average	Change in Score - 17 OECD Average - 49	Below OECD Av.

One of the problems faced by math teachers in middle schools in Indonesia today is that almost all of them are university graduates before the year 2000, thus, the latest theories of learning approaches and new models or methods developed from exisitng theories had not been applied in the classroom (Tambelu J, 2013: 27).

B. Problem Identification

Based on the background of the study, few of the main problems identified that contributed to the formation of the study were as follows;

1. There is a need to develop contextual based teaching materials to meet the expectation of the sttudents, parents and other stakeholders of the school to correspond with the economic demands of the country.

2. There is a need to shift classroom learning to be more students focus rather than to be teacher centred at all times.

3. Algebra needs to be contextualized so that students can understand and have the capability to explain the mathematical concepts studied rather than studying them abstractedly.

4. In the international arena such as the TIMMS and PISA competitions, Indonesia, still obtains below average results compared to other countries and Asian counterparts.

C. Limitations of the Study

The study is limited to developing contextual teaching materials to enhance the students self efficacy and mathematics achievement in algebra grade 7, for a local middle school in Indonesia.

D. Problem Statement

Based on the limitations of the study there were two problems formulated in this research.

1. Will the developed contextualized based teaching materials be valid, practical and effective?

2. Will the valid, practical and effective developed products enhance students self efficacy and mathematics achievement in algebra?

E. Purpose of the Study

The main purpose of the study was to develop contextualized teaching materials in algebra in grade 7 and to investigate it's impact on students self efficacy and mathematics achievement in the studied material.

F. Specifications of the Developed Product

The developed product at the end of this study using contextualized materials includes (1) students textbook, (2) teachers lesson plan and (3) students worksheet. The instruments constructed to collect data on students mathematics self efficacy and the achievement capabilities in algebra includes the students mathematics self efficacy pre and post test questionnaire and the achievement test respectively at the end of the study.

G. Significance of the Study

Few of the anticipated significances of the study are to (1) add to existing research on developing contextual based teaching materials in algebra, (2) add to research the use of contextual teaching and learning materials to enhance the self efficacy and mathematics achievement in mathematics, (c) contribute to the literature of research and development studies and (d) inform the practice of the mathematical content preparation for prospective middle school mathematics teachers.

H. Assumptions and Limitations of the Development

1. Assumptions

Assumptions anticipated during the process of the study were as follows;

(1) The developed product was to assist students in understanding the elements of algebra expressions so that they will have the capability to solve algebraic problems with confidence and the determination to solve algebraic problems in high school and in tertiary institution.

(2) Based on the constructive theory, learning should be more students centred so that students can be more adapted to scientific method of learning which would be able to assist them to construct knowledge on their own.

(3) Math teachers should be able to contribute in the development products to suit their students backgrounds and environment and thus, keep the products as learning resources for the school.

2. Limitations

Limitations encountered during the development process were unpredictable variables that occured in terms of natural environment and human nature which hindered and influenced the objective of development included the following;

1.The appropriate language that was needed to be used in the developed product as well as for the constructed instruments for students students in grade 7 of junior high school.

2.The teachers perception regarding the study and his or her ability to succesfully implement the developed product were according to his schedule and there was no consistency in consecutively carrying out the lessons.

3.The language barrier between the researcher and the subjects to be studied with their teacher, could have contributed to some mishaps and misunderstandings during the data collection period.

I. Definition of Terms

Given below are few of the common terms that will be found in this paper with their definitions in relation to the study.

developed product – developed product refers to the products being designed inclusive of the students textbook (ST), teachers lesson plan (TLP) and students worksheet (SW).

CHAPTER II
STUDIED THEORIES

A. Literature Review

1. Contextual Teaching and Learning Approach

a. Definition of CTL

Since, it has been commonly used in most education system, there has been numerous and various definitions of CTL based on the group or individual championing it's use. A collective definition by recent studies, which would also be appropriate for this study in the middle school conducted by Berns R.G & Erickson P. M, (2001) stated that:

> Contextual teaching and learning is a conception of teaching and learning that helps teachers relate subject matter content to real world situations; and motivates students to make connections between knowledge and its applications to their lives as family members, citizens and workers and engage in the hard work that learning requires (p. 2)

In simplifying the definition given above, Contextual Teaching and Learning approach, thus, becomes a tool in filling the gap between the real world and content subject matter taught in schools. In doing so, it focuses on the interests and ambitions of the learner rather than the educator. In addition, it is " a process built on the recognition that some students learn more effectively when they are taught in a hands-on, real world context rather than in an abstract manner" (Baker, Hope & Karandjeff, 2009; Bond, 2004; Predmore, 2005). Mazzeo (2008:207), agreed that CTL,"is a concept of relating subject matter content to meaningful situations that are relevant to students' lives, offers one promising approach to helping students learn more effectively". Alfred North Whitehead, in 1916,

according to Baker, Hope & Karandjeff (2009:7), mentioned that " the second-handedness of the learned world is the secret of its mediocrity". Indirectly, Whitehead, at that time had already introduced the core feature of contextual learning which is, the best learning is that which can be used.

In mathematics from middle school level to universities , contextual teaching can be a challenging task for the educators considering the subject content and its relevance to individuals lives. Compared to learning other courses such as music, art, science and finance, the concepts learned can be applied directly in daily lives. Whilst in mathematics, contextualising the content ought to be the vital part of the lesson, once the mathematics concept is throughly understood by the students. Hence, context gives meaning to content. The broader the context within which the students are able to make connections, the more meaning content will hold for them. As for teachers then, a great part of their task is to provide context. The more students are able to connect their academic lessons to the content, the more meaning they will derive from these lessons (Johnson Elaine, 2002). Furthermore, Johnson asserted that "it enables both the discouraged student accustomed to failure and the fortunate students who earns "easy A's" to realize their full potential" (Johnson E, 2002:2). In enabling students to courageously face their fears in mathematics, contextualized instruction, thus, should have positive impacts on self efficacy of the students, boosting their confidence in solving problems.

b. Theoretical Roots of CTL

Contextual Teaching and Learning is based on a constructivist educational theory which is "a conceptual framework that asserts that learners are constantly updating their memory based on ongoing experience" (Baker et al., 2009:8). Established by John Dewey, Jean Piaget and Lev Vygostky it views learning as "people constructing new knowledge and understanding based on what they already know and believe" (Bransford, John D; Ann L, Brown and Rodney R Cocking., 1999:10). Thus, constructivism asserts that students should create their own meaning of concepts when they learn through experience, which furthers an innate motivation and desire to learn. In that, CTL can motivate many students more effectively than traditional classroom pedagogy (Baker et al., 2009; Perin & Hare, 2010).

The difference between a traditional classroom and a constructivist classroom, often had great impacts on the students. Crawford (2001) stated that:

> Award winning teachers, teachers who succeed with students others have given up on, teachers whom parents want for their children, and teachers who make difference in students life are outstanding teachers who often create constructivists classrooms solely for the benefit of their students and also due to their passion in the profession (p,2).

Specifically, a constructivist classroom is one that engages students actively in the learning process. That is, students are more likely to discuss with other students their strategies for solving a problem instead of having the right strategy told to them by the teacher. Furthermore, they are more likely to be working cooperatively in small groups as they shape and reformulate their conceptions, rather than practicing skills silently at their seats. They are more likely to be

engaged in hands-on activities than listening to lectures. In constructivist classrooms, teachers establish in students a sense of interest and confidence and a need for understanding. Students, then, in a constructivist mathematics classroom create their own meaning of the learned mathematical concept in collaboration with the teachers assistance. Baker et al (2009) mentions that;

> constructivists argue that learner's version of the world is unique, even when the concepts are shared...in constructivist framework, the measure of and motivation for learning rests with the learner not the instructor (p,6).

However, it is the role of the teacher to facilitate learning or to create conditions that support student engagement in the learning process.

Apart from constructivism, Baker et al (2009), outline several other psychological and learning theories and research that have implications for CTL such as, *motivation theory, problem-centered learning, social learning theory, learning styles* and *brain research*. *Motivation theory* "focuses on students' perceived value of the mode of instruction and development of self-efficacy, which is the key component of CTL" (Kalchik & Oertle, 2010: 2). Having the capability to relate the learned concept to a real world scenario, students become motivated and interested in the lesson. Under this conceptual framework, contextual teaching and learning have the potential to motivate and positively involve students who's perception of education, classes or schooling is boring, non-essential and irrelevant to their future lives.

Compared to traditional classrooms, *problem centred learning* students actively participate in their own learning, of which at times, they are to define

the concepts to be learned through critical thinking, creativity and teamwork-oriented problem solving - just like in the real world. Supported by Massa (2008);

> this theory addresses students' engagement with the real world problem solving to develop a deep foundation of factual knowledge and understand that knowledge in the context of a conceptual framework...and finally to facilitate the development of metacognitive skills" (p,19).

That is, skills needed to take responsibility for planning, monitoring and evaluating their own learning. Under the CTL framework this theory assists students to see the usefulness of certain skills, reduces the emphasis on knowledge for its own sake and concentrate on the utility of skills and information.

Previous research reveals that *collaborative learning*, a social learning theory, effectively supports CTL (Baker et al, 2009). In other words CTL is effectively supported by collaborative learning. However, in this study the preffered term will be co-operative learning since the subjects are middle school students. Collaborative learning is a term used for adult learners and adult education (Clardy, 2005; Van Hook 2008; Merriam, Caffarella & Baumgartner, 2006). Cooperative learning is grounded on the concept of social cognitive theories, which asserts "that students learning can be facilitated and enhanced by connectivity to peers" (Baker et al 2009: 10). Social learning theory, sees students as co-operative learners rather than solitary studying and passive listening. In CTL Johnson (2002) elaborates that this process:

> ...remove mental blinders, imposed by limited experience and narrow perfections...working together, members of small groups are able to overcome obstacles, act independently and responsibily, rely on the talents of team members, trust others, speak up, and make decisions (p.89).

At this standard CTL prepares students for workplace behaviour, enhance their self efficacy and be better and confident citizens of a nation.

Alexander & Murphy (2000), asserts that learning styles under this framework is meant to answer the question: how can students be motivated to learn? According to Svinicki (2004), "there are specific differences among learners that siginificantly impact the learning process" (p.185). That is, due to students differences in traits, experiences and preferences to the learning task, instructors must employ appropriate instructions considering the different ways students learn. Teachers ought to consider three differences among learners that effectively has an impact on the learning process; (a) the role that prior knowledge and experience play in that process (Svinicki, 2004), (b) differences in motivational factors (Alexander & Murphy, 2000) and (c) personality differences that may cause learners to prefer a specific set of learning modalities (Baker et al, 2009). However, no matter what styles the learner prefers " students must have the opportunity to learn from feeling, learn by watching and listening, learn by thinking and learn by doing (Jacoby et al, 1996: 69). Thus CTL becomes an effective learning strategy that can accomodate the various learning styles individual students has. This is due to the various teaching methods utilized by the teacher such as cooperative learning groups, inquiry groups and so forth employed to accomodate these differences in learning styles. Finally, under this framework of CTL and learning styles sensitivity, teachers ought to "personalize the learning environment, having students relate personal experiences to content helps learners engages the material and makes learning more powerful and significant"

(Silverman & Casazza, 2000: 190). This will be indicated in this study as students local materials from their own backyard will be used to personalize the mathematical concept.

In terms of *brain research,* previous research reveals that practice and emotion are two changes that affects learning (Zull, 2004). That is, in terms of practice;

> ...when neurons are active, they create biochemical pathways to other neurons...when they connect and communicate, synapses are created which leads to the development of networks within the brain that creates the physical demonstration of knowledge and learning (p,68).

This demonstration of knowledge and learning by the students, in turn indicates that the learned mathematical concept is understood. On the other hand, as further asserted by Zull (2004: 70) emotion "creates a chemical reaction in the brain initiated by adrenaline, dopamine or seroton in students" . These chemicals strengthen connections in the brain, increasing the learning experiences and entangling emotion and learning. This motivates students to learn aggresively which leads to success and eventually confidence in the part of students to learn. Supported by Frith (2005: 10), brain based education reinforces "individual as an active learner in control of his [or her] learning situtation, with the teacher facilitating student planning, self-evaluation and self monitoring skills". Students brain in CTL is to develop patterns and create meaning by linking experience and sensory stimuli to new knowledge through a convergence in real life application.

c. Teaching and Learning In Context

There has been a plethora of practices or models utilized in the implementation of contextual teaching and learning. This study focuses on the

practices established by Crawford (2001), which is a suitable strategy for the middle school students. According to Crawford (2001), five teaching strategies had been observed to be used by teachers employing the contextual teaching approach, (1) Relating, (2) Experiencing, (3) Applying, (4) Cooperative and (5) Transferring. These five strategies formulates the acronym REACT, of which it is most commonly represented.

1). Relating

Relating according to Crawford (2001) is the most powerful contextual teaching strategy. It is used by teachers to link or connect students innate experience to new information or to the new mathematical concept to be learned. Relating in younger years of learning – when being a toddler, were much more simple compared to middle school years given the "range and complexity of concepts to be taught and due to the limitations of our resources, life experiences will have to be evoked through text, video, speech and classroom activity" (Crawford, 2001: 4).

Research reveals that, relating, has succesully enhanced learning and motivates students especially when the relating process is used at the beginning of the class and the teacher is to adjust teaching instruction in response to students changing conceptions during the ongoing instruction (Bransford, Brown & Cocking, 1999). According to Caine & Caine (1993), the instant reaction gained by students when succesfully making the connections is called "felt meaning". They assert that felt meaning can be momentous and subtle when insight leads to a sigh of relief and a milder reaction respectively, in obtaining solutions to a

problem. However, in order to obtain a felt meaning experience for the students, teachers ought to plan and prepare thoroughly before class. This is vital because at times students are mislead or fail to recognize the connection relevance of a prior knowledge to new knowldge. Nevertheless, when teachers "provide environments in which students activate memories or prior knowledge and recognize the relevance of the memories or knowledge, they are using relating" (Crawford 2001: 3).

As for teachers, Crawford, presents three ways to discover or to know students previous knowledge and beliefs, (1) experience, (2) research and (3) probes. Experience requires the teacher to review and take note of collective or individual experiences with students or with his or her colleagues. Teachers should make an effort to research about students commonly held ideas from their portfolios or other documented evidence of students. In terms of probes, teachers are to use carefully designed questions or tasks that would reveal students prior knowledge and beliefs.

2). Experience

Experinece is learning by "doing-through exploration discovery and intervention" (Crawford, 2001:5). Crawford, further elaborates that learning through experience includes the use of manipulatives, problem-solving activities and laboratories.

Manipulatives, refers to simple objects that students can utilize to model abstract concepts concretely (Crawford, 2001: 5). Mathematical objects that are most commonly used includes base-ten blocks model, fraction bars for the

addition and multiplication of fractions as well as certain computer programs that assists students in visualising abstract concepts. Problem-solving activities, in this case relates to problem centred learning, a theoretical root of CTL. Students are engaged in activities while learning the mathematical concept. Laboratory according to Crawford (2001:6) are activities and projects in which "students work in groups to collect data by making measurements, analysing of data, making conclusions and predictions and reflect on the fundamental concepts involved in the activity". Activities and projects under this category require longer time span. For instance, students in a group to collect prices of a particular item from various supermarkets and compare, analyse and make conclusions of their findings. As supported by the American Association for the Advancement of Science, Project 2061 (1990);

> Progression in learning is usually from the concrete to the abstract. Young people can learn most readily about things that are tangible and directly accessible to their senses-visual, auditory, tactile and kinesthetic. With experience, they grow in their ability to understand abstract concepts, manipulate symbols, reason logically, and generalize. These skills develop slowly, however, and the dependence of most people on concrete examples of new ideas persists throughout life (p, 199).

The learned mathematics concept must be experienced. Though this may require thorough preparation by teachers, it is of equal benefits to students and to the teacher as well, in terms of the teachers own experience in the teaching of that particular concept as well as for the students long term utilization of skills.

3) Applying

Applying is "defined as learning by putting concepts to use" (Crawford, 2001:8). Mostly, in mathematics, word problems in real-world context are used to

assess students' understanding of the previously learned concept indirectly. Students upon reading and understanding the objective of the question, should then realize and recall the appropiate mathematical concept to be applied. As supported by Crawford (2001:8) teachers can also "motivate a need for understanding the concepts by assigning realistic and relevant exercises".

Research revelas that certain classroom strategies that motivate students to learn academic concepts at a deeper level of understanding includes:

- *Focus on meaningful aspects of learning activities*. That is, teachers should stress how the academic tasks that are done in the classrooms are relevant and 'authentic' that have meaning in the real world (Pintrich & Schunk, 1996: 248).
- *Design tasks for novelty, variety, diversity and interest*. Teachers should attempt to provide a wide variety of tasks for students to engage in and ensure that the tasks have some novel, interesting or surprising features that will engage the students.
- *Design tasks that are challenging but reasonable in terms of students capabilities.*

Thus, under the strategy of CTL, applying fosters a deeper sense of learning within students which enables them to focus on the need or want in learning appropriate mathematical concepts.

4). Cooperating

Based on the social learning theory cooperating is "learning in the context of sharing, responding and communicating with other learners – is a primary

instructional strategy in contextual teaching"(Crawford, 2001). As a method of teaching, cooperative learning is the learning style normally used for middle school students during the learning process to ensure participation of all students within a group without feeling embarrased. "Learning often takes place best when students have opportunities to express ideas and get feedback from their peers" (American Association for the Advancement of Science, 1990: 199).

Teachers can establish guidelines to create environments in which students can be expected to learn concepts at a deeper level of understanding. These includes;

- Structuring positive interdependence within students learning groups.
- Having students interract while completing assignments and ensuring that the interaction are on-task.
- Holding all students individually accountable for completing assignments and not letting them rely overly on the work of others.
- Having students learn to use interpersonal and small group skills.
- Ensuring that learning groups discuss how well the group functions.

  (Johnson & Johnson, 1990)

Researches revealed that the use of cooperative or collaborative learning promotes higher students achievements compared to traditional individualistic and competitive methods (Johnson & Johnson, 1990).

There are various kinds of cooperative learning groups that can be used for this study: (a) Students Teams – Achievement Divisions (STAD) is a cooperative learning method for mixed ability groupings involving team recognition and

group responsibility for individual learning; (b) Jigsaw is a cooperative learning model in which students are assigned to six-member teams to work on academic material that has broken down into sections for each member; (c) Learning Together is a cooperative learning model in which students in four – or five member heterogeneous groups work together on assignments; (d) Group Investigation is a cooperative learning model in which students work in small groups using cooperative inquiry, group discussion, and cooperative planning and projects, and then make presentations to the whole class on their findings.

Though cooperating is difficult, it is worth the additional effort if increasing students achievement is an important goal and the ideas shared and mathematical concept learned will be used in the long term.

5). Transfering.

It is most important that students learn with understanding so that they can also transfer knowedge. Transfering is a teaching strategy defined as "using knowledge in a new context or novel situation – one that has not been covered in class" (Crawford 2001:14). The use of transfering in the mathematics classroom in the form of problem solving contributes to knowledge obtained beyond those that they have studied. Thus, if teachers expect "students to apply their knowledge in novel situations, then they must practice applying them in novel situations" (American Association for the Advancement of Science, Project 2061, 1990: 199).

In correspondence to the above, teachers ought to prepare exercises in unfamilliar situations in order to capitalize students curiousty. In middle school,

students understanding of mathematical concepts can be advocated by other disciplines such as science, social studies and commerce as sources of problems (NCTM, 2000). For instance, cooking, discussing newspaper articles that uses statistics and other novel but daily life activities can be used as problems in order to assess the skill of transfering. Research shows, "that when teachers design tasks for novelty and variety, student interest, motivation, engagement and mastery of mathematics goals can increase" (Crawford 2001: 14). Learning in the context of existing knowledge or transferring, uses and builds upon what the student already knows.

d. Contextual Teaching and Learning of Algebra In Middle School

According to NCTM (2000) "students in the middle grades should learn algebra both as set of concepts and competencies tied to the representation of quantitative relationships and style of mathematical thinking of formalizing patterns, functions and generalisations" (p. 223). Since they will have to work more frequently with algebraic symbols at this level compared to lower grades, it is vital, that they become more comfortable in relating symbolic expressions containing variables to verbal, tabular and graphical representations of numerical and quantitative relationships. In learning to reason symbolically, the complexity and types of equations and problems they are able to solve increase dramatically as a consequence. Developing an initial understanding of several different meanings and uses of variables through representing quantities in a variety of problem situations is a vital factor at this level as well. They should connect their experiences with linear functions to their developing understandings

proportionality and they should learn to distinguish linear relationships from nonlinear ones. The ability in acquring the latter, grasp complex, changing and abstract concepts stimulates the brain, helping students learn how to think in new ways. Moreso, algebra enable students at this level to organize their thinking, making it easier for them to craft reasonable responses when confronted with complicated or dynamic situations.

As stated earlier most educators require students to be proficient in algebra at this level, so that they would not have difficulty in attempting algebraic problems in high school. Even so, the acquired problem solving and critical thinking skills obtained at this level can help students succeed in their jobs even if they do not continue their education beyond high school.

Learning algebra in context promotes a distinction between constant numbers and variables, and a better understanding of algebraic concepts and properties, such as lack of closure of algebraic expressions and of equivalence of algebraic expressions. We believe that providing context-based meanings to algebraic objects, concepts and operations should occur at the initial stages of learning algebra - instead of at more advanced stages as possible applications. A context-based approach to beginning algebra provides points of reference that students can review at a more advanced stage of learning. As a result, the use of contexts has the potential to bridge the gap between arithmetic and algebra, as well as between concrete and abstract objects. Contexts also enable students to learn algebraic procedures in a meaningful way (Friedlander & Tabach, 2008). They found out that context-based learning increases student motivation and

willingness to become engaged in the activity. The benefits that relate to students' learning of algebra in context outweigh the risks.

2. Self Efficacy

a. Definition

Bandura (1986, 1997), asserted that "self efficacy refers to beliefs about one's capabilities to learn or perform behaviors at designated levels". For this study it is the belief within any student that he or she is capable of learning and understanding contextualized algebra and later on achieve desired results. Self efficacy, further added by Bandura (1989: 59) is a type of thought that affects action and a very strong one in that it is "central or pervasive then people's judgements of their capabilities to exercise control over events that effects their lives, thus it plays a major role in human agency".

b. Theoretical Background

Social cognitive theory, proposed to have explain the development changes that people undergo over the course of their lives (Bandura, 1989). Bandura asserted that, due to life-long processes of development, changes with the psychosocial functioning of adults as well as with those occuring in childhood is mostly the concern of social cognitive theory. Specifically, Bandura argued that:

> .... development is not a monolithic process, hence, humans capabilities vary in their pshychological origins and in the experiential conditions needed to enhance and sustain them of which also human development encompasses many different types and patterns of changes (p,2)

Grounded in this larger theoretical framework of social cognitive theory, self efficacy, "postulates that human achievement depends on interactions between one's behaviour, personal factors (e.g., thoughts, beliefs), and environmental conditions (Bandura, 1986, 1997). Thus, self efficacy affects one's behaviours and the environments with which one interacts, and is influenced by actions and conditions. Furthermore, self efficacy is hypothesized to have effects on task choice, effort, persistence, and achievement (Bandura, 1986, 1997; Schunk, 1995). Nevertheless, students efficacious capabilities differ in learning, some whom their learning capabilities, results in statisfactory achievements, whilst those who feel efficacious, work harder, persist longer when encountered with difficulties, thus achieve at a higher level.Self efficacy then, refers to beliefs about one's capabilities to learn or perform behaviors at designated levels (Bandura, 1986, 1997). Much research shows that self-efficacy influences academic motivation, learning and achievement (Pajares 1996; Schunk, 1995).

c. Development of Self Efficacy

According to Bandura, there are four influences of self efficacy namely, (a) familial influence on self-efficacy, (b) peer influence, (c) the role of schooling and (d) transitional influences. At home parents, siblings and caregivers are the first provider of experiences that differentially influence children's self-efficacy. Parents should provide home environments that help children interact effectively with the environment, stimulates youngersters' curiousty and allows for mastery experiences help to build children's self-efficacy. "Children then, are motivated to work on the activities, and thereby learn new information and skills, when

environments are rich in interesting activities that arouse children's curiousty and offer challenges that can be met", (Bandura, 2002: 18). Bandura further asserted that, with respect to other sources, parents who teach children ways to cope with difficulties and model persistence and effort strengthen their children's self efficacy.

Model similarity seems to the common influences of self efficacy in peers. Observing similar others can raise children's self efficacy and motivate them to perform the task if they believe that they too, will be succesful (Shunk, 1987). On the other hand observe students fail can lead students to believe that they lack the competence to succeed and disuade them from attempting the task (Bandura, 2002). This is most obvious, since the relationship with friends can influence individuals daily decision.

In the role of schooling research often shows that students' perceptions of academic competence decline as they advance in school (Pintrich & Schunk, 1996). They assert that this decline " has been attributed to various factors including greater competition, more norm-referenced grading, less teacher attention to individual student progress and stresses associted to school transitions". This can also be an attribute of physical and emotional development as children goes through transitions in life. They become more independent and matured that the notions of peer competitions or simialr modelings becomes no longer effective.

d. Role of Schooling

The school functions as the primary setting for developing and cultivating cognitive competencies in formative period of children's lives (Bandura, 1986). In that Bandura added that;

> School is the place where children develop cognitive competencies and acquire the knowledge and problem solving skills essential for participating effectively in society, where their knowledge and thinking skills are continually tested, evaluated and socially compared (pg, 65).

These early formative periods also becomes an anxious moments in parents lives as they are continously curious of their childrens academic abilities. These motivates them to empower and encourage their children to attain academic excellent achievements. Due to this, many children's self efficacy are strengthened which reinforces them action and self will to work harder. Thus, as children master cognitive skills, they develop a growing sense of their intellectual efficacy (Bandura, 1986). However, Schunk (1984; 1987) asserts that there are factors that affects children's judgement of their intellectual efficacy which includes, peer modelling of cognitive skills, social comparison with the performances of other students, motivational enhancement through proximal goals and positive incentives, and instructors intepretations of children's success and failures in ways that reflect favourably or unfavourably on their ability.

Self efficacy according to researchers (Shell, Colvin, & Bruning, 1995; Zimmerman & Martinez-Pons, 1990) is also enhanced through curriculums that reintroduced skills such as reading and mathematical computations in later grades and serving as building blocks for advanced skills. Thus, as children moved

through grades they gain experience with these tasks, which should raise their self efficacy. However, according to Bandura, such activities can also retard the development of self efficacy, especially among students who are less academically prepared to cope with increasingly challenging academic tasks. That is, lock-step sequence of instruction can be an attribute to students frustration who fail to grasp skills and increasingly fall behind their peers. In addition, teacher made groupings of students ability can hurt self-efficacy among those relegated to lower groups. In other words when social groupings of such are made it tends to lower the self efficacy of students who find their performances inferior to those of their peers. Thus peer groupings can enhances and at the same time diminishes students feelings or relatedness.

3. Mathematics Achievement Assessments

Students achievements in mathematics, and the culture in which students learning is situated, can be influenced by the variations in the quality of instruction, the opportunity to learn with understanding, and the capacity of schools to support mathematics teaching and learning (Romberg, T.A & Shafer, M.C, 2008). The culture in which students learn, influenced by the variations in the quality of instruction contributes to the type of assessments and measurements the teacher prepares, to evaluate students learning. This is supported by Ebel and Frisbie, (1991);

> The evaluation of learning takes place in an instructional context and, consequently, that learning environment shapes the reasons why we evaluate, influences the purposes for evaluating as well as how we evaluate and determines how we should use the outcomes of our evaluation (pg 26).

However, in order to ensure the appropriate and accurate flow of the process of assessments, measurements and evaluation, the schools contribution is a vital factor. It is also important to consider the role of teachers and parents in this process. According to Gronuld N.E, Linn R. L and Miller D.M (2009), the term assessments, measurement and evaluation are easily confused because they all may be involved in a single process. The purpose of this section is to specify the role of assessments in mathematics achievement correspondence to mathematics in context and the current education cirriculum of Indonesia, 'Curriculum 2013'.

a. Theoretical Background

According to Jones P, Smith R.W and Talley D (2006) achievement tests can be defined as:

> Tests developed for such as certification or licensure judgements, measurement of knowledge acquistion from a course of study, or decisions about whether a person has adequate prerequisite knowledge to be admitted to an educational opportunity, advance in a career development track, or be considered for a particular job (pg 487).

In other words the accomplishment or proficiency of performance in a given skill or body of knowledge or progress in school. Assessment, asserted by Gronuld, Linn and Miller (2009);

> Is a general term that includes the full range of procedures used to gain information about student learning (teacher observations, ratings of performances or projects, performances of authentic tasks traditional paper and pencil tests and student self report) and the formation of value judgements considering learning progress (pg 28).

There are various nature and formats of assessments which may be described and classified in different ways depending on the frame of reference used. In terms of

classroom assessment, there are two widely used categories which are informal and standardized tests (Gronuld et al, 2009). Informal test are those constructed by classroom teachers which may include formative and summative assessments, whilst standardized tests are designed by tests specialists and administered, scored and interpreted under standard conditions, for instance, national examiniations. In this study however, in correspondence to the Indonesian 2013 Curriculum, authentic assessment will be used in order to assess students capabilities in the particular domain of algebra. These authentic assessments can be classified as informal tests, since they will be teacher made and interpreted using norm-referenced measurements. Specifically, the three domains to be assessed are inclusive of knowledge, attitude and skills using paper and pencil tests, rating scales and observations respectively.

Measurements are of two types, correspondence to assessments which are measurement in the form of quantitative descriptions and nonmeasurement in the qualitative descriptions format (Gronuld et al, 2009). In this study, qualitative measurements consists of teacher observations on students overall participation (attitude) in their allocated groups and their level of curiousty (skill) during the teaching and learning process. Quantitative measurements includes the short tests conducted at end of every lesson and the achievement test conducted at the end of the intervention. These tests are interpreted using Norm- Referenced Measurement defined as " referencing the scores of individuals or groups to obtain meaning by comparing a person's score with the average score of some relevant group of people " (Ebel R.L & Frisbie D.A, 1991; 34). The outcome from

the latter will then reinforce decisions about whether a student has adequate prerequisite knowledge of algebra by the intervention of the independent variable which is the contextual based teaching materials. As part of Mathematics in Context (MiC), the mathematics achievement measurement performed in this study will correspond to the nature of achievement measurements common to MiC.

b. Assessments of Mathematics in Context

The role of contexts in assessments problems tests, plays a major role in assissting students to connect real world issues with the mathematical concept which can contributes to a more concrete understanding of the concept. These real world connections has to be developed to favour students social and cutural values in order to support the mathematical concept and make learning more meaningful for the students (Heuvel-Panhuizen Marja van den, 1996). According to Heuvel-Panhuizen, there are three functions of context to assessments which are; (1) contexts enhance accessibility, (2) contexts contribute to the latitude and the transparency of the problems and, (3) contexts provide strategies.

Contexts enhance accesibility refers to visual representations of mathematical problems in which students will quickly grasp the purpose of a given problem. An advantage of this visuality is that " students need not wrestle through an enormous amount of text before they can deal with the problem ... an inviting context can also increase the accesiblity through its motivational element" (Heuvel-Panhuizen Marja van den, 1996: 93). In *contexts contribute to the latitude and the transparency of the problems* refers to " the provision of latitude or freedom to

students in the way they approach the problems, the context further increase the transparency of the assessment" (van den Heuvel-Panhuizen Marja, 1996: 93). *Contexts provide strategies* according to Heuval-Panhizen is the most important aspect of contexts in assessment. That is, students ought to imagine themselves within the problem situation in order to solve the problem in a way that was inspired, as it were, by the situation. This assists and prepare students to be strategic about their current and future situations.

According to Romberg & Shafer (2008:9), " in MiC the teacher selects and modifies tasks in the instructional unit that involve important mathematics, allow for student discussion and include both independent and collaborative investigations of complex, non-routine problems". That is, mathematical relationship are to be explored by students, they will also need to develop their own strategies for solving problems, and use appropriate problem-solving tools, work together cooperatively, and value each other's strategies. Students at times will need to read their thoughts aloud and write their understanding of mathematical concepts or solve problems through writing. As asserted by Romberg and Shafer:

> The teacher's role in the instructional process involves capitalizing on students' reasoning and continually introducing and negotiating with students the emergence of shared terms, symbols, rules, and strategies, with an eye to encouraging students to reflect on what they learn (pg, 9).

Students under this instruction method, are expected to define mathematical concepts in relation to real world situations used. Whilst the teacher at the end of the lesson should then verify and facilitate the accuracy of their definitions in correspondence to the mathematical formal definition .

If intentions of assessments is to measure mathematical abilities needed by students in their adult lives, then it is most important that they shift their focus on providing reliable evidence that a student can apply knowledge, in reasoning and flexible ways, to new, unfamilliar problem contexts. Over the course of years, students should be able to show, on those assessments evidence of growth in the level or complexity of tasks he or she can solve (Romberg & Shafer, 2008). The formative assessments in the study includes short tests, portfolios, observation sheets and presentations to evaluate both the affective and cognitive domains of the developed contextual based teaching material. However, the summative assessment at the end of the study is designed to capture the overall performance of the students in algebra using the norm-referenced interpretations. In implementing all these essential forms of assessments it has been concluded that Contextual Teaching and Learning exemplified as Mathematics in Context is a viable instructional approach that produces a high level of learning when implemented well (Romberg & Shafer, 2008).

c. Aligning Mathematics Achievement to the Current Curriculum

According to 'Permen Nomor 65, Standard Proses Pendidikan Dasar dan Menengah' (Govenrment Policy No.65 on Primary and Middle School Standard Process on Education), for Curriculum 2013, the process of learning implemented ought to be "interactive, inspiring, fun, opposing, motivate students to participate actively as well as to provide ample space for innovations, creativity and interdependence according to their talents, interests with physical and psychological development" (pg 1). For mathematics in middle school,

Curriculum 2013, emphasizes the assessment of knowledge, attitude and skills from the cognitive, affective and psychomotor domains respectively. Kementarian Pendidikan dan Kebudayaan (2013), reccomends the following assessment process on learning, (a) measuring students cognitive level ascendingly, (b) use questioning technique which requires deep thought, (c) measure co-operative learning during the teaching and learning process and (d) use portfolio to monitor students progress.

1. Developing Knowledge, Attitudes and Skills

Middle school mathematics Standard Content, Curriculum 2013 for Indonesia, presented the objectives of learning mathematics in Table 3.

Tabel 3
SMP/MT Mathematics Standard Competence

No.	Standard Isi (Bahasa Indonesia)	Standard Content (English Version)
1	Memiliki kemampuan berpikir kritis, logis, analitik dan kreatif, kemampuan pemecahan masalah, dan kemampuan mengkomunikasikan gagasan serta budaya bermatematika.	Students should have the ability to think critically, logically, analytically and creatively. Should also have the ability to communicate mathematics ideas in social real world issues.
2	Memahami konsep matematika, mejelaskan keterkaitan antar konsep dan mengaplikasikan konsep atau algoritma, secara luwes, akurat, efisien, dan tepat dalam pemecahan masalah.	Students should have the ability to explain mathematics concept and its appilcation or algorithms accurately, flexibly, effeciently and precisely in problem solving.
3	Mengunakan penalaran pada pola dan sifat, melakukan, manipulasi matematika dalam membuat generalisasi, menyusun bukti, atau menjelaskan gagasan dan pernyataan	Use reasoning to justify patterns and its characteristics, make generalizations, compile evidence or explain the ideas behind

	matematika.	mathematical statements.
4	Mengembangkan sikap menghargai kegunaan matematika dalam kehidupan, yaitu memiliki rasa ingin tahu, perhatian, dan minat dalam mempelajari matematika, serta sikap ulet dan percaya diri dalam pemecahan masalah di kehidupan sehari-hari (dunia nyata)	Develop an attitude to appreciate the usefulness of mathematics in life, i.e. have curiosity, attention, and interest in learning mathematics, as well as a tenacious attitude and confidence in problem solving in everyday life (real world).
5	Mengembangkan sikap dan perilaku yang sesuai dengan nilai-nilai dalam matematika dan pembelajarannya.	Develp and attitude and behaviour that corresponds to the values of learning mathematics.

The development of *knowledge* requires students to understand mathematical concept and explain the relationship between the concept and it's application in problem solving activities (Kementarian Pendidikan dan Kebudayaan, 2013). In terms of developing *attitude* students are expected to think critically, logically, analytically and creatively, appreciate the usefulness of mathematics in the life indicated by the growth of curiousty, attention and interest in studying mathematics, resilient and confident in solving day to day problems (Kementarian Pendidikan dan Kebudayaan, 2013). In terms of developing *skills* students are expected to solve problems, communicate ideas within the mathematics culture, use reasoning skills to justify patterns, perform mathematical manipulations in making generalizations and compile evidence or explain ideas (Kementarian Pendidikan dan Kebudayaan, 2013).

2. Authentic Assessment

Authentic assessment according to Aitken and Pungur (2005);

> ... moves beyond learning by rote and memorization of traditional methods and allows students to construct responses ... captures aspects of students'

> knowledge, deep understanding, problem-solving skills, social skills and attitudes that are used in the real-world, or simulation of a real-world situation. It sets meaning and engaging tasks, in a rich context, where the learner applies knowledge and skills, and perfoms the task in a new situation. Most importantly, authentic tasks help students rehearse for the complex ambiguities of adult and professional life (pg 1).

In that it reinforces on "real-world" tasks relevant outside the classroom (Gronuld et al, 2009).

The demand for a more ambiguous form of assessment as such, has come about due to the increasing demands of cirriculum expectations as a consequence of eductional reforms suggesting that teaching is becoming more complex and theres growing diversity among students (Darling-Hammond, 1997; Shulman 1987; Sizer, 1992). For Curriculum 2013, incorporating authentic assessment is essential since it has a strong relevancy to scientific approach. It supports the illustration that authentic assessments directly measures learners skills associated with long-term outcomes such as educational success in the workplace, the tasks involved requires broad and complex performance and the analysis process generates learners response over the acquisition of attitude, skills and existing knowledge. As teachers, there are a few criteria that needs to be fulfilled in order to satisfy the requirements of authentic assessments in mathematics classrooms, which are (a) know how to assess students strength and weaknesses within the instructional design, (b) know how to guide learners to develop their prior knowledge by way of asking questions and providing adequate resources for the learners to perform the acquisition of knowledge, (c) be facilitators of new information to students, viewing and be assimilation to understanding learners and

(d) be creative about how learners learning process can be extended to draw experiences from the world outside the walls of the school (Kementarian Pendidikan dan Kebudayaan, 2013) .

There are four types of assessments that are recommended by Cirriculum 2013, under authentic assessments inclusive of (1) performance assessment, (2) project assessment, (3) portfolio assessment and (4) writing assessments. Performance assessments with reference to Cirriculum 2013 is special considerations. First of all, performance measures should be undertaken to demonstrate learners' real performance for one or more types of specific competencies. Secondly, the accuracy and completeness of the performance is assessed. Third, the specific skills needed by learners to complete learning tasks. Fourth, the main focus of the performance is to be assessed, in particular essential indicators that will be monitored. Eventually, the order of ability or skills of learners is to be observed. Project assessment involves tasks or activities that must be completed by the participanting students in a given time period/duration. Completion of the tasks is in the form of an investigation carried out by learners, ranging from planning, data gathering, organizing, processing, analysis and presentation of data. Portfolio assessment, assesses artifacts and collected works related to real world issues of students that shows their progress in learning. Portfolio assessments are collected individually or in groups which reflect the learners, and are evaluated based on several dimensions. The writing assessment as in Writing to Learn may involve a written test or essay demanding the learners capability in recalling, understanding, applying, analyzing, organizing,

synthesizing and evaluating in assessing students understanding of materials that has already been learned.

3. The Scientific Method

Curriculum 2013 advocates the use of scientific approach as a pedagogy of learning for the students of Indonesia. The scientific approach establishes the following criteria in the teaching and learning process, (a) encourages and inspires students to think critically, analitically and be explicit in identifying, understanding, problem solving and applying the mathematical concept learned, (b) encourage and inspire students to think hypothetically, able to recognize the distinction, similarities and connect mathematical concepts learned to other disciplines, (c) scientific approach is based on concepts, theories and empirical facts and (d) the learning objectives are formulated and presented in a simple and clear way that could be motivating to students.

Under the scientific approach, the affective domain – attitude, fulfills the requirement in teaching students to 'KNOW WHY' the concept needs to be studied. The psychomotor domain- skills, fulfills the requirement of ' KNOWING HOW' the mathematical concept is utilized in the real-world. On the other hand the cognitive domain – knowledge, assists students to 'KNOW WHAT' is it that the mathematical concept is about. In adopting all of the above, the scientific approach is expected to mould a student into becoming a better person (soft skills), whose self-controlled, skilled and knowledgeable to live a decent life (hard skill) incorporating the aspects of attitudes, knowledge and skills learned.

The scientific approach contains five components inclusive of (a) observation, (b) questioning, (c) associating, (d) practise and (e) networking. The components given above are explicitly explained as follows:

(a) Observation

According to Kementarian Pendidikan dan Kebudayaan (2013), this method prioritizes meaningful learning and fulfills the learners curiousty. The students in this aspect of learning should be able to make connections or relate that there is a fact between the analyzed objects – mathematical concept, and the materials presented by the teacher. An advantage in this method is that materials are often presented on power points which excite, challenged and motivate the students curiousty in learning. However, in order to capture students attention and ensure meaningful learning, teachers will be required to prepare really well which can take longer periods of time and economic costs. The observation activity follows the following steps; (i) determining which objects to be presented, (ii) design the object according to the guidelines of the objects to be observed, (iii) determine clearly the type of data to be presented – primary or secondary, (iv) determine the venue of the presentation which can be related to the meaning of the concept learned (v) specify clearly how an observation ought to be conducted for purposes of easy retrieval of data, (vi) determine methods of presentation, for instance, using laptops/ notebooks, cameras, tape recorders, video recorders and other writing tools.

(b) Questioning

An effective teacher inspires her students to enhance their scope on attitude, skills and knowledge. In the process of questioning, a teacher also guides and supervise his or her participants, channelling their thoughts and emotions towards the objectives of the lesson. On the other hand, in answering students questions, teachers ought to answer in a way that encourages students to become excellent learners. The questions asked is intended to elicit verbal responses, and questions asked can also be in the form of attributes of an effective sentence.

A few functions of questioning are inclusive of, (a) to arouse curiousty, interests and students' attention about a theme or topic of study, (b) encourage and inspire learners to learn actively as well as to develop questions from and for himself, (c) diagnose the learning difficulties faced by students and convey solutions at once, (d) design tasks and provide opportunities for students to show attitude, skills and understanding of the substance of the given instruction. According to Kementarian Pendidikan dan Keduyaan (2013), five criteria for excellent questioning technique are (a) short and clear, (b) to produce inspiring answers, (c) probing and diverging (d) is valid and reinforcing and (e) focus on attaining relevant anwers.

(c) Associating

The term associating within the framework process of learning for scientific approach in Curriculum 2013, illustrates that teachers and students are active participants rather than just merely facilitators and audience respectively. Actually, the point of focus was more certainly in many ways and situations is

that students are to be more active than teachers. Reasoning becomes a process of logic and systematic thinking over the fact that empirical words can be observed to obtain a summary of knowledge. Reasoning ought to be scientific reasoning otherwise than it will not be helpful for students.

The term association in learning refers to the ability to classify a variety of ideas and a variety of associated events and later integrate it into episodes of memory. During transfer of special events to the brain, the experience already stored can be of reference with other events. Experiences that are already stored in the memory of the brain closely related and interact with previous experience are already available. From the perspective of psychology, association refers to the connection between conceptual entities or mentally as a result of the similarities between thoughts or proximity in space and time.

(d) Practice

To obtain the results of a real or authentic learning, learners will have to experiment learned skills, especially for material or substance that is appropriate. On science subjects, for example, learners need to understand the concepts of IPA and connection with the everyday life. Learners also need to have the skills of a process to develop knowledge of the natural surroundings, as well as being able to use the scientific method and scientific attitude to solve problems faced on a daily basis.

The application of experimental methods try intended to develop a wide realm of learning objectives, i.e. the attitude, skills, and knowledge. The real learning

activity for this are: (1) determine the themes or topics in accordance with the basic competencies according to the demands of the curriculum; (2) study ways to use tools and materials that are available and must be provided; (3) learn the basic relevant theoretical and experimental results previously; (4) perform and observe the experiments; (5) note a phenomenon that happened, or analyze, and present data; (6) draw conclusions on the results of the experiment and (7) make report and communicate the results of the experiment.

In order for the implementation of the experiment to be effective: (1) teacher should formulate individual experiments aims or objectives; (2) students and teachers need prepare the equipment used (3) venue and duration of experiment needs to be decided (4) teachers to provide worksheets for student activities briefing (5) the provider will discuss Teacher who will be made the experiment (6) split the paper work to his (7) Pupils carry out experiments with teacher guidance and (8) collecting the work of Teachers and pupils evaluate, if necessary, discussed in classical.

(e) Networking

What is collaborative learning? Collaborative learning is a personal philosophy, rather than simply learning techniques in school classes. Collaboration in its essence is a philosophy of human interaction and lifestyle that places and interprets cooperation as the structure of the interactions that are well designed and deliberately mannered to facilitate collective efforts in order to achieve a common goal.

On the role of teacher authority collaborative learning teacher more directive or Manager of learning, on the contrary, participants to be more active. If learning collaborative positioned as a personal philosophy, he touched on the identity of the students especially if they relate or interact with each other or the teacher. In collaborative situations, learners interact with empathy, respect, and accept the lack or excess of each. By this means, a sense of security is developed, so it's possible the learners facing various changes and demands to learn together.

B. Relevant Researches

Akin to this study, one of the relevant research conducted recently on contextualizing instructions to improve developemental math in Carlifornia community colleges was performed by Walter Charles Wisely. The research is titled as **Effectiveness of Contextual Approaches To Developemntal Math In Carlifornia Community Colleges**. Completed in 2009, the purpose of the research was to document types of contextual approaches used in developemental education in Carlifornia community colleges and compare the effectiveness of those contextual courses to standard basic skills courses. A mixed method design was first of all used to identify colleges and course using basic skills math instruction in the context of an occupational program. Then logistic regressions was used to analyze students level data from the Carlifornia community college system office databse. Results revealed that contextualization of pre-algebra mathematics was shown to increase the likelihood of succesful remediation, accelerated entry into college-level coursework, and community colleges.

Furthermore, the contextual math instruction was found to be most effective for Black, Hispanic and other Non-White students.

The second study titled as **Effects of Contextualized Math Instruction on Problem Solving of Average and Below-Average Achieveing** Students was conducted by Brian A. Bottage. The purpose of the study was to investigate the effects of contextualized math instruction on the problem solving performance of 17 middle school students in one remedial class and 49 middle school average-achieveing students in two prealgebra classes.The study used an experimental and quasi experimental designs to compare the impact of word problem instruction and contextualized problem instruction on omputational skills and problem solving performance. Results revealed that students in the contextualized instruction programme manage to outperformed students in the word problems groups on a contextualized and transfer problems.

The third study conducted by Candace Mulcahy and Michael Krezmien of the University of Massachusetts in Amherst was published online by ProQuest on May 2009. Titled, **Effects of a Contextualized Instructional Package on the Mathematics Performance of Secondary Students With EBD**, it was designed "to evaluate the effects of teaching secondary students a contextualized instructional package with self-monitoring techiniques to solve geometry problems" (Mulcahy C.A & Krezmien M.P, 2009:141). The study employed a single-subject multiple probe across 2 participants, replicated by 2-participants design. Results provided evidence that these EBD students can improve performance on grade-appropriate measurement and geometry objectives when

instruction is delievered through contextualized instructional package, despite academic and behavioral difficulties.

C. Literature Review

Contextualized instruction in relation to the relevant researches discussed earlier has proven to be an effective method of teaching mathematics to solve associated problems. Most often the problem associated is the failure in the current model of teaching to meld the abstract concepts with the concrete applications of the various mathematics concept (Krezmien & Mulcahy, 2009; Bottage, 1999; Wisely, 2009). Thus, students are often alienated, frustrated, and bored to the point where they see no reason to continue their educational pursuits in higher education. Literature reveals the various types of subjects such as emotional and behavioral disorders (EBD) students, average and below average students, Black, Hispanic and Other Non-White students who had succeeded in their mathematics achievements due to the use of contextualized instruction. The study conducted by Krezmien & Mulcahy (2009), was constructed due to the demands of the No Child Left Behind Act of 2001, for an effective mathematics instruction on non-computational skills including the calculation of perimeter and area of polygons for students with EBD secondary grades. In the second study, the National Research Council (NRC, 1989), warned that the mathematics skills of American Children were woefully inadequate for the kinds of problem solving required in the workplace (Bottage, 1999). Wherelse, Wisely (2009) argues that limited research had cited certain forms of developmental education such as

linked and hybrid courses where foundational academic skills are studied in context and where applied learning occurs. Given the various problems discussed in the three studies, outcome obtained revealed the same result.

Results revealed that there has always been a positive association between contextualized instructions with improved mathematics achievement. This is also supported by Johnson (2002: 82), as she presents CTL as the "best pathway to true academic excellence in which the process yields deep knowledge and varied skills that defy standardized measures". This indicates the possibility of the same outcome occurring for the current study. In terms of research methodology, experimental research methods had often been employed to prove these investigations. Literature is flooded with researchers of the same concept inspired by finding effects of contextualized instruction despite results of previous studies, (Bottage, 1999; Eck, 2006; Krezmien & Mulcahy, 2009; Perin, 2011; Wisely, 2009). Thus, the lack of published article in literature on the development of contextual based teaching materials that can be used for resources in schools. The development of contextualized based teaching materials can motivate potential investigators to review and design various contexts related to the particular mathematics concept. Results on the latter should be able to initiate the designing of a curriculum that can present all mathematics concepts concretely. Since, middle school graders would still be making decisions on their potential career opportunities, it is at this stage that abstract mathematics concept can be dressed up to represent context that can motivate them to pursue further in learning. There is a need for longitudinal studies of which researchers can collect information's

regarding all mathematical activities that occurs in all sorts of career and make connections of all these activities to appropriate mathematics concepts

Furthermore, the developments of contextualized teaching materials to not only improve cognitive development but affective as well still needs to be studied further. ."Two components of contextual teaching and learning system-self regulated learning and collaboration-especially warranted careful study" (Johnson, 2002:81). She further elaborates that self –regulated learning features active, independent inquiry which connects academic study with daily life in meaningful ways to achieve a significant purpose. Thus, due to limited time provision, this study focuses on the characteristics of developing contextual based teaching materials to enhance students mathematics self efficacy and students mathematics achievement in algebra.

D. Research Question

There were two research questions that guided the progress of this study. These research questions will focus on the enhancement of students self efficacy and mathematics achievement in algebra after the intervention utilizing the developed contextual based teaching material. The two research questions were:

1. Will the developed contextualized based teaching materials in algebra be valid, practical and effective?
2. Will the valid, practical and effective developed products enhance students self efficacy and mathematics achievement in algebra?

CHAPTER III
RESEARCH METHODS

A. Development Model

Educational design research is the systematic study of designing, developing and evaluating educational interventions as solutions for complex problems in educational practice, (Plomp, 2007: 9). In this study, contextual based teaching materials was designed and developed to enhance students self efficacy and mathematics achievement in algebra in grade 7 of middle school. As mentioned ealier the developed products were inclusive of: (1) students textbook, (2) teachers lesson plan and (3) students worksheet. The instruments constructed were inclusive of (1) validation evaluation sheets to gather data on the validity of the products, (2) practicality evalutaion sheets to gather data on the practicality of the teaching and learning process of the contextual teaching and learning approach (3) the tests and non tests conducted to gather data on the effectivity of the products.

The development model used, was a modified model of Plomp, design to suit the development process of the study. The four phases of the models presented in Figure 1 were all facilitated to determine the final product and at the same time find the characteristics of contextual teaching and learning in students self efficacy and mathematics achievement in algebra.

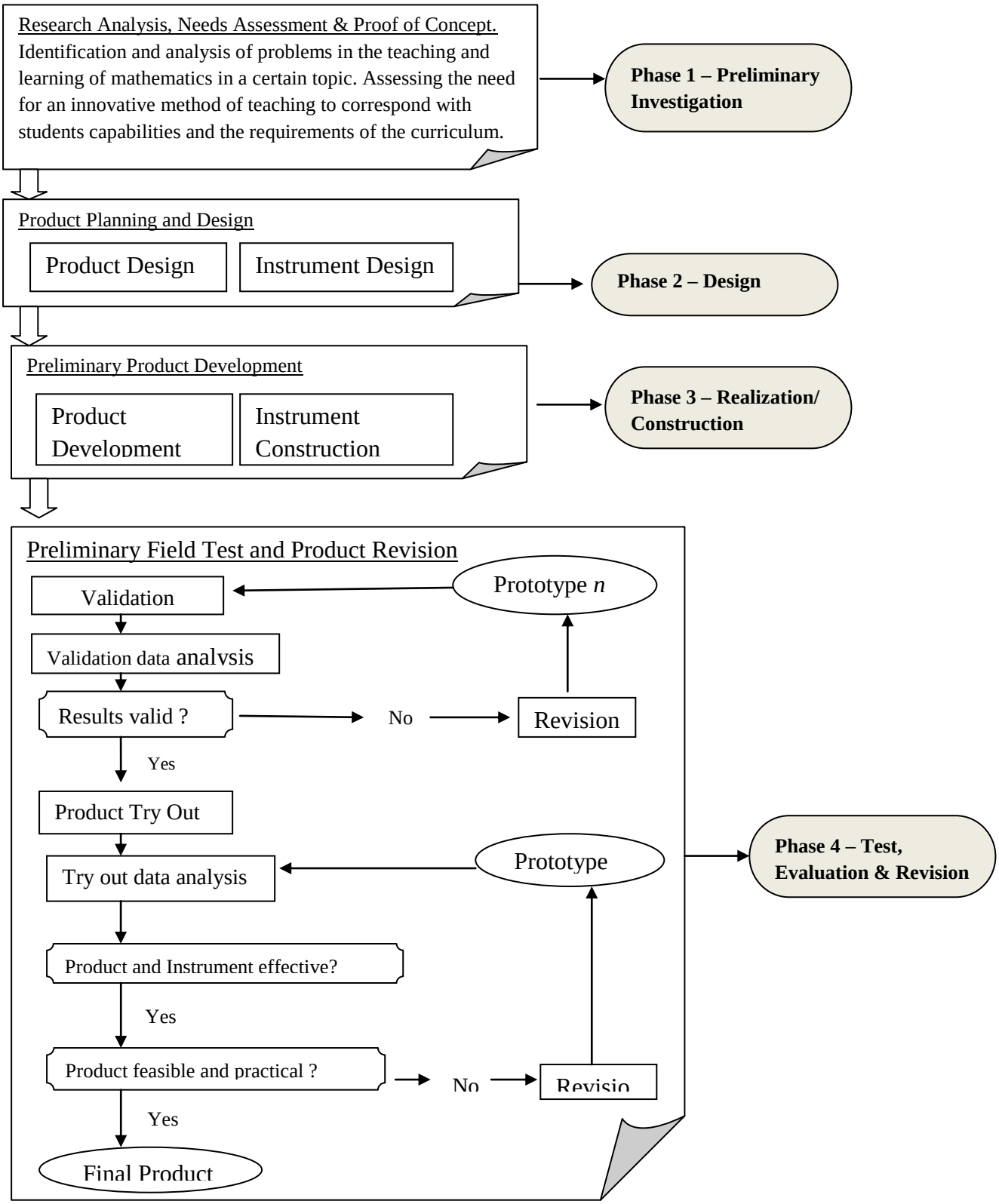

Figure 1 Research and Development Model

B. Development Procedure

The four phases of development specified above was used to research and develop contextual based teaching materials as intervention to the problems faced by students in understanding algebraic concepts.

1. Phase 1 – Preliminary Investigation

The survey conducted prior to the formation of this study reveals that students finds algebra to be one of the challenging topics for the semester. An interview conducted with the teacher revealed that algebraic concepts was needed to be expressed in other innovative ways from its usual definition as a mathematics concept. The students in other words were becoming weary and bored of concepts being defined abstractedly. In addition, the capability of the teacher to use innovative techniques to deliver mathematical concepts succesfully were still insufficient as most teachers had been teaching for decades and are yet to be updated with the latest teaching and learning theories with their corresponding strategies. Results from the survey reveals that majority of the students finds teaching and learning boring when it becomes teacher centred most of the time during the class. Students felt that the teacher needs to be more innovative with his teaching technique in order to keep them motivated during the teaching and learning process. The data from this survey was analysed and presented as information to support the proposal of this thesis. This initial problem contributes to the formation of an innovative teaching technique to facilitate students in understanding mathematical concepts better. In addition to the latter, other problems identified includes, below average results in local examinations and

international mathematic competition such as TIMMS and PISA which are further specified in Chapter 1.

2. Phase 2 – Design

Theories associated with contextual teaching and learning is similar to realistic mathematics education which is a method of teaching being practised in Indonesia for the last couple of years as an innovative method used to counter the mathematics difficulties in the country (Turmudi, 2009). Based on the latter, contextual teaching and learning strategies using the five steps introduced by Cord was utilized on the algebraic materials considering the culture and personal background of the students. Since most of the subjects lived around the city with parents working as traders and merchants, the context used to introduced the mathematical concepts was designed to suit their daily living situations and their future carrer aspirations. The intention of the types of carrer used in the context was to enhance students self efficacy, enabling them to see algebra as a material that will be useful in their future. In addition, the use of authentic assessment and the scientific method of learning to accompany contextual teaching and learning was used to keep the students involved in the teaching and learning process, thus a shift from teacher centred to student centred learning. Theories and methods specified in Chapter 2 was used to assist in the designing and developing of the materials.

c. Phase 3 – Realization/ Construction

The result of this phase is Prototype 1. The three products developed consisted of the: (1) students textbook, (2) teachers lesson plan, and (3) students worksheet. The instruments constructed to collect students self efficacy and mathematics achievement in algebra were the students mathematics self efficacy questionnaire and the achievement test respectively. The students textbook was developed to facilitate the 5 elements of contextual teaching and learning used for this study considering contexts that were familliar to the students. The teachers lesson plan was prepared in correspondence to the standards required by curriculum 2013. The steps used in the teachers lesson plan in correpondence with the teachers book to encompass an inquiry method of learning through the scientific method where the teacher acts as a facilitator in carrying out the teaching and learning activities. The teachers leasson plan includes authentic assessments in terms of short test at beginning of every class and evaluations of their presentation skills for algebraic concepts that were needed to be explained and demonstrated for better understanding. The students worksheet was developed to use the five characteristics of scientific method inclusive of: (1) observing, (2) questioning, (3) association, (4) experience and (5) presentation. This was done through co-operative learning method of Learning Together.

d. Phase 4 – Validations, Test, Evaluation and Revision

This phase encompasses 3 main process.

(1) the validation process – the validation process requires the validators who are experts in specific field of education incorrespondence with the topic of our thesis

and the type of research to review and evaluate prototype 1. Discussions and changes were made within the product to suit the validators layout in relation to the theory of learning used for the development. At the end of the validation process, the overall evaluation of the validator was to decide whether the product was fit to be used for trial out, needed to be revised before trial out or is not fit to be used at all for trial out. The result from this validation process became prototype 2.

(2) the trial out of the product – the product was trialed out on subjects of 32 students. Since the students had already covered algebra in first semester, the main objective of the try-out on this study was to investigate the effectiveness of a different method of teaching on algebra and also its characteristics on the self efficacy and achivements of students in algebra.

(3) evaluation and revision process before being used in the main field – the result of this process was prototype 3. This was obtained after the trial out and analysis were made of the feasibility and practicality of the product from the teacher and students respectively.

C. Product Try Out

1. Product Try-Out Design

The main objective of the product try-out was to determine the validity , practicality and effectivity of the product. The two main stages involved were inclusive of the validation process and the field try out.

Validations

The products that were developed during the Phase 2 of the development procedure were needed to be validated. The validity of the product were determined by the mathematics education lecturers who were experts in the filed of study depending on the type of research and the theories and strategies involved in the various studies. The validators overall evaluation were to determined whether the products and the instruments were suitable to be used for the field try out or needed to be revised.

Field Try Out

After the products were validated, it was then tried out at the school. The main objective of this try out for this study was to determine its practicality and effectivity by the students and the mathematics teacher. Before the try out students were given the students mathemathematics self efficacy pre-test questionnaire. During the try out, obeservations were also made on the process of the teaching and learning activity carried out by the teacher and students response to the new method of teaching and learning inclusive of the authentic assessments.

2. Try-Out Subjects

The subjects used for this research were the students and mathematics teacher of class 7C in SMPN 2 Mlati, Sleman, Yogyakarta for academic year 2013/2014. There were 32 students altogether, with 20 females and 12 males. There was only one mathematics teacher assigned to the three stream of class 7 at SMPN 2 Mlati.

3. Types of Data

The types of data collected for the study were both qualitative and quantitative. The qualitative data consists of the: (1) evaluations from the validators regarding the product and the content validity of the self efficacy questionnaires and the achievement tests , (2) evaluations from the teachers and students regarding the effectivity and the practicality of the product and (3) observations about the teaching and learning process. The quantitative data consisted of: (1) data from the students mathematics self efficacy questionnaire and (2) data on the achievement test conducted at the end of the study and (3) data on the formative assessments in the form of short tests performed during the try-out.

4. Techniques and Data Collection Instruments

The types of data collection instruments for the study were classified into 3 categories in terms of the products validity, effectivity and praticality. Instruments constructed to evaluate the validity of the product were inclusive of the validation sheets for the; (1) students textbook, (2) teachers lesson plan, (3) students worksheets, (4) students mathematics self efficacy questionnaire and, (5) the validatioin sheet for the achievement test. The evaluation instruments constructed to determine the effectivity of the product incorporating CTL approach consisted of the; (1) students mathematics self efficacy questionnaire pre and post test, (2) short tests conducted at the beginning of each lesson and, (3) the achievement test. For the practicality of the product incorporating CTL, instruments constructed were inclusive of the; (1) teacher's evaluation sheet for the ST, TLP, SW and AT,

(2) teacher's questionnaire for the lesson procedures and (3) students questionnaire about the ST , SW and the lesson procedures.

Instruments for Evaluating the Validity of the Developed Products.

1. Students Book Validation Sheet.

The students textbook validation sheet was prepared to determine the validity of the book for utilization in the try-out field. There were four aspects needed to be validated to determine the validity of the students book. These were inclusive of: (1) students book format, (2) contents of the book, (3) language and writing with (4) illustrations, table arrangements, pictures and graphs. The validator's evaluation on the contents of these aspects were of a choice on 5 point scale listed as poor (value = 1.); statisfactory (value = 2); good (value = 3); very good (value = 4) and excellent (value = 5). The validator's overall assessment were then to determine whether the product is suitable to be used for try-out or needed further revision before being tried-out.

2. Teachers Lesson Plan Validation Sheet.

The teachers lesson plan validation sheet was prepared to determine the validity of the contents of the teachers lesson plan in terms of the teaching and learning activities that was carried out by the teacher in correspondence to the students book and the students worksheet. The aspects that were needed to be evaluated by the validators were inclusive of the (1) lesson identification, (2) achievement indicators, (3) learning objectives, (4) teaching materials, (5) teaching and learning process and (6) class assessments. Similar to the students textbook validation sheet evaluation, the validator had to choose from a 5 point

scale of poor (value = 1); satisfactory (value = 2.); good (value = 3); very good (value = 4) and excellent (value = 5). The validator's overall assessment was to decide whether the teachers lesson plan is suitable for try-out or needed revision before being tried-out.

3. Students Worksheet Validation Sheet.

The students worksheet was prepared to fulfill the scientific method of learning which consisted of 5 steps inclusive of observations, questioning, associations, practise and presentations. The students worksheet validation sheet was then prepared to determine the validity and suitability of the developed strategy for try-out. The aspects content includes the (1) contents of the students worksheet, (2) presentation and (3) language used to suit students understanding. The validator's evaluation and overall assessment for the students worksheet were similar to that of the students textbook and teachers lesson plan.

Instruments for Evaluating the Effectivenes of the Developed Product.

There were 3 types of instruments prepared to collect data on the effectiveness of the product inclusive of the (1) students mathematics self efficacy pre and post test, (2) the short test conducted at beginning of each class and (3) the achivement test.

1. Students Mathematics Self Efficacy Pre and Post Test.

The students self efficacy questionnaires was distributed to students at the beginning and towards the end of the intervention. The main objective of the students self efficacy questionnaire was to investigate the characteristics of the

developed contextual teaching materials incorporation with authentic assessment and scientific method of learning on the self efficacy of the students. The affective domains prepared to evaluate the affective characteristics of the students were inclusive of their performance and behaviour. The specific aspects evaluating students characteristics consisted of the students confidence in attempting algebraic problems and confidence in organizing themselves to learn algebra. Table 4 below specifies the components of the questionnaire which was presented both as pre-test and post-test.

The two sections of the questionnaire consisted of (1) students confidence in completing the test problems, self regulation in studying algebra and completing home works and the cooperative learning done in class, and (2) students confidence in obtaining the marks provided on the questionnaire, from the achievement test. A 5 point likert scale was prepared for the subjects to evaluate their confidence in the 40 item questionnaire ranging from not confident at al (value =1), not confident (value =2), least confident (value =3), confident (value =4) and very confident (value =5).

Tabel 4
Blue Print of the Students Math Self Efficacy Questionnaire (Section A)

Domains	**Aspects of Self Efficacy**	**Judgemental Factors**	**No. Of Item**	**Item No.**
Performance	Self efficacy on attempting algebraic problems.	1. Perceived capability in achieving good grades in algebra	2	1,20,
		2. Perceived capability in simplifying	8	21,23, 24, 25, 26, 27, 28, 30

		mathematical algebraic expression.		
		3. Perceived capability on solving contextual algebraic problems.	5	22,17, 18, 19,29
Behaviour	Self efficacy in organizing oneself to learn algebra.	4. Perceived capability to contribute during group work.	2	3, 6
		5. Perceived capability to complete home works and assignments independently.	4	7, 8,9,10
		6. Self regulation in learning.	6	4, 12, 13,14,15,16
		7. Perceived capability to overcome difficulty independently.	3	2, 5,11,

2. The Short Tests

The formative assesments in the form of short tests were given out during the beginning of each class to determine the students capabilities in fulfilling the achievement indicators of the previous lesson. There were 5 tests altogether in correspondence to the five lessons that were developed inclusive of (1) identifying the elements of an algebraic expression, (2) adding, subtracting, multiplying and dividing monomials, (3) adding, subtracting, multiplying and dividing algebraic fractions, (4) solving linear equations in one variable and (5) solving linear inequations of one variable. The short tests format was designed considering the indicators associated with mathematical concept to be tested. Thus, short test 2, 4

and 5 were prepared as multiple choice questions whilst short test 1 and 3 were short answer questions in which students were required to write down their working as part of their answers.

3. The Achievement Tests

The summative assessment in the form of an achievement test was conducted at the end of the intervention to determine the subjects overall capabilities in algebra to basic competences 2.1, 2.2, 2.3, 2.4, 3.1 and 3.2 in curriculum 2006 in using contextual teaching and learning approach. The achievement test validation sheet was also prepared to determine the content validity of the achievement test in relation to the blue print prepared and the achievement indicators of each lesson. The two aspects needed to be validated for the validity of the achievement test consisted of (1) the blue print prepared and (2) the content of the achievement test which encompasses the 20 multiple choice items as specified in Table 5.

Tabel 5
Blue Print Summary of the Achievement Test

Basic Competence	**Achievement Indicators**	**No. Of Items**
2.1 Identifying algebraic expression and its elements.	Identify elements of algebraic expression	3
2.2 Perform arithmetic operations on algebraic expressions.	- Add and subtract algebraic expression. - Multiply and divide monomials -Add and subtract algebraic fractions -Multiply and divide algebraic fractions	7
2.3 Solve linear equations of one variabel .	Solve linear equation	2
2.4 Solve linear inequations of one variabel.	Solve linear inequation	2
3.1 Formulate mathematical models	-Model algebraic expression	4

from real world problems that are related to linear equation and solve them.	from real world problems and solve them. - Model algebraic expression equation from real world problems and solve them	
3.2 Formulate mathematical models from real world situations that are related to linear inequations and solve them.	Model algebraic expression inequation from real world problems and solve them	2

The achievement test was the last instrument distributed to students to collect data on the effects of the contextual teaching and learning approach for the study. The duration of the test was 40 mins on a 20 multiple choice item.

Instruments for Evaluating the Practicality of the Developed Product.

Instruments that were used to evaluate the practicality of the developed contextual based teaching materials and the teaching and learning process with scientific method of learning were:

1. Teacher's Evaluation Sheet on the Students Textbook (ST), Teachers Lesson Plan (TLP), Students Worksheet (SW) and the Achievement Test (AT).

This instrument was prepared to obtain data about the teachers evaluation on the practicality of the developed products and the achievement test. The aspects components that were needed to be evaluated by the teacher for the ST, TLP, SW and AT were almost similar to each other. The most commonly used were (1) clarity in the components of the ST, TLP, SW and AT, (2) that the developed teaching materials is in accordance with the standard competence and basic competence of the curriculum currently utilized by the school and (3) the

language used is in consistent with the Indonesian language principles. The teacher was to evaluate the aspects provided on a 5 point evaluation scale ranging from: is not feasible (value =1); probable feasibilty (value =2); feasible (value =3); most certainly feasible (value =4) and, is certainly feasible (value =5).

2. Teacher's Questionnaire on the Implementation of the Teaching and Learning Process.

This instrument was prepared to obtain data on the teachers evaluation about the actual implementation of the teaching and learning process using the contextual teaching and learning approach with scientific method for the students in completing the students worksheet. The teacher used this instrument for the overall assessment on the five lessons performed. The aspects that needed to be evaluted for the praticality of the lessons consisted of (1) orientation (opening activities), (2) representing the required competences and learning activities, (3) contents of the lesson, (4) application of the scientific method, (5) students involvement in learning and the (6) closing activity. The teacher was to evaluate the aspects provided on a 5 point evaluation scale ranging from: is not feasible (value =1); probable feasibility (value =2); feasibile (value =3); most certainly feasible (value =4) and, is certainly feasible (value =5).

3. Students Evaluation Sheet on the Teaching and Learning Process using the Contextual Teaching and Learning Approach.

This instrument was prepared to obtain data of students opinions on the whole teaching and learning process of the (CTL) approach and in using scientific method on the SW. Techiniques used was to give out the questionnaire at the end

of the fifth lessons and they were asked to make a general evaluation depending on the aspects provided on the questionnaire. Aspects that were needed to be evaluated consisted of (1) the teaching and learning process, (2) the activities and steps conducted within the SW and (3) the ST. A 5 point evaluation scale was provided on the questionnaire for the students to choose from.

5. Techniques and Data Analysis

Analysing the data for the study was to answer the research questions formulated in Chapter 2 which was to investigate the characterisitics of the developed contextual teaching materials on the self efficacy and mathematics achievement of the students in algebra. Data collected, that was to contribute to the revision of the product being developed was classified as qualitative descriptive data which requires evaluators to comment and provide reccomendations on the products through out the try-out period. Whilst the achievement test results and the students self efficacy pre and post test questionnaire were classified under descriptive statistics. The technique used to analyse data on all the products validation sheets, the teacher's evaluations on the products, teachers questionnaire on the lesson procedure and on all students questionnaire was a method presented by Saifuddin Azwar (2010: 163). Table 6 below specifies the evaluation criteria.

Tabel 6
Validation Criteria for the Contextual Teaching Materials

Grade	Interval Score	Category
A	$X > \bar{X}i + 1.5\ isd$	Excellent
B	$\bar{X}i + 0.5isd < X \leq \bar{X}i + 1.5isd$	Very Good
C	$\bar{X}i - 0.5isd < X \leq \bar{X}i + 0.5isd$	Good
D	$\bar{X}i - 1.5isd < X \leq \bar{X}i - 0.5isd$	Statisfactory
E	$X \leq \bar{X}i - 1.5\ isd$	Poor

Key:

$\bar{X}i =$ ideal average score = ½ (maximum ideal score + minimum ideal score).

$isd =$ ideal standard deviation = $\frac{1}{6}$ (maximum ideal score – minimum ideal score).

$X =$ actual score.

Contextual Teaching Materials/ Learning Materials Validity Analysis

Validation data from the developed contextual materials inclusive of the (1) students textbook (ST), (2) teachers lesson plan (TLP) and (3) students worksheet (SW) were analysed using the validation criteria presented in Table 6. Each aspect content was validated on a five point scale ranging from excellent (value =5), very good (value =4), good (value =3), satisfactory (value =2) and poor (value =1). Values for the ideal average score ($\bar{X}i$) and ideal standard deviation for all the products were analysed and presented in Table 7. The obtained quantitative data was then translated to qualitative data to determine the quality of the products as presented in Table 8.

Tabel 7
Values of $\bar{X}$ *i* and *isd* for all the Products Validity.

Product	No.OfItems	Max Score	Min Score	$\bar{X}i$	isd
ST	20	100	20	60	13.3
TLP	18	180	36	108	24
SW	13	130	26	78	7.3

Tabel 8
Products Validity Criteria Interval (Converting Quantitative Data To Qualitative Data)

ST	TLP	SW	Category	Grade
$X > 79.95$	$X > 144$	$X > 104$	Excellent	**A**
$66.65 < X \leq 79.95$	$120 < X \leq 144$	$86.7 < X \leq 104$	Very Good	**B**
$53.35 < X \leq 66.65$	$96 < X \leq 120$	$69.4 < X \leq 86.7$	Good	**C**
$40.05 < X \leq 53.35$	$72 < X \leq 96$	$52 < X \leq 69.4$	Satisfactory	**D**
$X \leq 40.05$	$X \leq 72$	$X \leq 52$	Poor	**E**

Apart from evaluating each aspect content in each of the developed teaching materials, the validators were then to determine whether the products were fit to be used for try-out or needed revision before tried-out. Each aspect content was analysed according to the validation criteria presented in Tabel 8, whilst the analysed overall score for each product determined the validity of the product. The minimum grade decided for a product to be valid was Grade B. However, if the overall analysis of a particular product falls under Grade C, D or E, then the particular developed product were to be revised in order to meet the minimum evaluation.

Learning Effectiveness Analysis

Datas that were analysed to determine the effectivity of the developed product during and after the intervention were inclusive of (1) data from the short tests and achievement test (AT), and (2) data from the students self efficacy pre and post test.

1. Short Test and Achievement Test Analysis

The formative and summative assessments in the form of short tests and achievement tests were conduted during and after the try-out period respectively. The short tests were given out at the beginning of each lesson to test the achievement indicators of the previous lesson, whilst the achievement test was given out after the whole process of intervention to determine the subjects overall achievement in algebra. The following steps were undertaken to analyze the results of both the tests.

a) Recorded the raw marks obtained by each student.

b) Convert the raw marks obtained to 100%.

c) Determine the number of students who fulfill the requirements of the Minimal Completion Criteria (MCC) of the school.

At the end of this analysis the developed product inclusive of the students textbook (ST), the teachers lesson plan (TLP) and the students worksheet (SW) was said to be effective if the number of students who met the MCC would be at least 75%.

2. Students Mathematics Self Efficacy Pre and Post Test

The students self efficacy pre and post test data was analysed to investigate the characteristics of the developed contextual based teaching materials on the self efficacy of the subjects. The pre test was conducted prior the intervention whilst the post test was conducted after the intervention before the achievement test was given out. A Likert Scale of 5 points was provided for the students to evaluate their self efficacy which consisted of: not confident at all (value =1); not confident (value =2); least confident (value =3); confident (value =4) and very confident (value =5). The total scores for the self efficacy questionnaire ranges from 30 to 150 as the minimum and maximum scores respectively. Using methods represented by Saifuddin Azwar (2010), the ideal average score ($\bar{X}$ i) and the ideal standard deviation (isd) were calculated as : $\bar{X}\ i$ = (150 + 30)/ 2 = 90 and the isd = (150 – 30)/ 6 = 20. Data collected on both the pre and post test of the questionnaire, Section A was then analyzed using Table 9.

Tabel 9
Students Mathematics Evalutaion Self Efficacy Criteria

Interval Score	Score (X)	Category	Grade
$X > \bar{X}i + 1.5sdi$	$X > 165$	Excellent	**A**
$\bar{X}i + 0.5isd < X \leq \bar{X}i + 1.5isd$	100 < X ≤ 165	Very Good	**B**
$\bar{X}i - 0.5isd < X \leq \bar{X}i + 0.5isd$	70 < X ≤ 100	Good	**C**
$\bar{X}i - 1.5isd < X \leq \bar{X}i - 0.5isd$	60 < X ≤ 70	Satisfactory	**D**
$X \leq \bar{X}i - 1.5\ isd$	X ≤ 60	Poor	**E**

In correspondence to the developed teaching materials, the results of the students self efficacy on pre test was compared to that of post test and

conclusions were made on the increase in number of students in the 5 levels of learning. The developed product was classified effective if there was an increase in the number of mastery learning in the post test compared to the pre test and there would be at least 75% of the students over grade C.

Learning Practicality Analysis

Data analyzed to prove the practicality of the products and the teaching and learning process using the developed products were obtained from instruments on (1) teacher's evaluation sheet on the ST, TLP, SW and the AT, (2) teacher's questionnaire on the implementation of the teaching and learning process and (3) students evaluation sheet about the teaching and learning process.

1. Teacher's Evaluation Sheet on the ST, TLP, SW and AT.

Table 10 presents the only mathematics teacher for class 7 at the school who and also the subjects mathematics teacher who evaluated the ST, TLP, SW and the AT towards the end of the intervention.

Tabel 10
Name and Positions of Teachers

Name	**Position**
Drs Sujono NIP. 196306031998021001	Mathematics teacher for Class 7A, 7B, 7C and 7D

The ideal average score and the ideal standard deviation for the ST, TLP, SW and AT is presented in Table 11 whilst the practical criteria for each of the aspect is presented in Table 12.

Tabel 11
Values of $\bar{X}$ *i* and *isd* for all the Products Practicality

Product	No. Of Items	Max Score	Min Score	$\bar{X}i$	*isd*
ST	6	30	6	18	4
TLP	7	35	7	21	4.67
SW	5	25	5	15	3.33
AT	6	30	6	18	4

Tabel 12
Analysis Criteria on the ST, TLP, SW and AT Practicality

ST	TLP	SW	AT	Category	Grade
X > 24	X < 28	X > 20	X > 24	is certainly feasible	**A**
20 < X ≤ 24	23.3 < X < 28	16.7 < X ≤ 20	20 < X ≤ 24	most probably feasible	**B**
16 < X ≤ 20	18.7 < X ≤ 23.3	13.35 < X ≤ 16.7	16 < X ≤ 20	feasible	**C**
12 < X ≤ 16	14 < X ≤ 18.7	10 < X ≤ 13.4	12 < X ≤ 16	probable feasibility	**D**
X < 12	X ≤ 14	X ≤ 10	X ≤ 12	Is not feasible	**E**

2. Teacher's Questionnaire on the Teaching and Learning Process

Data analyzed to prove the practicality of the teaching and learning process of the CTL approach with scientific method of learning was done according to the evaluation criteria in Table 13. The ideal average score and the ideal standard deviation for each of the aspects evaluated are presented in Table 14.

Tabel 13
Value of Xi and isd for each Aspect on Teachers Questionnaire

No	Evaluated Aspects	No. Of Items	Max Score	Min Score	$\bar{X}i$	isd
1	Orientation	5	50	10	30	6.67
2	Contents of the lesson	4	40	8	24	5.34
3	Presenting the competences.	2	20	4	12	2.66
4	Implementation of educational learning strategy	6	60	12	36	8
5	Application of Scientific Method	7	70	14	42	9.34
6	Students Involvement in Learning	3	30	6	18	4
7	Closing Activity	4	40	8	24	5.34

Tabel 14

Analysis Criteria of the Practicality on the Teaching and Learning Process

Orientation	Learning Activities Presentation	Lesson Content	Implementation of learning strategy	Application of Scientific Method	Students Involvement in Learning	Closing Activity	Criteria
$X > 40$	$X > 16$	$X > 28$	$X > 48$	$X > 56$	$X > 24$	$X > 28$	certainly feasible
$33.34 < X \leq 40$	$13.34 < X \leq 16$	$25.33 < X \leq 28$	$40 < X \leq 48$	$46.7 < X \leq 56$	$20 < X \leq 24$	$25.33 < X \leq 28$	most probably feasible
$26.68 < X \leq 33.3$	$10.67 < X < 13.34$	$22.67 < X \leq 25.33$	$32 < X \leq 40$	$37.3 < X \leq 46.7$	$16 < X < 20$	$22.67 < X \leq 25.33$	feasible
$20 < X \leq 26.68$	$8 < X \leq 10.67$	$20 < X \leq 22.67$	$24 < X \leq 32$	$28 < X \leq 37.3$	$12 < X \leq 16$	$20 < X \leq 22.67$	probable feasibility
$X \leq 20$	$X \leq 8$	$X \leq 20$	$X \leq 24$	$X \leq 28$	$X \leq 12$	$X \leq 20$	is not feasible

3. Students Evaluation Sheet about the Teaching and Learning Process

Students evaluations on the teaching and learning process was also analysed to determine their approval of the students worksheet and the students book. The three sections of the students questionnaire that needed to be evaluated were inclusive of; (1) the teaching and learning activities; (2) the students worksheet and its contents; (3) the students textbook. These three sections were analysed separately with values of ideal average score and ideal standard deviation depicted on Table 15. The practicality criteria are presented on Table 16.

Tabel 15

Values of $\bar{X}$i and isd on Students Evalutions

Aspects	Number of Items	Max Score	Min Score	$\bar{X}i$	isd
Teaching & Learning Activity	6	960	192	576	128
Students Worksheet	6	960	192	576	128
Students Textbook	5	800	160	480	106.7
Overall	17	2720	544	1632	362.7

Tabel 16
Students Evaluations Analysis Criteria

Teacching and Learning Activity	Students Worksheet	Students Textbook	Overall	Category	Grade
X > 768	X > 768	X > 640.1	X > 2176.1	is certainly feasible	**A**
640 < X ≤768	640 < X ≤ 768	533.4 < X ≤ 640.1	1813.4 < X ≤ 2176.1	most probably feasible	**B**
512 < X ≤ 640	512 < X ≤ 640	426.7 < X ≤ 533.4	1450.7 < X ≤ 1813.4	feasible	**C**
384 < X ≤ 512	384 < X ≤ 512	320 < X ≤ 426.7	1088 < X ≤ 1450.7	probable feasibility	**D**
X ≤ 384	X ≤ 384	X ≤ 320	X ≤ 1088	is not feasible	**E**

6. Reliability and Validity

The two main instruments which are the students self efficacy questionnaire and the achievement test were subjected to validity and reliability.

1. Validity

The two instruments were first of all subjected to content validity, which was completed during the validation process. The self efficacy results was further subjected to construct validity which revealed a KMO of 0.565, concluding the middling worthiness of the instrument. Factor analysis on the item revealed that no items were to be removed and there was a derived empirical constructs of 9 factors compared to the judgemental developed content of 7 factors as presented in Table 17.

2. Reliability

For the achievement test, reliability coefficient of 0.578 was obtained during the item analysis which confirmed the reliability of the achievement test instrument. Wherelse in the self efficacy results the Cronbach alpha of 0.879 during the factor analysis reveals the reliability of the instrument**.**

Table 17
Judgemental and Empirical Factors of Self Efficacy

Aspects of Self Efficacy for Judgemental Factors	**Judgemental Factors**	**Aspects Self Efficacy for Empirical Factors**	**Empirical Factors**
Self efficacy on attempting algebraic problems.	1. Perceived capability in achieving good grades in algebra	Self efficacy on problem solving	1. Achieving good grades in algebra test.
	2. Perceived capability in simplifying mathematical algebraic expression.		2. Elements of CTL.
	3. Perceived capability on solving contextual algebraic problems.		3. Understanding algebraic concept
Self efficacy in organizing oneself to learn algebra.	4. Perceived capability to contribute during group work.		4. Solving contextual problem
	5. Perceived capability to complete home works and assignments independently.		5. Simplifying mathematical algebraic problems
	6. Self regulation in learning.	Self regulating	1. Group work
	7. Perceived capability to overcome difficulty independently.		2. Home work & assignment.
			3. Self regulation
			4. Difficulty

CHAPTER IV
RESULTS ANALYSIS AND DISCUSSION

Given that the objective of the study was to develop contextual teaching based materials, authentic assessment with the utilization of scientific method was also utilized to assist in enhancing students self efficacy and mathematics achievement in algebra. The procedures of development obtained data on the validity, practicality and effectivity of the developed products. The process of development initiated in February, 2014.

Results of the study was obtained after all the development procedures were undertaken which described the analysis done on the products validity, practicality and effectivity during and after trial out. The procedures of obtaining data and analysis are further specified below.

A. Research and Design Procedure

This study utilized Plomp's (2007) development model, modified to suit the designated process for the study. The development procedures consisted of (1) preliminary investigation, (2) design, (3) realization/ construction and the (4) test, evaluation and revision phase.

1. Preliminary Studies

Preliminary studies prior to the developement of this study reveals that students at the school were finding difficulty in understanding the concepts of algebra when being taught abstractedly. The problem surfaced after an action research was conducted in the school to incorporate the use of co-operative learning to enhance students achivements in algebra. Data anaylsis on results in

questionnaires given to students reveals students casual attitudes in mathematics classes. This was due to lack of understanding in the studied concepts because they do not find a connection between the concepts with their daily life situations neither any use to their future. The normal or traditional methods of learning used in the classroom were not of much assistance in students motivation. In addition, teacher's capabilities in solving the latter, was inadequate due to lack of professional development.

Studied theories and innovative methods of teaching obtained during coursework assists in embedding constructive theory as the main pillar of the study. Results from a series of literature review, indicated effective methods of contextualized instruction in middle school which is also an important motivation tool for the students (Krezmien & Mulcahy, 2009; Bottge B, 1999; Wisely W.C, 2009).

2. Planning Stage

Results of the planning stage was collected for information in assisting the development of prototype 1. Relevant basic competences of the study was choosen in relation to its appropriate standard competence. The basic competences and standard competences used had to be of those currently utilized by the school. The decision to remain with algebra as the learning material used for this research, though it was already covered in school was to investigate the differences in methods of teaching and learning. Also to compare the students attitude and mathematics achievement between the previous methods used by the teacher with the innovative methods developed in this study.

Formulation of the achievement indicators and lesson objective was done to suit the basic competence involved considering the theories and assessment methods of the study. However, all these, formulations of achievement indicators and lesson objectives considered the standards required by the Indonesian education system for middle school in terms of the standard contents of mathematics classes.

3. Initial Products Development

The techniques used to develop students textbook, teachers lesson plan and students worksheets are further specified as follows:

a. Techniques In Designing Students Textbook.

The designing of a students textbook was necessary as it would become an accesible learning tool for the students compared to the teachers lesson plan and the students worksheet. The students textbook ought to be the main tool of which students would always refer to for reference in terms of understanding the mathematical concepts. The following steps was undertaken in designing students textbook prototype 1:

1. Identifying the basic competences relevant to the study.
2. List achievement indicators associated with the basic competences.
3. List the mathematical concepts relevant to the fulfillment of the achievement indicators.
4. Review the current textbook used by the student for comparison purposes.

5. Considering the theories and strategies of the study design contextual situations appropriate to every listed mathematical concept considering the culture and customs of Indonesia.
6. Writing the book, considering the format used by current textbook but using contextual examples and exercises as assignments and homework.

b. Techniques In Designing Teachers Lesson Plan.

The teachers lesson plan was designed according to the Indonesian standard of teachers lesson plan considering the innovative methods of the study. Altogether there were 5 teachers lesson plan developed with respect to basic competences 2.1, 2.2, 2.3, 2.4, 3.1 and 3.2. on the algebra which also consisted of linear and non-linear equation of one variable. Each teachers lesson plan consisted of 9 main components.

The first component of teachers lesson plan were inclusive of the name of the school, topic to be studied, time allocation, semester and class. The other components were inclusive of the standard competence, the basic competence, achievement indicators, lesson objective, mathematical concept for the lesson, learning methods, teaching and learning activity and the assessment strategies.

Some of the modifications done to the teachers lesson plan during the process of validations were inclusive of:

1. Specifying the achivement indicators to suit the basic competences used
2. Reviewing the allocation of time on each lesson so that it can cater for all the activities to be done in the class.

3. Rearranging the events within the teaching and learning activities to suit the methods of scientific learning for the students worksheet in relation to the 5 characteristics of CTL used in the students book.
4. Reviewing the questions and methods of assessment prepared as short tests and observation sheets to suit the requirements of authentic assessments.
5. Reviewing the answer and marking sheet.

The results of the validations were determined on the evaluations done on the 6 aspects prepared for validity purposes.

c. Techniques In Designing Students Worksheet

The students worksheet was designed to fulfill the requirements of the achievement indicators considering the 5 processes of scientific method of learning inclusive of observation, questioning, associations, practice and networking. The students worksheet and the authentic assessments method were used in order to allign the study to the methods and strategies of the newly established curriculum 2013. Some of the modifications done to the students lesson plan during the process of validation were inclusive of:

1. Ensuring that the problems provided to be solved by the students is appropriate to the methods of scientific method.
2. Ensuring that the context provided is relevant to students level of understanding with local culture and traditions.
3. Reviewing the language used in the students worksheet so that it can be easily understood by the students.

The results of the validations were determined on the evaluations done to the 3 aspects prepared for validity purposes.

c.. Constructing Instruments for Data Collection

Instruments prepared were to collect data in order to answer the research questions formulated. The instrumensts prepared to support the study were inclusive of: (1) the validations sheets for the developed product, (2) the teacher's evaluation sheet for the practicality of the products and the teaching and learning process, (3) the students evaluation sheet, (4) students self efficacy questionnaire and the (4) achievement test. The validation process also included determining the content validity of the self efficacy questionnaire and the achievement tests.

1. Validation Procedures

The validation process took place during mid Apiril. The validators are represented in Table 18. The designed products with the constructed instruments were reviewed by the validators. As listed above the modifications done on the each of the developed product inclusive of the ST, TLP and SW, were considered and reviewed. Modifications were also done to instruments prepared as the validators cautiously ensure that all products and instruments prepared are alligned to the theories and strategies of the study.

After the validation process, analysis was then made on the results of validation to determine the suitability for try-out. Each product was also graded in terms of its qualitativeness. Final remarks by the validators was considered and further modifications was done to each product before the try-out.

Tabel 18
Validators Name, Title & Position

No	Name	Title	Field
1	Dra. R. Rosnawati, M.Si	Senior Lecturer	Mathematics Education
2	Himmawati Puji Lestari, M.Si	Lecturer	Mathematics Education

2. Try –Out Implementation

The try-out process took place at the beginning of May till June. The try out consisted of 32 students consisied of 20 females and 12 males. The try-out process consisted of 7 lessons, which due to the nature of the activities and events in the school was not consistently carried out. The try-out was carried out as an operational field test straight away, since the students had already covered the algebra.

Considering the teachers level of education, there was first of all a brief discussion on the objectives of the study, the utilization of the developed products and the teachers role on the whole research process.

B. Try-Out Data

1. Teaching and Learning Materials Validations Results

All the products and instruments used in this development research was validated by the appropriate validators who are experts in this field of study. During the process of validation, there were a few suggestions and reccomendations made on the product and the instruments by the validators to ensure its suitability for the trial-out. The validated products were inclusive of the, students textbook (ST), the teachers leson plan (TLP) and students worksheet

(SW) whilst the instruments were the students self efficacy questionnaire (SSEQ) and the achievement test (AT).

a. Students Book Validation Result

Table 19 shown below represents a summary of the evaluations done by the validators on all the aspects needed to be validated. The complete validation results of the students book is presented in Apendix 2a.

Tabel 19
Students Textbook Validation Results

No.	Evaluated Aspects	Total
1	Students book format	**22**
2	Book contents	**26**
3	Language & writing	**12**
4	Illustrations, tables, etc...	**16**
Total		**76**

b. Teachers Lesson Plan Validation Result

Table 20 presented below reveals the results of the evaluations done by the two validators on each aspects to be evaluated. The complete validation results are presented in Appendix 2b.

Tabel 20
Teachers Lesson Plan Validation Results

No.	Evaluated Aspects	Validators Evaluations		Total Score.
		1	2	
1	Subject Identification	5	4	9
2	Achievement Indicators	14	12	26
3	Learning Objectives	13	12	25
4	Teaching Materials	17	16	33
5	Teaching and Learning Process	8	8	16
6	Class Assessments	22	16	38
Total		79	78	157

c. Students Worksheet Validation Result

Table 21 provided below presents the summary done by the two validators on each of the 3 aspects evaluated. The complete validation results are presented in Appendix 2c.

Tabel 21
Students Worksheet Validation Results

No.	Evaluated Aspects	Validators Evaluations		Total score.
		1	2	
1	Contents	32	27	59
2	Presentation	17	16	33
3	Language	9	8	17
Total		58	51	109

d. Students Mathematics Self Efficacy Questionnaire Validation Results

The students mathematics self efficacy questionnaire was validated using the students self efficacy validation sheet. This was also represented as the validity of this instrument in terms of content validity. The aspects evaluated were inclusive of two main components which were the contents and the language used in the questionnaire. The complete validation results for the students self efficacy questionnaire is presented in Appendix 2d. Table 22 below presents the results of the evaluation by the two validators on the two aspects to be validated.

Tabel 22
Students Mathematics Self Efficacy Validation Results

No.	Evaluated Aspects	Validators Evaluations		Total score.
		1	2	
1	Contents	19	16	35
2	Language	11	12	23
Total		30	28	58

e. Achievement Test Validation Results

The achievement test items were validated in terms of content validity using the achievement test validation sheet. The aspects to be validated were inclusive of the blue print prepared and the items in the twenty multiple choice questions problem. The complete validation results for the achievement test are provided in Appendix 2e. Table 23 below represents a summary of the evaluations on the validation sheet done by the two validators.

Tabel 23
Achievement Test Validation Result

No.	**Evaluated Aspects**	**Validators Evaluations**		**Total score.**
		1	**2**	
1	Blue Print	8	8	16
2	Content	15	16	31
Total		23	24	47

2. Teaching and Learning Materials Practicality Results

The practicality data were obtained from results of teachers and students evaluation on the developed products and the teaching and learning process. The three instruments used to collect data for the practicality results consisted of (1) the teachers evaluation sheet on the developed product, (2) the teachers questionnaire on the teaching and learning process and (3) students questionnaire on the teaching and learning process.

a. Teacher's Evaluation Sheet Results on the ST, TLP, SW & AT

Results on the teachers evaluation regarding the practicality of the developed product are provided in Table 23. The evaluation was carried by two mathematics teacher in SMPN 2 Mlati. Results of the complete evaluations is provided in Appendix 2f.

Tabel 24
Teacher's Evaluation Result on the ST, TLP, SW & AT

No.	Evaluated Aspects	Total score
1	Students Book	24
2	Teachers Lesson Plan	25
3	Students Worksheet	20
4	Achievement Test	19
Total Score		88

b. Teachers Evaluation Results on the Teaching & Learning Process

Results on the questionnaire regarding the practicality of the teaching and learning process is provided in Table 24. The questionnaire was evaluated by the mathematics teacher and the researcher for 2 lesson. Results of the complete evaluation is provided in Appendix 2g.

c. Students Evaluation Results on the Teaching and Learning Process

Results from the students questionnaire regarding the practicality of the teaching and learning process is provided in Table 25. The students questionnaire was given out to 32 subjects of the study in SMPN 2 Mlati. The complete results is provided in Appendix 2h.

Tabel 25
Teacher's Evaluation Result on the Teaching & Learning Process

No.	Evaluated Aspects	Teachers Evaluations		Total score.
		L1	L2	
1	Orientation	20	20	40
2	Announcing the Competence and Learning Activities	7	7	14
3	General Content Activity	15	16	31
4	Implementing learning strategies	20	24	44
5	Applying Scientific Method	27	31	58
6	Students Involvement in Learning	12	13	25
7	Closing Activity	15	16	31
Score/ Lesson		116	127	243

Tabel 26
Students's Evaluation Result on the Teaching & Learning Process

No	Evaluated Aspects	Total Score
1	Teaching and Learning Activity	698
2	Students Worksheet	724
3	Students Textbook	597
Total Score		**2019**

3. Teaching and Learning Materials Effectivity Results

The effectivity of the teaching and learning materials was determined by the short test results, results of the students self efficacy pre and post test and the results of the achievement test.

a. Short Test Results

Short test data were obtained from short test results that were conducted at the beginning of every lesson to test the achievement indicators of the previous lesson. A summary of the results of the 5 short tests that was conducted is provided Table 26. The complete analysis result is presented in Appendix 2.j.

Tabel 27
Short Test Average Score Results

Short Test	No. Of Students	Average Score
1	32	80
2	32	76
3	32	76
4	32	73
5	32	77

b. Students Mathematics Self Efficacy Results

Data on students mathematics self efficacy was obtained from results on the pre test and post test given to students before and after the intervention respectively. Factor analysis conducted on the items derived nine factors from the prepared 7 judgemental factors. The total scores on every tested aspects on students confidence before and after the intervention is provided on Table 27.

Tabel 28
Pre Test and Post Test Results on Self Efficacy Aspects

No	Self Efficacy Aspects	Max. Score	Students Self Efficacy Total Score	
			PreTest	Post Test
1	Self efficacy on attempting algebraic problems	2080	1605	1703
2	Self efficacy in organizing oneself to learn algebra	2720	1672	1727

Graded total scores of each student on each evaluated self efficacy aspects is presented Table 28.

Tabel 29
Graded Total Scores of Students Self Efficacy Pre and Post Test

No	Category	Number of Students	
		PreTest	Post Test
1	Excellent	0	0
2	Very Good	18	25
3	Good	14	7
4	Statisfactory	0	0
5	Poor	0	0

The complete evaluation results on the self efficacy of the students is presented in Appendix 2i.

c. Achievement Test Results

The achievement test data was obtained from results of the achievement test that was conducted at the end of the intervention. The achievement test consisted of 20 multiple choice questions . Result of the average score on the achievement test is presented on Table 29. The complete analysis on the achievement test is presented in Appendix 2.k.

Tabel 30
Result of Average Score for the Achievement Test

Achievement Test	Number of Students	Average Score
Class 7C	32	15

C. Data Analysis

1. Validation Results Data Analysis

All validation results were analysed using Tabel 6. Each of the aspects on each of the three products were individually analysed and graded according to the criteria level of validity provided. The developed products inclusive of the ST, TLP and SW were all validated on criteria based on Table 8.

a. Students Textbook Validation Results Data Analysis

The students textbook was to be categorized as valid and suitable for try-out if the minimum evaluation category on all aspects is "valid". Data analysis for the students textbook and each of its aspect is provided in Table 30

Tabel 31
Students Textbook Data Analysis

No.	Evaluated Aspects	Total	Category
1	Students book format	22	Very Good
2	Book contents	26	Very Good
3	Language & writing	12	Excellent
4	Illustrations, tables, etc...	16	Excellent
Total score		76	Very Good

b. Teachers Lesson Plan Validation Result Data Analysis

Total score for each of the evaluated aspects from Table 19 were analyzed and presented in Table 31.

Tabel 32
Teachers Lesson Plan Validation Results Analysis

No.	Evaluated Aspects	Total Score.	Category	Grade
1	Subject Identification	9	Excellent	A
2	Achievement Indicators	26	Excellent	A
3	Learning Objectives	25	Excellent	A
4	Teaching Materials	33	Excellent	A
5	Teaching and Learning Process	16	Excellent	A
6	Class Assessments	38	Excellent	A
Total		157	Excellent	A

Each aspect of the teachers lesson plan were categorized as excellent. The teachers lesson plan is valid and therefore was used for try-out without revision.

c. Students Worksheet Validation Result Data Analysis

Total score for each of the evaluated aspects of the students worksheet from Table 20 were analysed and presented below in Table 32.

Tabel 33
Students Worksheet Validation Results Analysis

No.	Evaluated Aspects	Total score.	Category	Grade
1	Contents	59	Excellent	A
2	Presentation	33	Excellent	A
3	Language	17	Excellent	A
Total		109	Excellent	A

Each of the aspects were categorized excellent and therefore was classified valid and suitable for try-out without revision.

d. Students Mathematics Self Efficacy Validation Sheet Data Analysis

Total score for each of the evaluated aspects of students mathematics self efficacy validation sheet from Table 21 was analyzed and presented in Table 33.

Tabel 34
Students Mathematics Self Efficacy Validation Results Analysis

No.	Evaluated Aspects	Total score.	Category	Grade
1	Contents	35	Excellent	A
2	Language	23	Very Good	B
Total		58	Excellent	A

Content validity of the students self efficacy questionnaire was classified valid as presented in the table above.

e. Achievement Test Validation Result Data Analysis

Total score for each of the evaluated aspects of the achievement test from Table 22 was analyzed and presented in Table 34.

Tabel 35
Achievement Test Validation Results Analysis

No.	Evaluated Aspects	Total score.	Category	Grade
1	Blue Print	16	Excellent	A
2	Content	31	Very Good	B
Total		47	Very Good	B

Content validity of the achievement test was classified valid as presented in the table above.

2. Practicality Results Data Analysis

Similar to the analysis criteria for the validation data, all the practicality data was evaluated and analyzed using Table 6.

a. Teachers Evaluation Sheet Results Analysis on the ST, TLP, SW and AT

The total score for each of the evaluated aspects in Table 23 was analyzed individually as represented in Table 35 below.

Tabel 36
Teacher's Evaluation Result on the ST, TLP, SW & AT Analysis

No.	Evaluated Aspects	Total score	Category	Grade
1	Students Textbook	24	Most probably feasible	B
2	Teachers Lesson Plan	25	Most Probably feasible	B
3	Students Worksheet	20	Most Probably feasible	B
4	Achievement Test	19	Feasible	C
Total		88	Most Probably Feasible	B

The data analysis reveals that according to teacher, the students book, teachers lesson and the students worksheet proved to practical as categorized most probably feasible whilst the achievement test scored the minimum evaluation of feasible

b. Teacher's Evaluation Results Analysis on the Teaching and Learning Process

The total score for each of the evaluated aspects in Table 24 was analyzed invidually and the results are represented in Table 36 below. As presented in the table below the overall analysis of the teaching and learning process evaluated by the teacher for two lessons is categorized "certainly feasible". In other words the teaching and learning process based on the approach of contextual teaching and learning is practical.

Tabel 37
Teacher's Evaluation Result Analysis on the Teaching & Learning Process

No.	Evaluated Aspects	Total score.	Category	Grade
1	Orientation	40	Most probably feasible	B
2	Announcing the Competence and Learning Activities	14	Most probablyfeasible	B
3	General Content Activity	31	Is certainly feasible	A
4	Implementing learning strategies	44	Most probably feasible	B
5	Applying Scientific Method	58	Is certainly feasible	A
6	Students Involvement in Learning	25	Is certainly feasible	A
7	Closing Activity	31	Is certainly feasible	A
	Total Score/ Lesson	243	Is certainly feasible	A

c. Students Evaluation Results Analysis on the Teaching and Learning Process

A total of 29 subjects, were able to fill in the questionnaire for evaluation of the teaching and learning process. The total score for each of the evaluated aspects as presented in Table 25 were analyzed and presented in Table 37 given below.

Tabel 38
Students's Evaluation Result Analysis on the Teaching & Learning Process

No.	Evaluated Aspects	Total score	Category	Grade
1	Teaching and Learning Activity	698	Most Probably Feasible	B
2	Students Worksheet	724	Most Probably Feasible	B
3	Students Textbook	597	Most Probably Feasible	B
Total Score		2019	Most Probably Feasible	B

3. Effectivity Results Data Analysis

Data analyzed to obtain the effectivity of the developed products were obtained from results of the short test, the students mathematics self efficacy, post and pre-test and the achievement test conducted at the end of the intervention.

a. Short Test Results Analysis

The results of the five short tests presented on Table 38 was anlyzed by seeing that it met the Minimal Completion Criteria (MCC) of the school which is 75%.

Tabel 39
Short Test Average Score Results

Short Test	Average Score	No.of students with MCC
1	80	20 (63%)
2	76	26 (81%)
3	76	20 (63%)
4	73	23 (72%)
5	77	26 (81%)

In observing the the table presented above, it can be concluded that since more than half of the students achieved the Minimal Completion Criteria, the developed product is considered effective in terms of the short tests.

b. Students Mathematics Self Efficacy Results Data Analysis

The nine components derived after conducting factor analysis were allocated into the two main aspects of self efficacy examined. The first aspect consisted of 5 components inclusive of: (1) achieving good grades in algebra, (2) simplifying mathematical algebraic expression (3) solving contextual algebraic expression and (4) understanding algebraic concepts and (5) performing elements of CTL. These

five components were analyzed and compared in terms of pretest and posttest as presented in Figure 2.

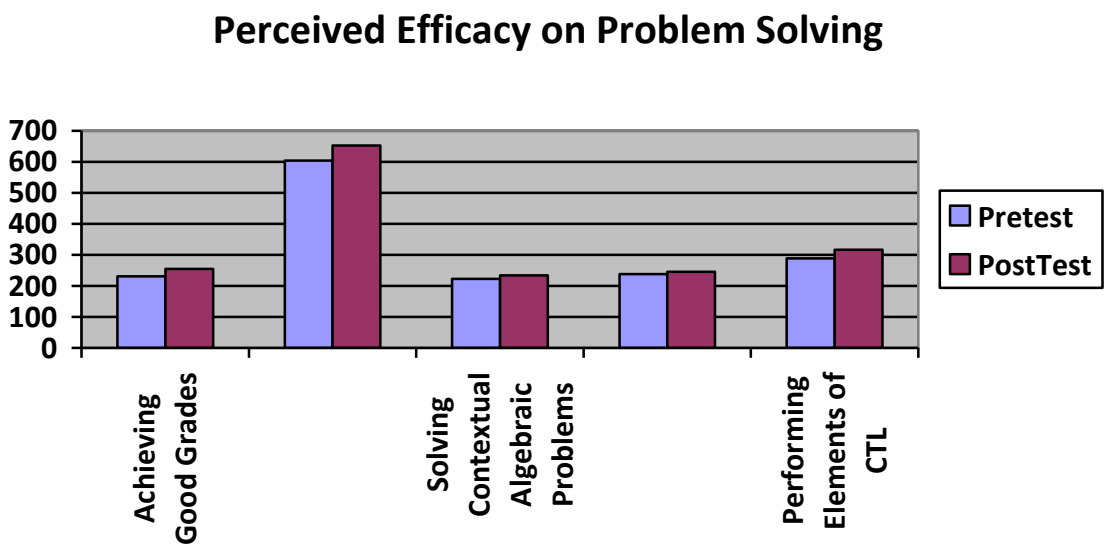

Figure 2

The graph shown clearly indicates an increased self efficacy in the 5 components examined.

The second aspect however consisted of 4 components inclusive of: (1) the ability to communicate during group work, (2) complete homework and assignments, (3) self regulation in learning and (4) ability to overcome difficulties by own self. Results of the comparison in terms of pretest and post test is presented in Table 28. As noted, figures on the chart reveals an increase in the post test results compared to pre-test in all the 4 components displayed below.

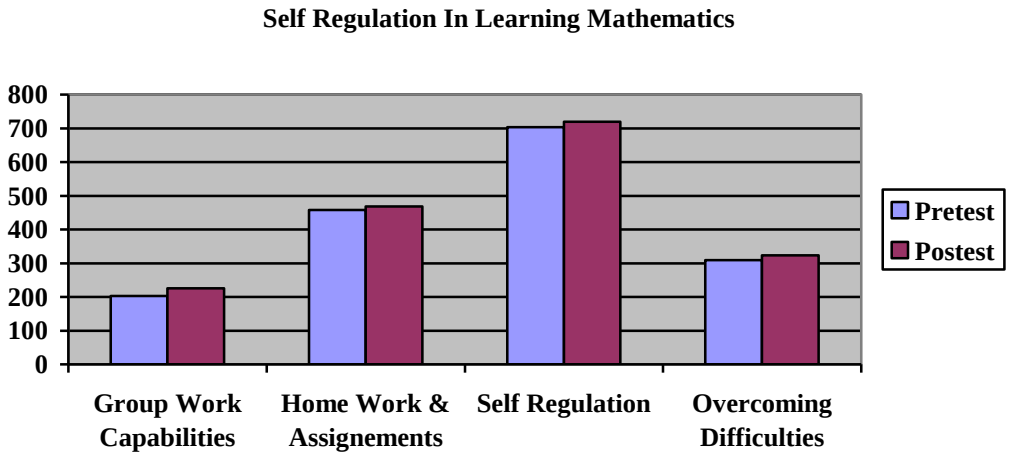

Figure 3

a. Achievement Results Data Analysis

The results of the achievement test presented in Table 29, was analyzed in terms of the number of students who met the Minimal Completion Critieria of the school. Analysis presented in Table 39 revelas that more than 50% of the students achieved the MMC of 75%, indicating the effectivity of the intervention.

Tabel 40
Result of Average Score for the Achievement Test

Achievement Test	Average Score	No.of Students with MCC
Class 7C	15	20 (63%)

D. Product Revision

The first revision process done on the developed product were those made by the validators.

1. Product Revision by the Validators- Draft 1

Tabel 41
Product Revision – Validators

No.	Product	Suggestion	Purpose of Revision
1	Students Textbook	Table of contents numbering	Has to be consistent with the number basic competence.
2		Aperseption material to be labelled as motivation material as well.	Students to read and consider their role in attemting the given problems.
3		Lesser problems on the apeseption and motivation material	Problems on these section is supposed to get students ready for the actual teaching and learning process. Too many problems would divert their focus for the main parts of the lesson.
4		Problems in the aperseption and motivation materials ought to review arithmetic concepts first, with a few probelms introducing students to algebraic expressions	Students to see the main objective of algebra in relation to arithmetic.
5		Sections in chapters to be rearranged	Sections in a particular chapter to follow the 5 elements of contextual teaching and learning, shortened as REACT.
6	Teachers Lesson Plan	Teachers lesson plan format	To follow the format required by the Ministry of Education.
7		Achievement indicators prepared to consider all the basic competence employed.	Ensure that students will have ability to complete mathematics problems as required by the basic competence.
8		Time allocated to be reviewed	So that all planned activities can be carried out succesfully.
9		Teaching and learning activities to be consistent with the sections prepared in the book.	So that students are accustomed to CTL approach
10	Students Worksheet	Nature of the problem has to be modified to suit the 5 elements the scientific method	So that students can see the relevance of the scientific method when attempting the problems.
		Problems in worksheet to also include some mathematical problems	Ensure the practicality of Applying as an element of CTL.

2. Product Revision by the Teacher – Draft 2

Table 42
Priduct Revision-Teacher

No.	Product	Suggestion	Purpose of Revision
1	Students Textbook	Language	Some words used in the book needed to be revised for students understanding
2		Order of the elements of an algebraic expression	Order shoud be variable, koefficient then constant
3		Students at this level does not understand definitions of concept	The word ‘definitions’ to be replaced by summary.
4		Font size of variables should be in lowwercase often	So that students can see differentiate.
5	Teachers Lesson Plan	Every lesson plan should have identity section	According the schools TLP format
6	Students Lesson Plan	Activity 1 of SW 1 - table needs to be reconsidered.	So that students are not confused

E. Final Product

1. Learning Products Validity

The final product was obtained after a revision session was carried out between the teacher and the researcher after the intervention. The designed products were already proven valid before the try-out. The validation process carried out reveals that the learning products inclusive of; (1) students textbook, (2) teachers lesson plan and (3) students worksheet are valid.

2. Learning Products Practicality

The practicality aspects of the final product was conducted during the process of intervention. The products practicality was mainly decided by observations made by the teacher and the students rergarding the implementation of the lesson in utilizing contextual teaching and learning approach with scientific method during attempting problems on students worksheet. Results from data analysis revealed that the learning products are practical.

3. Learning Products Effectivity

Results from students short tests, mathematics self efficacy questionnaires and achievement tests determines the effectivity of the products. Data analysis on the three instruments revealed the effectiveness of the products. Results also reveals positive effects of the products on students mathematics achievements.

F. Research Limitation

A few limitations that occured during the course of the research consisted of; (1) language, (2) time, (3) teacher's capability. The use of appropriate language during the product development, instruments construction and during the actual try out of the products and instruments was very important. Though the researcher may not be a native Indonesian speaker, but it is noted that when language used does not comply with the principles expected, it can have an adverse effect on the situation. However, it should also be considered that some sttudents in the world are not using their own mother toungue to learn in schools, but still achieve better grades.

Time was not always on our side. Using the contextual teaching and learning approach in association with scientific method of learning may require more time than allocated. Students were used to the traditional method of teaching where, mathematical concepts are first of all discussed on the board followed by mathematical problem as an example. However, in this case students were first of all presented with a contextual situation in relation to the mathematical concept in discussion. It was noted that they needed more time compared to traditional method of teaching in order to actually relate the concept in discussion with the context provided. However, once they grasp the concept during the relating period they were able to progress further with minimum assistance from the teacher.

As mentioned earlier, the teacher's capapility in executing the lessons succesfully lacks consistency and commitment due to lack of knowledge and professional development.

CHAPTER V
CONCLUSION AND SUGGESTION

A. Conclusions about the Product

1. Validity

Overall evaluations on the students textbook was graded B under the category "very good". Apart from comments made by the validators about the accurate theoretical process of contextual teaching and learning approach to be used in the book, a main course of concern was the appropriate use of language in the textbook. Nevertheless, numerous revisions assisted in the quality of the textbook. The teachers lesson plan was well designed as it was graded A overall under the category "excellence". This was also supported by the teacher as he made very few revisions on the five teachers lesson plans designed. The students worksheet was also graded A. Though students took time in understanding the contextual problems, the related mathematic concept was more understood compared to the traditional method.

2. Practicality

The teacher's evaluation on the products was graded B. Teachers comments supports the practicality of the products. In terms of teaching and learning process the two observations made by the teacher were graded A. However, as mentioned, more time is needed for students to be adapted to solving contextual problems rather than the usual mathematical problems. Their observation on the teaching and learning process was graded B. Though many of them were excited with the

new teaching method, the use of scientific method on the students worksheet confuse many of them. Thus, it is impotant that students are throughly briefed about the objectives of scientific method before the use of curriculum 2013 in the school.

3. Effectivenes

The 5 short tests conducted reveal that more than 50% of the students were fulfiiling the requirements of the Minimal Completion Criteria. The students mathematics self efficacy shows that in terms of the two aspects , there was an increase on all the components during the postest compared to the pretest. Achievement test revealed that 63% of the students were able to meet the MCC which was 75%.

4. Impact of the Contextual Based Teaching Materials on Students Self Efficacy.

Contextual teaching and learning emphasizes self regulated learning, on which students learn at their own pace, they make their own decisions and accept responsiblity for them (Johnson E, 2002). In relation to the process of intervention the effectiveness of an innovative method of teaching depends on students knowledge of the method itself. Thus, it is important to educate the students as well as the teachers on the process of a particular method of teaching to be experimented in schools. There were few teething problems at first in relation to the study about the issue mentioned. However, once the students were briefed and familiarized with the techiniques being used, they were able to grasp the objective of each lesson and the techniques of CTL.

Analysis reveals positive effects of the contextual based teaching materials on students self efficacy. In terms of self efficacy in attempting algebraic problems, a 6% increase in scores was discovered after the intervention. Similarly, in terms of self efficacy in organizing oneself to learn algebra, an increase of 3% took place after the intervention.The contextual based materials assisted in enhancing students self efficacy as they were enthusiastic, interested, curious and eager to experiment and practice on the contextual problems provided through cooperative learning. An important factor that contributed to this enhancement was their energetic and exploring instinct at this age. Thus, a main characteristic of CTL on students self efficacy is the enhancement of one's capability to learn or perform at designated a level through curiousty, eagerness and enthusiasm.

5. Impact of the Contextual Based Teaching Materials on Mathematics Achievement of the Students.

Data analysis on the achievement test revealed that 63% of the students were able to meet the Minimal Completion Criteria of the school, which is a pass of more 75% in their achievement test. In semester 1, 78% of the students managed to get the MCC of 75%. There can be a lot of factors that contributes to this decrease in value. A probable cause can be the new method used, that students may try to get used to. Nevertheless, if the use of contextual based teaching materials is to be sanctified in schools, it would be in no time become a norm and contributed more effectively in students mathematics achievement in terms of conceptual and mathematical understanding rather than the mathematical understading alone that the traditional teaching method has to offer. Thus, that

would be a characteristic of contextual based taeching material to mathematics achievement of the students. That is, students would be able to gain more in terms of theorectical and practical understanding of mathematics concept.

B. Suggestions and Reccomendation on the Product

Due to the lack of time for a small evaluation session, the products were tried-out to subjects of 32 students. More time was used on trying to individually attend to students questions regarding the products. This could have been avoided if there was time for a small group try out of at least 5 students. As mentioned earlier and most important was the importance of letting students know the innovative methods of teaching and learning and its process undertaken during the study. Those are some suggestions and reccomendations considered for further developement on the products.

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APPENDIX 1

RESEARCH INSTRUMENTS

Appendix 1a- Students Textb**ook Validation Sheet**

LEMBAR VALIDASI BUKU MATEMATIKA

A. Tujuan *(Objective)*

Penggunaan instrumen ini adalah untuk mengkur kevalidan isi buku matematika yang dikembangkan pada sebuah penelitian pengembangan perangkat pembelajaran matematika pendekatakan kontextual matematika pada materi Aljabar kelas VII SMPN.*(This instrument is to be used for the validation of the studentstextbook for a developement research using the 'Mathematics in Context' approach for Algebra in middle school)*

B. Petunjuk *(Instruction)*

1. Objek Penilain adalah Buku Matematika Siswa dengan pendekatan 'Kontextual Matematika'. *(The object to be evaluated is the students mathematics textbook using the contextual mathematics approach)*

2. Bapak/Ibu dapat memberikan penilain dengan cara memberikan tanda (√) pada kolom yang tersedia pada tabel berikut. *(The validator is requested to evaluate the components of this book by placing a (√) in the provided coloumn).*

3. Skala penilaian mulai 1 s.d 5 dengan makna sebagai berikut: *(Scale of evaluation)*

1 = tidak baik *(poor)*

2 = kurang cukup *(statisfactory)*

3 = cukup baik *(good*)

4 = baik *(very good)*

5 = sangat baik *(excellent)*

C.PENILAIN *(Evaluation)*

No.	Kriteria yang dinilai *(Criteria for Evaluation)*	Poin Penilain				
A. Identitas (Identifying a sense of Purpose)						
1	Penyampaian tujuan sebuah topik *(Conveying Unit Purpose)*					
2	Penyampain tujuan pembelajaran *(Conveying lesson purpose)*					
3	*(Justifying sequence of activities)*					
B. Building on Student Ideas About Mathematics						
4	Specifying prerequisite knowledge					
5	Membantuan guru mengidentifikasi ide *(Assisting teacher in identifying ideas)*					
6	*(Addressing misconceptions)*					
C. Engaging Students In Mathematics						
7	Memberikan kontext yang berbeda *(Providing variety of context)*					
8	Memberikan pengalaman *(Providing first hand experiences)*					
D. Developing Mathematical Ideas						
9	Kesesuain SKL/ KI/ KD *(Is in accordance with SKL/KI/ KD)*					
10	Perkenalan konsep matematika dan procedure *(Introducing terms and procedures)*					
11	Menyajikan materi pembelajaran dengan tepat *(Representing Ideas Accurately)*					
12	Mendemonstrasikan/ Merumuskan procedures *(Demonstrating/ Modelling Procedures)*					
13	Providing Pratice (*Menberikan Praktek)*					
E. Promoting Student Thinking about Mathematics *(Mendorongkan PerceptionPeserta Didik tentang Matematika)*						
14	Encouraging students to explain their thinking					
15	Guiding intepretation and reasoning					
16	Mendorongkan peserta didik memikirkan tujuan pembelajaran *(Encouraging students to think about what they've learned*)					
F. Addressing Students Progress In Mathematics						
17	Menggunakan kegiatan penilain yang keterkaitan dengan tujuan pembelajaran.*(Aligning assessment)*					
18	Menggunakan penilaian aplikasi *(Assessing through application)*					

G.Enhancing the Mathematics Learning Environment (Membangun						
19	Providing teacher content support					
20	Supporting all sttudents					
Penilain secara umum terhadap Buku		LD		LDR		

Keterangan: **LD = jika layak digunakan untuk uji coba** *(To be used for trial out)*

LDR = jika layak digunakan untuk uji coba setelah revisi *(To be used for trial out after revision)*

TLD = tidak layak digunakan untuk uji coba. *(Is not appropriate for trial out)*

D. MASUKAN VALIDATOR (Comments)

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Yoryakarta, ...2014

Validator

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Appendix 1b- Teachers Lesson Plan Validation Sheet

LEMBAR VALIDASI RENCANA PELAKSANAAN PEMBELAJARAN (RPP) MENGGUNAAN METODE SCIENTIFIC DENGAN MATERI KONTEXTUAL MATEMATIKA

A. TUJUAN *(Objective)*

Instrumen ini digunakan untuk mengukur kevalidan komponen-komponen Rencana Pelaksanaan Pembelajaran (RPP) dalam pembelajaran matematika dengan materi kontexkstual matematika yang menggunakan metode scientific. *(The objective of this validation sheet is to evaluate and measure the components of this Teachers Lesson Plan in learning mathematics using contextual mathematics materials with scientific method of learning)*

B. PETUNJUK *(Instruction)*

1. Objek penilaian adalah Rencana Pelaksanaan Pembelajaran (RPP). (*The object to be evaluated is the Teachers Lesson Plan)*

2. Bapak/ Ibu dapat memberikan penilain dengan cara memberikan tanda (√) pada kolom yang tersedia pada tabel berikut. *(The validator is requested to evaluate the components of this Teachers Lesson Plan by placing a (√) on the appropriate coloum provided)*

3. Skala penilain mulai 1 s.d 5 dengan makna sebagai berikut: *(Evaluation scale provided initiates from 1 to 5 with the corresponding description provided below)*

1 = tidak baik *(Poor)*

2 = kurang cukup *(Statisfactory)*

3 = cukup baik *(Good)*

4 = baik *(Very good)*

5 = sangat baik ***(****Excellent)*

C. PENILAIAN *(Evaluation)*

No.	**Komponen** *(Components)* **Rencana Pelaksanaan Pembelajaran** *(Teachers Lesson Plan)*	**Hasil Penilaian dan Skor** *(Evaluation Results and Score)*				
		1	**2**	**3**	**4**	**5**
A. Identitas Mata Pembelajaran *(Identifiying the Course)*						
1	**Satuan pendidikan, kelas, semester, program/ program keahlian, mata pembelajaran atau tema pembelajaran, jumlah pertemuan**. *(Level of education, grade, term, course of study, learning theme, and total number of classes)*					
B. Perumusan Indikator *(Formulation of Achievement indicators)*						
2	**Kesesuain dengan SKL, KI dan KD**. *(Is in accordance with SKL, KI and KD)*					
3	**Kesesuain penggunaan kata kerja operasional dengan competensi yang diukur**. *(In accordance with operational verbs to measure the appropriate competent)*					
4	**Kesesuain materi ajar untuk mencapai SK/KD**. *(The learning material is in accord of the SK/KD achievements)*					
C. Perumusan Tujuan Pembelajaran *(Formulation of Learning Objectives)*						
5	**Kesesuain dengan proses dan hasil belajar yang diharapkan dicapai.**[1] *(Is in accordance with the achieving the results of the teaching and learning process)*					
6	**Kesesuain dengan kompentensi dasar**. *(Is in accordance with the basic competences)*					
	Keberadaan langkah-langkah pembelajaran.[2] (*Conveying the learning process steps with assessments undertaken)*					
D. Pemilihan Materi Ajar *(Selection of Teaching Materials)*						
7	**Kesesuain dengan materi matematika kontextual menggunakan dunia nyata pendidikan**.[3] (*Is in accordance with contextual mathematics using real world education)*					

[1] Source: Bell, F. H (1978)

[2] Source: Bell, F. H (1978)

[3] Source: Berns & Erickson (2001); Johnson, E.B (2002); Kieran, C (2007); Cyril J, (2013) and Crawford M (2001)

8	**Kesesuain dengan tujuan pembelajaran**. *(Is in accordance to objectives of the lesson)*					
	Kesesuain dengan karakteristik peserta didik.[4] *(Is suited to the education level at middle school and students characteristic)*					
	Kesesuain dengan alokasi waktu. *(Is in accordance with the time allocated).*					
E. Model dan Skenario Pembelajaran *(Model and Scenario of the Teaching and Learning Process)*						
	Kesesuain dengan pendekatan scientific.[5] *(Is in accordance with the scientific method of learning)*					
	Kesesuain kegiatan dengan pendekatan scientific *(Is in accordance with scientific approach activities)*[6]					
F. Penilain *(Class Assessments)*						
	Kesesuain dengan teknik dan bentuk penilain autentik.[7] *(Is in accordance with techniques of authentic assessment)*					
	Kesesuain dengan indikator pencapain kompetensi. *(Is in accordance with achieving the desired competence)*					
	Kesesuain kunci jawabandengan soal. *(Prepared answers is in accord to the questions provided)*					
	Kesesuain pedoman penskoran dengan soal *(Mark sheet is in accord with the questions provided)*					
JUMLAH *(Total)*						
Penilain secara umum terhadap RPP *(Overall evaluation on Teachers Lesson Plan)*			LD		LDR	TLD

[4] Source: NCTM (2000); Carpenter et al (200); Friendlander, A & Tabach M (2009)

[5] Source:KEMENTARIAN PENDIDIKAN DAN KEBUDAYAAN, 2013.

[6] Source: Robert S (2002); PRIMAS, University of Nottingham, (2010); Bell, F. H (1978); KEMENTARIAN PENDIDIKAN DAN KEBUDAYAAN, (2013).

[7] Source:KEMENTARIAN PENDIDIKAN DAN KEBUDAYAAN, (2013); Darling-Hammond, et al (2000).

Keterangan (Key): **LD = jika layak digunakan untuk uji coba** *(To be used for trial out)*

LDR = jika layak digunakan untuk uji coba setelah revisi (*(To be used for trial out after revision)*

TLD = tidak layak digunakan untuk uji coba. *(Is not appropriate for trial out)*

D. MASUKAN VALIDATOR *(Validators Comments)*

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Yoryakarta,.....2014

Validator,

Appendix 1c– Student Worksheet Validation Sheet

PENILAIN LEMBAR KEGIATAN SISWA (LKS)

A. TUJUAN *(Objective)*

Instrumen ini digunakan untuk mengukur kevalidan komponen-komponen Lembar Kerja Siswa (LKS) dalam pembelajaran matematika dengan materi kontekstual matematika. *(The objective of this validation sheet is to evaluate and measure the components of this Students Worksheet in learning mathematics using contextual mathematics materials with scientific method of learning)*

B. PETUNJUK *(Instruction)*

1. Objek penilaian adalah Lembar Kerja Siswa (LKS). (*The object to be evaluated is the Students Worksheet)*

2. Bapak/ Ibu dapat memberikan penilain dengan cara memberikan tanda (√) pada kolom yang tersedia pada tabel berikut. *(The validator is requested to evaluate the components of this Students Worksheet by placing a (√) on the appropriate coloum provided)*

3. Skala penilain mulai 1 s.d 5 dengan makna sebagai berikut: *(Evaluation scale provided initiates from 1 to 5 with the corresponding description provided below)*

1 = tidak baik *(Poor)*

2 = kurang cukup *(Statisfactory)*

3 = cukup baik *(Good)*

4 = baik *(Very good)*

5 = sangat baik ***(****Excellent)*

C.PENILAIAN *(Evaluation*)

No.	Komponen LKS (Students Worksheet Components)	Poin Penilaian					Komentar *(Comments)*
		1	2	3	4	5	
1	**Kelayakan Materi *(Worthiness of students worksheet contents)***						
	a.Kesesuaian dengan standar isi (Is in accordance with satndard contents)						
	b.Kesesuaian dengan RPP (Is in accordance with Teachers Lesson Plan)						
	c.Kebenaran materi matematika yang berhubungan dengan konteks (Using contextual mathemathematics materials)						
	d.Kesesuain dengan perkembangan anak. (Is appropriate in students developments)						
	e.Kesesuain dengan metode scientifik yang digunakan (Is in accordance with the scientific method)						
	f.Kesesuaian urutan materi (The materials are in order as planned)						
	g.Keajegan penggunaan isitilah (There is constancy in the terms used)						
2	**Kesesuain penyajian *(Appropriate Presentation*)**						
	a.Kejelasan tujuan yang ingin dicapai (Explain the objectives needed to be achieved)						
	b.Kemenarikan tampilan (Appealing and interesting presentation)						
	c.Kesesuaian penggunaan jenis huruf (Letters and characters are used accordingly)						
	d.Kesesuaian ilustrasi/gambar/foto (Appropriate use of illustrations, pictures and photos)						
3	**Kesesuaian Bahasa (*Appropriate Language Used)***						
	a.Kesesuaian dengan kaidah Bahasa Indonesia yang baik dan benar (Appropriate language and according to Indonesian language policy)						
	b.Kalimat yang digunakan mudah dipahami (Sentences used is simple and easy to understand)						
Jumlah Nilai Diperoleh							

MASUKAN VALIDATOR *(Validators Comments)*

.....
.....
.....
.....
.....
.....

Kesimpulan *(Conclusion):*

Secara umum Lembar Kerja Siswa (LKS) ini: mohon lingkari sesuai dengan penilain Bapak/ Ibu *(Please give your overall evaluation of the worthiness of this students worksheet)*

LD = jika layak digunakan untuk uji coba *(To be used for trial out)*

LDR = jika layak digunakan untuk uji coba setelah revisi *(To be used for trial out after revision)*

TLD = tidak layak digunakan untuk uji coba. *(Is not appropriate for trial out)*

Yorgyakarta, ...2014

Validator,

(.....)

Appendix 1d-Teachers Questionnaire About the Products

Angket Guru Terhadap Buku Siswa, RPP, LKS dan THB

(Teachers Evalutaion Questionnaire About the Students Textbook (ST), Teachers Lesson Plan (TLP), Students Worksheet (SW) and Achievement Test (AT))

A. Tujuan *(Objective)*

Tujuan penggunaan angket ini adalah untuk memperoleh guru terhadap perangkat pembelajran matematika dengan menggunakan model pembelajaran "Contextual teaching and Learning". *(The objective of this questionnaire is to evaluate the learning materials used in this study by the teachers with the contextual teaching and learning approach)*

B. Petunjuk *(Instruction)*

1. Objek penilain adalah Buku Siswa, Rencana Pelaksanaan Pembelajaran (RPP), Lembar Kegiatan Siswa (LKS), Tes Hasil Belajar (THB) dan Angket Self Efficacy Siswa (ASES). *(The objects to be evaluated are the ST,TLP, SW, AT).*
2. Bapak/ Ibu dapat memberikan penilaian dengan cara memberi tanda (√) pada kolom yang tersedia pada tabel di bawah. *(The evaluator is requested to use the checklist (√) symbol on the coloumn provided.)*
3. Makna skala penilaian adalah sebagai berikut *(Description of the evaluation points is listed below)*
   1 = Tidak Terlaksan *(is not feasible)* 2= Sebagian Kecil Terlaksana *(probable feasibility)* 3= Sebagian Terlaksana (*feasible)* 4= Sebagian Besar Terlakasana *(most probably feasible)* 5= Terlakasana Sepenuhnya *(is certainly feasible*)

C. Penilaian (Evaluation)

No	**Aspek yang dinilai** *(Aspects to be Evaluated)*	**Poin Evaluasi** *(Evaluation Points)*				
	A. Buku Siswa *(Students Book)*	**1**	**2**	**3**	**4**	**5**
1	Kejelasan komponen buku (There is clarity in the students textbook)					
2	Kesesuain standar kompetensi dengan kompetensi dasar *(Basic competence is in accord with standard competence)*					
3	Kejelasan materi *(There is clarity in the material used)*					
4	Ketepatan bahasa yang digunakan dengan kaidah bahasa Indonesia *(The Indonesian language used is accurate)*					
5	Kemudahan memahami bahasa yang digunakan *(The language used is simple and easy to understand)*					
6	Kejelasan sumber belajar yang digunakan *(Clarify the sources/ reference of the lesson)*					
	B. Rencana Pelakasanaan Pembelajaran *(Teachers Lesson Plan)*					
7	Kejelasan komponen RPP *(There is clarity in the components of the TLP)*					
8	Kepraktisan komponen RPP dalam pembelajaran *(There is praticality in the components of the TLP)*					
9	Ketepatan bahasa yang digunakan dengan kaidah bahasa Indonesia *(Accuracy in the use of the Indonesian lanuguage)*					
10	Kemudahan memahami bahasa yang digunakan *(The language used is simple and easy to understand)*					
11	Kejelasan bahasa yang digunakan sehingga tidak menimbulkan penafsiran ganda *(There is no multiple representations in the language used)*					
12	Kesesuain/ kecukupan waktu yang disediakan untuk tahapan pembelajaran *(Time allocated for the lessons were well utilized)*					
13	Kejelasan setiap tahapan pembelajaran *(Each step of the lesson were well executed)*					
	C. Lembar Kegiatan Siswa *(Students Worksheet)*					
14	Kesesuain dengan SK/KD *(Is in accord with the Standard Competence and Basic Competence)*					
15	Kesesuain dengan kebutuhan bahan ajar *(Is in accord with the requirements of the teaching materials)*					
16	Pemfasilitasian pelibatan peserta didik dalam proses pembelajaran *(Is students centered)*					

17	Pemfasilitan peserta didik untuk presentasi bekerja secara individual atau kelompok *(Facilitates students for group learning or indivudually)*					
18	Kejelasan bahasa yang digunakan *(There is clarity on the language used)*					
	D. Tes Hasil Belajar *(Achievement Test)*					
19	Kejelasan petunjuk megerjakan soal *(Instructions on the questions are clearly explained)*					
20	Kesesuain soal dengan indikator pencapaian hasil belajar *(Is in accord with the achievement indicators)*					
21	Tujuan soal dirumuskan dengan singkat dan jelas (*Objectives of the problems are well explained and formulated)*					
22	Bahasa yang digunakan sesuai dengan kaidah Bahasa Indonesia *(Language used is appropriate and decent under the Indonesian language principles)*					
23	Kemudahan memahami bahasa yang digunakan *(Language is simple and easy to understand)*					
24	Kejelasan bahasa yang digunakan, sehingga tidak menimbulkan penafsiran ganda. *(There is no multiple representations in the language used)*					
JUMLAH						

Kandangan, Juni 2014

Responden

.....

Appendix 1e-Teachers Questionnaire About the Teaching and Learning Process

LEMBAR PENILAIN KETERLAKSANAAN MODEL PEMBELAJARAN
(Learning Model Feasibility Evaluation Sheet)

Dengan Materi Kontextual Matematika, Menggunaan Metode Scientific
(Using Contextual Mathematics Materials with Scientific Method of learning)

Tempat Pelakasanaan :..... Hari/ Tanggal :.....

Nama Guru :..... Kelas/Semester: VII/2

Mata pelajaran : Matematika Materi Aljabar

A. TUJUAN *(Objective)*

Penggunaan instrumen ini adalah untuk mengetahui tingkat keterlaksanaan perangkat pembelajaran menggunakan kontextual matematika dengan metode scientific pada materi Aljabar kelas VII SMP. *(This instrument is used to evaluate the feasibilty of the teaching and learning process with Mathematics in Contexusing the scientfic method)*

B. PETUNJUK *(Instruction)*

1. **Objeck penilain adalah Kegiatan Pembelajaran dengan perangkat pembelajaran Matematika yang disediakan**. *(The object to be evaluated is the Learning Activities, with the provided innovative method for teaching Mathematics).*

2. **Bapak/ ibu Guru dapat memberikan penilaian dengan cara memberikan tanda (√) pada salah satu kolom pilihan tingkat keterlaksanaan setiap aspek kegiatan pada pembelajaran, dengan keterangan :** *(The evaluator is to place a (√) on the appropriate coloumn provided)*

5 = Terlaksana Sepenuhnya *(Is Certainly Feasible)*

4 = Sebagian Besar Terlaksana (*Feasible)*

3 = Sebagian Terlaksana *(Probable Feasibility)*

2 = Sebagian Kecil Terlaksana *(Partly Feasibility)*

1= Tidak Terlaksana *(Is Not Feasible)*

C. PENILAIN *(Evaluation)*

No	Aspek Kegiatan Pembelajaran *(Aspects of the Teaching and Leaning Activities)*	Keterlaksanaan *(Feasibility)*					Catatan*(Remarks)*
		1	2	3	4	5	
A. Kegiatan Awal (Orientasi) *(Orientation)*							
1	**Pembukaan pembelajran dengan salam dan do'a** *(Opening the lesson with prayer)*						
2	**Pengumuman hasil kuis atau PR**. *(Announcing homework or quiz results)*						
3	**Penyampaian tujuan pembelajaran oleh guru**. *(Delievering the lesson objectives)*						
4	**Penyampaian langkah-langkah pembelajaran oleh guru**.*(Delievering the activities and the learning process)*						
5	**Mendemonstrasikan sesuatu yang terkait dengan materi pembelajaran**.*(Demonstrating something that is related to the learning materials)*						
B. Penyampain Kompetensi dan Rencana Kegitan*(Announcing the competence and learning activities)*							
1	**Menyampaikan kemampuan yang akan dicapai peserta didik**. *(Stating the competencies required)*						
2	**Menyampaikan rencana kegiatan misalnya, individual, kerja kelompok, dan melakukan observasi** *(Announcing the types of co-operative learning that will be used)*						
C. Kegiatan Inti *(Contents of the Lesson)*							
Penguasan Materi Pembelajaran *(Broadening of the Learning Materials)*							
	Kemampuan menyesuiakan materi dengan tujuan pembelajaran. *(The level of material provided is in accord with the learning objectives)*						
2	**Kemampuan mengkaitkan materi dengan pengetahuan lain yang relevan, dan kehidupan nyata**. *(Using the contextual mathematics to connect relevant knowledge to daily*						

	living)						
3	**Menyajikan pembahasan materi pembelajaran dengan tepat.** *(Accurate discussion presentation of the learning material)*						
4	**Menyajikan materi secara sistematis (mudah ke sulit, dari konkrit ke abstrak)** *(Materials are presented from concrete to abstract)*						
Penerapan Strategi Pembelajaran yang Mendidik							
1	**Melaksanakan pembelajaran sesuai dengan kompetensi yang akan dicapai**. *(Perform learning according to competence that needs to be achieved)*						
2	**Melaksanakan pembelajaran secara runtut.** *(Orderly flow of the lesson)*						
3	**Menguasai kelas.** *(There is class management)*						
4	**Melaksanakan pembelajaran yang bersifat kontekstual** *(Perform contextual learning)*						
5	**Melaksanakan pembelajaran yang memungkinkan tumbuhnya kebiasaan positif** (*nurturant effect*)						
6	**Melaksanakan pembelajaran sesuai dengan alokasi waktu yang direncanakan** *(Class activity is in accord with time allocation)*						
Penerapan *Pendekatan Scientific (Application of the Scientific Method)*							
1	**Memberikan pertanyaan mengapa dan bagaimana** *(Providing the WHY and HOW questions)*						
2	**Memancing peserta didik untuk bertanya** *(Encouraging students to ask)*						
3	**Memfasilitasi peserta didik untuk mencoba.** *(Facilitate the practical sessions)*						
4	**Memfasilitasi peserta didik untuk mengamati** *(Facilitating the observation session)*						
5	**Memfasilitasi peserta didik untuk menganalisis** *(Facilitating students in their analysis)*						

6	**Memberikan pertanyaan peserta didik untuk menalar (proses berfikir yang logis dan sistematis).** *(Providing logical and sistematic questions***)**						
7	**Menyajikan kegiatan peserta didik untuk berkomunikasi**. *(Encourage students to communicate)*						
Pelibatan Peserta Didik dalam Pembelajaran *(Students Involvement In Learning)*							
1	**Menumbuhkan partisipasi aktif peserta didik melalui interaksi guru, peserta didik, sumber belajar.** *(Generate students active participation through teachers interaction and sources of learning)*						
2	**Merespon positif partisipasi peserta didik.** *(Responding to students positive participation)*						
3	**Menunjukkan sikap terbuka terhadap respons peserta didik.** *(Showing open attitude with students responses***)**						
Kegiatan Penutup *(Closing Activity)*							
Penutup pembelajaran							
1	**Melakukan refleksi atau membuat rangkuman dengan melibatkan peserta didik.** *(Involve students in summarising and reflecting on the lesson)*						
2	**Memberihan tes lisan atau tulisan .** *(Giving an oral or written test)*						
3	**Mengumpulkan hasil kerja sebagai bahan portofolio** *(Collecting worksheets for portfolio)*						
4	**Melaksanakan tindak lanjut dengan memberikan arahan kegiatan berikutnya dan tugas pengayaan**. *(Giving out homework and the next lessons activities)*						

D. CATATAN DAN SARAN OLEH GURU

.....
.....
.....
.....
.....

Rantau,.....2014

Guru

Appendix 1f. Students Questionnaire about the Teaching and Learning Process

LEMBAR ANGKET PENDAPAT SISWA TERHADAP PEMBELARAN DENGAN KONTEXTUAL MATEMATIKAYANG MENGUNAKAN METODE SCIENTIFIC

Nama/ Kelas :..... **Tanggal**:.....

A. TUJUAN

Tujuan penggunaan instrumen ini adalah untuk menjaring data pendapat siswa terhadap kegiatan dan komponen pembelajaran matematika dengan pendekatan 'contextual teaching and learning' pada materi Algebra kelas VII SMP yang menggunakan metode scientific.

B.PETUNJUK BAGI SISWA/ RESPONDEN *(Instructions for students/ responden)*

1. Kamu bebas berikan pendapat tanpa rasa takut karena apapun pendapatmu tidak akan mempengaruhi penilaian hasil belajar/ rapor.
2. Bacalah dengan seksama, dan beri tanda ceklist (√) pada kolom yang sesuai pendapatmu sendiri, tentang kegiatan belajar yang telah diikuti.

PENILAIN TERHADAP KEGIATAN PEMBELAJARAN						
Bagaimana pendapat kamu tentang:		Sangat menyenangkan	Menyenangkan	Biasa saja	Tidak menyenangkan	Sangat Tidak menyenagkan
1	Kegiatan belajar yang dilaksanakan?					
2	Suasana pembelajaran?					
3	Cara pengelompokan dalam belajar?					
4	Kegiatan diskusi dalam kelompok seperti ini?					
5	Cara belajar dengan memecahkan masalah seperti ini?					
Bagaimana pendapatmu jika:		Sangat setuju	Setuju	Ragu-ragu	Tidak setuju	Sangat tidak setuju
6	Pembelajaran selanjutnya dilaksanakan seperti ini?					
Berikan beberapa alasan singkat atas pendapatmu tersebut dan saran jika ada.						

Bagaimana pendapatmu tentang:		Sangat jelas	Jelas	Meragukan	Tidak jelas	Sangat tidal jelas
7	Petunjuk yang disajikan dalam LKS					
8	Tujuan penggunaan LKS					
9	Tugas uang ada dalam LKS					
10	Langkah-langkah kegiatan dalam LKS?					
11	Ilustrasi gambar/ grafik/ diagram yang ada di LKS?					
Bagaimana pendapatmu jika:						
12	Pembelajaran selajutnya menggunakan LKS seperti ini?					
Berikan alasan singkat terhadap pendapatmu tersebut.						

PENILAIAN TERHADAP BUKU SISWA						
Bagaimana pendapatmu tentang:		Sangat jelas	Jelas	Meragukan	Tidak jelas	Sangat tidal jelas
12	Langkah-langkah belajar di buku siswa?					
13	Materi apersepsi dan motivasi?					
14	Bahasa yang digunakan ?					
15	Gambar-gambar dan foto pada masalah kontekstual?					
16	Latihan-latihan yang tersedia?					

Appendix 1g.-Self Efficacy Blue Print

Self Efficacy Instrument Blue Print (Kisi-Kisi Instrument – Angket Self Efficacy Siswa)

A. Conceptual Definition of Self Efficacy

According to Bandura (1997), perceived self efficacy is concerned with people's beliefs in their capabilities to promote given attainments. In other words, 'perceived self efficacy are ***personal judgements of one's capabilities*** to organize and execute courses of action to attain goals (Bandura, 1977a, 1997). Zimmerman (2000), explains further that in relation to the personal judgements of one's capabilities to organize and execute courses of action to attain goals, Bandura asseses the level, generality and strength across activities and contexts. That is, in terms of level 'self efficacy refers to its dependence on the difficulty of a particular task; generality pertains to the transferability of self-efficacy beliefs across activities, such as algebra to statistics and the strength of perceived efficacy is meaured by the amount of one's certainty about performing a given task' (Zimmerman, 2000: 83). In referring to the latter, in terms of their content, self efficacy measures focus on ***performance capabilities*** rather than on personal qualities, such as one's physical or pychological characteristis. Thus, students or respondents judge their capabilities to fulfill given task demands, such as solving fraction problems in arithmetic and not who they are personally or how they feel about themselves in general. Furthermore according to Zimmerman, self efficacy beliefs are not a single disposition but rather are multidimensional in form and differ on the basis of the domain functioning.

It is also mentioned that self efficacy ought to be designed to measure variations in performance context, such as learning in a noisy lounge compared to the quitude of the library. Also it ought to be noted that self efficacy judgements are rated on difficulty level rather than how students can perform better than others on a particular task. *Self efficacy judgments therefore, should refer to future functioning and are assesed before students perform the relevant activities, which reinforce self efficacy judgements to play a causal role in academic motivation.*

B. Operational Definition

In terms of academic motivation, Usher and Pajares (2009) asserted that self efficacy is the belief students hold about their academic capabilities on academic achievement. In mathematics, math self efficacy ought to be more predictive of problem solving. For this particular study, in correspondence to the topic; **Developing Contextual Teaching Materials to Enhance Self Efficacy and Mathematics Achievement In Algebra Grade 7,** student will be assesed on their perceived capabilities in performing contextual algebraic problems using inquriy strategy through scientific method of learning . These contextual problems should have enabled students to understand algebraic concepts and enable them to transfer their algebraic knowledge to other topics in mathematics and also to other subject areas and their daily lives situations. Thus in this Math Self Efficacy in Contextual Algebra, the two main categories will be the;

(i)performance aspects – this includes the mathematics perceived capabilities of the repsondents to solve allocated algebraic problems.

(ii) behavioural aspects – the behaviour of a respondent in carrying out tasks that will enable him or her to be confident in (i). In other words how an invidual regulates him or herself in order to attian the level of perceived efficacy of his or her interest.

C. Construction of the Math Self Efficacy Scale In Contextual Algebra.

According to Bandura (2006), the standard methodology for measuring self-efficacy should be on a 0-100 point scale. However, in this study, considering the students age and their level of understanding a Likert Scale point 5 will be used ranging from Cannot do at all to Highly certain can do as specifically depicted below.

1 - Not confident at all

2 - Not confident

3 - Least confident

4 - Confident

5 - Very confident.

D. Blue Print of the Students Math Self Efficacy on Contextual Algebra.

Domains	Aspects of Self Efficacy	Judgemental Factors	No. Of Item	Item No.
Performance	Self efficacy on attempting algebraic problems.	1. Perceived capability in achieving good grades in algebra	2	1,20,
		2. Perceived capability in simplifying mathematical algebraic expression.	8	21,23, 24, 25, 26, 27, 28, 30
		3. Perceived capability on solving contextual algebraic problems.	5	22,17, 18, 19,29
Behaviour	Self efficacy in organizing oneself to learn algebra.	4. Perceived capability to contribute during group work.	2	3, 6
		5. Perceived capability to complete home works and assignments independently.	4	7, 8,9,10
		6. Self regulation in learning.	6	4, 12, 13,14,15,16
		7. Perceived capability to overcome difficulty independently.	3	2, 5,11,

Reference

Bandura, A. (1997). Self-efficacy: The exercise of control. New York: Freeman.

Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares & T. Urdan (Eds.), Adolescence and education, Vol. 5: Self-efficacy and adolescence (pp.307–337). Greenwich, CT: Information Age Publishing.

Usher, E. L., & Pajares, F. (2009). Sources of self efficacy in mathematics: A v alidation study. Contemporary Educational Psychology, 34, 89–101.

Zimmerman, B. J. (2000). Self-Efficacy: An Essential Motive to Learn. Contemporary Educational Psychology, 25, 82 - 91.

Appendix 1h – Students Self Efficacy Questionnaire

Angket Self Efficacy Siswa – PreTest dan Post-Test

Kode: ..... **Kelas:**.....

Petunjuk

1. Silahkan isilah nomor kode anda yang sudah diberikan oleh guru. Angket ini tidak mempengaruhi nilai anda, tetapi untuk mengevaluasi keyakinan anda saja dalam pembelajaran aljabar.
1. Berilah tanda cek (√) pada kolom tersedia yang sesuai dengan tingkat keyakinan anda dengan skala penilaian di bawah:

   Sangat tidak yakin 1

   Tidak yakin 2

   Ragu-ragu 3

   Yakin.....4

   Sangat yakin.....5
2. Pertanyaan-pertanyaan 21 sampai 30, bukan untuk memecahkan, tetapi untuk menunjukkan tingkat keyakinan seperti yang ditunjukkan di atas dalam mencoba pertanyaan tersebut**.**

A. <u>Menyakinan untuk menyelesaikan soal, pengaturan diri dalam belajar soal dan kerja kelompok</u>

No.	Butir	Tingkat Yakinan				
		1	2	3	4	5
1	Saya yakin dapat nilai baik dalam tes aljabar					
2	Saya dapat mengatasi kesulitan memahami aljabar dengan kerja keras.					
3	Saya perani menggungkapkan pendapat tentang permasalahan aljabar kepada teman-teman di dalam kelompok belajar.					
4	Saya dapat menuliskan jawaban persmasalah aljabar dengan alasan yang benar, jelas dan lengkap.					
5	Saya percaya dari ketika saya harus menjelaskan pendapat saya tentang permasalahan aljabar di hadapan guru dan seluruh teman-teman.					
6	Saya mendapat bertanggung jawab dengan memberikan kontribusi jawaban kualitas kepada teman-teman di dalam kelompok belajar supaya kita semua dapat belajar aljabar dengan baik.					
7	Saya dapat mengerjakan perkerjaan rumah /tugas matematika dengan mandiri.					
8	Saya dapat mengerjakan perkerjaan rumah /tugas aljabar dengan mandiri.					
9	Saya dapat menghadapi pekerjaan rumah/ tugas aljabar dengan tepat waktu.					
10	Saya dapat bekerja keras untuk menyelesaikan perkerjaan rumah/tugas aljabar yang sulit.					
11	Apapun tugas aljabar yang saya hadapi, saya dapat menyelesaikan tugas tersebut.					
12	Saya dapat mengatur waktu dengan baik untuk belajar aljabar.					
13	Saya dapat berkonsentrasi dengan baik elama pembelajaran aljabar berlangsung.					
14	Saya dapat membuat catatan aljabar yang baik untuk membantu ingatan saya.					
15	Saya dapat mencari tempat yang untuk belajar untuk membantu saya berkonsentrasi.					
16	Saya dapat mengatasi kecemasan terhadap tes aljabar dengan mempersiapkan diri sebaik mungkin.					

17	Saya dapat menggunakan aljabar untuk menyelesaikan masalah matematika dalam topik lain matematika lain seperti Segitiga dan Segiempat.					
18	Saya dapat menggunakan aljabar untuk memecahkan masalah mata pelajaran lain seperti IPS.					
19	Saya dapat mengaitkan aljabar yang saya pelajari dengan contoh kehidupan nyata.					
20	Saya yakin memperoleh hail baik di kelas 8					
21	Saya dapat menyelesaikan soal aljabar sebagai berikut. **Konstanta bentuk aljabar** $2x^3y^6 - 4xy^4 + 3 + 5x^2$ **adalah** ...					
22	Saya dapat menyelesaikan soal aljabar sebagai berikut. **Putri menabung untuk membeli sebuah tablet. Tuliskan bentuk aljabar untuk menunjukan jumlah uang yang akan dia punya jika dia memiliki tabungan sebesar *'s'* dollar dan dia menambahkan *'d'***					
23	Saya dapat menyelesaikan soal aljabar sebagai berikut. $Hasil\ dari\ 7v^6w^8 + 10v^2w^6 - 2vw + 6v^6w^8 + -3v^2w^6$ **adalah...**					
24	Saya dapat menyelesaikan soal aljabar sebagai berikut. **Hintunglah bentuk aljabar .....$x^2y^3 \times 4xy : (4xy)^2$**					
25	Saya dapat menyelesaikan soal aljabar sebagai berikut. **Hasil dari** $\frac{8x}{5} - \frac{3x}{4} + \frac{7x}{10}$ **adalah....**					
26	Saya dapat menyelesaikan soal aljabar sebagai berikut. **Bentuk sederhana dari** $\frac{10r^3}{6n^3} \cdot \frac{42n^2}{35r^3}$ **adalah...**					

27	Saya dapat menyelesaikan soal aljabar sebagai berikut. **Bentuk sederhana dari $\frac{6a^2b^2}{8c} \div 3ab$ adalah...**					
28	Saya dapat menyelesaikan soal aljabar sebagai berikut. **Penyelesain dalam $\frac{2}{4}x - 5 = -17$ adalah...**					
29	Saya dapat menyelesaikan soal aljabar sebagai berikut. **Untuk pertemuan kelas, Pak Jono membeli persedian air. Dia membelanjakan Rp 50.000,00. Dia membeli satu teko air dengan harga Rp20.000,00 dan 6 gelas. Setiap gelas memiliki harga yang sama. Menentukan bentuk persamaan linear dari aktivitas yang dilakukan Pak**					
30	Saya dapat menyelesaikan soal aljabar sebagai berikut. **Penyelesaian dari $5x - (7x - 4^2) > -4$ adalah...**					

B. Keyakinan dalam mendapatkan nilai baik di Tes Aljabar.

Saya dapat menyelesaikan dengan baik.

Tingkat Yakinan

(1-5)

10% soal tes....._____

20% soal tes....._____

30% soal tes....._____

40% soal tes....._____

50% soal tes ....._____

60% soal tes....._____

70% soal tes....._____

80% soal tes....._____

90% soal tes....._____

100% soal tes ....._____

Terima kasih banyak!

Appendix 1i-Students Self Efficacy Questionnaire Validation Sheet

LEMBAR VALIDASI ANGKET SELF EFFICACY MATEMATIKA SISWA

(Students mathematics self-efficacy questionnaire validation sheet)

A. Tujuan *(Objectives)*

Penggunaan instrument ini adalah untuk mengukur kevalidan isi instrument angket self-efficacy matematika siswa.

B. Petunjuk *(Instructions)*

a) Objek validasi adalah instrument angket siswa. *(The validated object is the students questionnaire instruments)*

b) Bapak/ Ibu dimohon memberi penilaian dengan tanda cek (√) pada kolom yang tersedia. *(The validators are requested to put the checklist sign (√) on the coloumn provided)*

c) Poin validasi adalah sebagai berikut. (*Validation points are provided below)*

1 = tidak valid *(not valid);* 2 = kurang valid *(less valid);* 3= cukup valid *(valid enough*); 4= valid *(is valid)* 5= sangat valid *(is certainly valid*)

C. PENILAIAN *(Evaluation)*

No.	Aspek Penilaian (Evaluation Aspects)	Poin Validatas (Evaluation Points)				
1	**Isi (Contents)**	**1**	**2**	**3**	**4**	**5**
	a. Kesesuaian kisi-kisi dengan definisi operasional. *(Blue pint uses operational definition)*					
	b. Kesesuain butir-butir angket dengan kisi-kisi. *(Questionnaire items is in accord with the blue print)*					
	c. Keterwakilan setiap indikator pada butir-butir angket. *(Every indicator is represented in the questionnaire items)*					
	d. Kecukupan jumlah butir. *(There is enough items to be tested)*					
2	**Bahasa (Languages)**					
	a. Penggunaan bahasa ditinjau dari kaidah bahasa Indonesia. *(Language used is in accord with the principles of the Indonesian language)*					
	b. Struktur kalimat sederhana . *(The sentence structure is simple)*					
	c. Kalimat tidak mengandung ambiguitas. *(There is no ambiguity in the sentence)*					
Penilaian secara umum instrument angket (Overall evaluation of the questionnaire instrument)		**Kesimpulan penilaian (Final Evaluation)**				
	Penilaian secara umum terhadap (General Evaluation)	**LD**		**LDR**	**TLD**	

Keterangan:

LD: Layak digunakan

LDR: Layak digunakan dengan revisi

TLD: Tidak layak digunakan

D. Masukan Validator

.....

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Yogyakarta,.....2014

Validator;

.....

Appendix 1j-Achievement Test Blue Print

Grade 7 Algebra Topic Test – Blueprint

(Kisi-kisi Soal Tes)

A. Sub-Topics

Chapter 1 – Elements of Algebraic Expression

Chapter 2 – Simplification of algebraic expressions

Chapter 3 – Solving Linear Equations of One Variable

Chapter 4 – Soving Linear Inequations of One Variable

B. Test Format and Marks Allocation

Multiple Choice Questions

20 Questions = 20 marks (1 mark each)

C. Time: 40 mins

No. Of Students: 32

E. Blue Print Summary Table

Basic Competence	Main Materials	Achievement Indicator	Cognitive Aspect	No. Of Items
Menyelesaikan persamaan dan pertidaksamaan linear satu variable.	Elements of algebaric expression	○ Identify elements of algebraic expression	C1[8]	3
	Simplication of algebraic expression.	○ Add and subtract algebraic expressions	C3[1]	1
	Application of algebra	○ Mulitiply and divide monomials	C3	3
	Solving linear equation of in the form of mathematics problems.	○ Multiply and divide algebraic fractions	C3	2
		○ Add and subtract algebraic fractions	C3	1
	Solving Linear Inequation in the form of mathematics problems.	○ Solve linear equation	C3	2
		○ Solve linear inequation	C3	2

[8] Source: Anderson, Lorin W. & Krathwohl, David R. (2001). *A Taxonomy for Learning, Teaching and Assessing: a Revision of Bloom's Taxonomy*. New York. Longman Publishing.

Membuat dan menyelesaikan model matematika dari masalah nyata yang berkaitan dengan persamaan dan pertidaksamaan linear satu variabel.	Form algebraic equations from real world problems and solve them.	○ Model algebraic expression from real world problems and solve them	C2[9]	1
	Form algebraic inequations from real world problems and solve them.	○ Model algebraic expression equation from real world problems and solve them	C2	1
	Applications of linear equation and linear inequation.	○ Model algebraic inequation from real world problems and solve them	C2	1
		○ Apply the concepts of linear equation and inequation to solve problems.	C3	3

[9] Source: Anderson, Lorin W. & Krathwohl, David R. (2001). *A Taxonomy for Learning, Teaching and Assessing: a Revision of Bloom's Taxonomy*. New York. Longman Publishing

Appendix 1k-Achievement Test

UJIAN KOMPETENSI – PENDEKATAN KONTEKSTUAL MATEMATIKA

Pililah jawaban yang tepat pada soal-soal berikut! Tulislah jawaban yang anda dipilih di LEMBAR JAWABAN tersedia.

1. Yang merupakan konstanta bentuk aljabar $5x^3y^6 - 6xy^4 + 2 + 5x^2 adalah \ldots$

   A. (x,y) B. -6 C. 2 D. $5x^2$

2. Variabel bentuk aljabar $\frac{3}{5}m^6n^2 \times 4ab$ adalah...

   A. $(m^6 n^2)$ B. (6,2) C. (m, n, a, b) D. $(\frac{3}{5}, 4)$

3. Koefisien dari suku r^2t pada bentuk aljabar $3r^9s^8t^6 - r^2t + 4$ adalah...

   A. 4 B. 3 C. 2 D. -1

4. Zaifa menabung untuk membeli sebuah tablet SAMUNG. Tuliskan bentuk aljabar untuk menunjukan jumlah uang yang akan dia punya jika dia memiliki tabungan sebesar '***s***' dollar dan dia menambahkan ***'d'*** dollar per minggu untuk 13 minggu kemudian.

   A. $13s + d$ B. $13d + s$ C $13d + 13s$ D. $s + d$

5. $Hasil\ dari\ 10v^6w^8 + 2v^2w^6 - 3vw + 4v^6w^8 - 3v^2w^6$ adalah...

   A. $-13v^6w^8 - 5v^2w^6 - 3vw$

   B. $12v^6w^8 - v^2w^6 + 3vw$

   C. $7v^6w^8 + 13v^2w^6 - 2vw$

   D. $14v^6w^8 - v^2w^6 - 3vw$

6. Bentuk sederhana dari $(a^5b^4)^8$ adalah....

A. $a^{40}\,b^{32}$ B. $a^{13}b^{12}$ C. $a^9\,b^{12}$ D. ab

7. Bentuk sederhana dari $(-2b^3)^3 \times 3(-2b^4)^2$ adalah...

A-$8b^9$- $12b^8$ B. -$6b^9$ C. $8b^9$+ $12b^8$ D. -$96b^{17}$.

8. Bentuk sederhana dari $5x^2y : 25xy^2$ adalah....

A. $\frac{5x}{25y}$ B. $\frac{x}{5y}$ C. $\frac{x}{y}$ D. $\frac{x^2y}{xy^2}$

9. Hasil dari $\frac{-5x}{5} + \frac{7x}{4} - \frac{3x}{10}$ adalah....

A. $\frac{9x}{10}$ B. $\frac{-x}{10}$ C. $\frac{9x}{20}$ D. $\frac{17x}{20}$

10. Bentuk sederhana dari $\frac{15r^4}{24n^5} \cdot \frac{96n^2}{35r^3}$ adalah...

A. $\frac{1440r^4n^2}{840n^5r^3}$ B. $\frac{12r}{7n}$ C. $\frac{12r^3n^2}{7nr}$ D. $\frac{42rn}{21nr}$

11. Bentuk sederhana dari $\frac{8a^2b^2}{10c} \div 4ab$ adalah...

A. $\frac{ab}{5c}$ B. $\frac{16a^3b^3}{5c}$ C. $\frac{8a^2b^2}{40abc}$ D. $\frac{ab}{6c}$

12. Penyelesain persamaan dalam $\frac{2}{4}x - 7 = -8$ adalah....

A.x = 30 B.x = -2 C.x = 12.5 D.x = 5

13. Untuk pertemuan keluarga, Pak Agus membeli persedian air. Dia membelanjakan Rp 65.000,00. Dia membeli satu teko air dengan harga Rp24.000,00 dan 8 gelas. Setiap gelas memiliki harga yang sama. Menentukan bentuk persamaan linear dari aktivitas yang dilakukan Pak Jono tersebut.

A. $24.000x + 8.000 = 65.000$ B. $65.000x - 8x = 24.000$

C. $65.000 + 8x = 24.000$ D. $65x + 24.000 = 8.000$

14. Jika p = 2, q = -3, dan r = 5, nilai dari $pr^3 - pq$ adalah.....

A. 4 B. 256 C. 254 D. 369

15. Penyelesaian dari $5x - (7x - 4^2) > -4$ adalah...

A. $x > -6$ B. $x < 10$ C. $x < 6$ D. $x > -10$

16. Dalam survei terbaru, ditemukan bahwa lebih dari 21 juta orang yang berumur antara 12 sampai 17 menggunakan internet. Dari yang menggunakan internet tersebut, sebanyak 16 juta mengatakan mereka menggunakan internet di sekolah. Bentuk pertidaksamaan dari total orang yang menggunakan internet di sekolah dan di luar sekolah adalah.....

A. $16 + x < 21$ B. $16 - x < 21$

C. $16 + x > 21$ D. $16 - x > 21$

17. Himpunan penyelesain dari peramaan ini $\frac{2p-1}{3} - \frac{p-2}{2} > 1$, P ε Q adalah

A. {P| P > -14, P ε Q}
B. {P| P > $-1\frac{1}{4}$, P ε Q}
C. {P| P > 2, P ε Q}
C. {P| P > 14, P ε Q}

18. Pak Mahmudi bekerja di pabrik sepatu. Dia mendapatkan Rp 35.000,00. Dia mendapatkan tambahan pembayaran sebesar 10%. Dia bekerja 24 hari dalam satu bulan. Berapa banyak uang dia akan dapatkan untuk bulan itu.

A. Rp840.000,00
B. Rp900.000,00
C. Rp924.000,00
D. Rp84.000,00

19. Mas Farhan membeli motor dengan harga Rp 14.500.000,00Rp. Kemudian motor tersebut diperbaiki di bengkel motor. Mas Farhan menghabiskan Rp55.000,00 untuk biaya perbaikan. Mas Farhan lalu menjual motor tersebut. Ternyata, Mas Farhan mengalami rugi sebesar Rp Rp2.000.000,00. Tentukan persentase kerugian yang dialami Mas Farhan.

A. 13, 47% B.13,74 % C.14,74% D. 14,47%

20. Sebuah persegi panjang memiliki ukuran panjang 8m lebih panjang dari pada lebarnya. Jika keliling peregi panjang adalah 40m, maka lebar dan panjang dari persegi panjang tersebut adalah

A. lebar = 4m, panjang = 12m
B. lebar = 12m, panjang=4m
C.lebar = 14m, panjang = 6m
D.lebar = 6m, panjang = 14m

All the best!!!

UJIAN KOMPETENSI – PENDEKATAN KONTEKSTUAL MATEMATIKA

LEMBAR JAWABAN

Pelajaran: Matematika **Kelas:** VIIC/7C

Hari/ Tanggal:..... **Nama**: .....

Materi: Aljabar **No:** .....

Lingkari jawaban yang benar dari pernyataan-pernyataan tersedia.

1	**A**	**B**	**C**	**D**		**11**	**A**	**B**	**C**	**D**
2	**A**	**B**	**C**	**D**		**12**	**A**	**B**	**C**	**D**
3	**A**	**B**	**C**	**D**		**13**	**A**	**B**	**C**	**D**
4	**A**	**B**	**C**	**D**		**14**	**A**	**B**	**C**	**D**
5	**A**	**B**	**C**	**D**		**15**	**A**	**B**	**C**	**D**
6	**A**	**B**	**C**	**D**		**16**	**A**	**B**	**C**	**D**
7	**A**	**B**	**C**	**D**		**17**	**A**	**B**	**C**	**D**
8	**A**	**B**	**C**	**D**		**18**	**A**	**B**	**C**	**D**
9	**A**	**B**	**C**	**D**		**19**	**A**	**B**	**C**	**D**
10	**A**	**B**	**C**	**D**		**20**	**A**	**B**	**C**	**D**
TOTAL KOLOM 1						**TOTAL KOLOM 2**				

KUNCI JAWABAN *(Answer Sheet)*

No.	**Jawaban *(Answers)***
1	C
2	C
3	C
4	B
5	D
6	A
7	D
8	B
9	C
10	A
11	C
12	B
13	A
14	B
15	B
16	C
17	C
18	C
19	B
20	D

Appendix 1l-Achievement Test Validation Sheet

LEMBAR PENILAIAN VALIDATOR TERHADAP

TES HASIL BELAJAR (THB)

A. TUNJUK *(Objectives)*

Instrumen ini digunakan untuk mengukur kevalidan komponen-komponen Tes-Hasil Belajar yang telah disusun. (The main objective of this validation sheet is to evaluate and measure the components of this validation sheet for the summative assessment that has already been prepared)

B. **PETUNJUK** *(Instruction)*

1. Objek penilaian adalah Tes Hasil Belajar (THB). (The object to be evaluated is the Achievement Test).

2. Bapak/ Ibu dapat memberikan penilaian dengan cara memberikan tanda (√) pada kolom yang tersedia pada tabel berikut. (The validator is requested to evaluate the components of this Achievement Test by placingg a (√) on the appropriate coloumn provided)

3. Skala penilaian mulai 1 s.d 5 dengan makna sebagai berikut: (Evaluation scale provided initiates from 1 to 5 with the corresponding description provided below)

1 = tidak baik (poor)

2 = kurang cukup (statisfactory)

3 = cukup baik (good)

4 = baik (very good)

5 = sangat baik (excellent)

C. PENILAIAN *(Evaluation)*

No.	**Aspek Penilaian (Aspects to be evaluated)**	**Poin Validatas (Evaluation Points)**				
		1	**2**	**3**	**4**	**5**
1	**Kisi-Kisi (Blue Print)**					
	1. Dapat digunakan sebagai pedoman untuk merancang penulisan butir-soal. *(The blue print serves it purpose in acting as aguide for the preparations of the items)*					
2	**Tes hasil Belajar (Achievement Test)**					
	1. Butir soal sudah sesuai dengan indikator yang ditetapkan. (The test items is in accord with the achievement indicators)					
	2. Butir soal dirumuskan dengan singkat dan jelas. (The test items are well formulated and explained)					
	3. Soal menggunakan bahasa yang sesuai dengan kaidah Bahasa Indonesia yang baik dan benar. (Language used is in accord with the principles of the Indonesian Language)					
	4. Rumusan kalimat soal komunikatif, menggunakan bahasa sederhana, mudah dimengerti dan menggunakan kata-kata yang dikenal peserta didik. (Language used is communicative, simple, easy to understand and the words used are familliar to the students)					
3.	**Penilaian secara umum instrument Tes Hasil Belajar**					
Penilaian secara umum terhadap		**Kesimpulan Penilaian**				
		LD	**LDR**		**TLD**	

Keterangan:

LD: Layak digunakan *(Is fit to be used)*

LDR: Layak digunakan dengan revisi *(Is fit to be used after revision)*

TLD: Tidak layak digunakan (*Is not fit to be used)*

D. Masuka Validator

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.....
.....

Yorgyakarta,.....2014
Validator:
.....

APPENDIX 2

RESEARCH RESULTS AND DATA ANALYSIS

Appendix 2a- Students Textbook Validation Results & Analysis

STUDENTS TEXTBOOK VALIDATION RESULTS AND ANALYSIS
DEVELOPING CONTEXTUAL BASED TEACHING MATERIALS

No	Evaluated Aspects	No. Of Items	Validators Evaluation	X	Category
	Format Buku (Students Book Format)				
1	Kejelasan pembagian materi (Materials consistently layed out)	**6**	**3**	**22**	**Very Good**
2	Penomoran (Numbering System)		**3**		
3	Kemenarikan (Appealing and attractive appearance)		**4**		
4	Kesesuaian antara teks dan ilustrasi (Text is in accord with illustration)		**4**		
5	Jenis ukuran huruf (Variations in fonts)		**4**		
6	Pengaturan ruang tata letak (Spaces are well managed)		**4**		
	Isi Buku (Book Contents)				
7	Kesesuain dengan KD dan SKL (Is in accord with KD & SKL)	**7**	**4**	**26**	**Very Good**
8	Kebenaran konsep/ kebenaran materi (Materials and concepts used is correct)		**4**		
9	Kesesuaian urutan materi (Materials are in the right order)		**4**		
10	Kesesuain dengan pembelajaran pendekatan CTL (Is in accord with CTL)		**3**		
11	Kesesuain dengan LKS dan RPP (Is in accord with SW & TLP)		**3**		
12	Keajegan penggunaan istilah dan simbol (Terms & symbols are used appropriately)		**4**		
13	Mengembangkan keterampilan proses pemecahan masalah/ berfikir tingkat tinggi (Develop skills for problem solving and higher order thinking)		**4**		
	Bahasa dan tulis (Language and writing)				
14	Menggunakan bahasa yang komunikatif dan struktur kalimat sederhana, sesuai dengan taraf berpikir dan kemampuan membaca serta usia siswa (Language and sentences		**4**		**Excellent**

	used is appropriate to age and students cognitive level)				
15	Menggunakan Bahasa Indonesia yang baik dan benar (Indonesia languange used is correct and appropriate at this level of education)	**3**	**4**		
16	Menggunakan arahan dan petunjuk yang jelas, sehingga tidak, menimbulkan penafsiran ganda (Instructions used were well explained so that it does not interfere with students assessments)		**4**	**12**	
	Ilustrasi, tata letak tabel, gambar dan grafik (Illustrations, table arrangements, pictures and graphs)				
17	Buku disertai dengan ilustrasi, tabel, gambar dan grafik yang berkaitan langsung dengan materi pelajaran atau konsep yang dibahas (The use of illustrations, table, pictures and graphs is in accord with the learning mnaterials and concepts used)		**4**		
18	Ilustrasi, table, gambar dan grafik dibuat dengan tata letak secara efektif (The location of illustrations, tables, pictures and graphs are effective)	**4**	**4**		**Excellent**
19	Ilustrasi, tabel, gambar dan grafik dapat digunakan untuk memperjelas konsep/ mater (The illustrations, table, pictures and graphs is also used to explain the concepts and materials)		**4**		
20	Ilustrasi, tabel, gambar dan grafik menarik, jelas terbaca dan mudah dipahami (The illustrations, table, pictures and graphs used captures interests and easy to understand)		**4**	**16**	
TOTAL SCORE		**76**			**Very Good**
Maximun Score		**100**			
Minimum Score		**20**			
Xi		**60**			
Isd		**13.3**			
Overall Evaluations of the students textbook (ST)		**To be used for trial out after revision**			

Appendix 2b- Teachers Lesson Plan Validation Results & Analysis

TEACHERS LESSON PLAN VALIDATION RESULTS AND ANALYSIS
DEVELOPING CONTEXTUAL BASED TEACHING MATERIALS

No	Evaluated Aspects	No. Items	Validators Evaluation		∑scores/item	X	Category
			I	II			
A. Identitas Mata Pembelajaran (Identifying the Course)							
1	Satuan pendidikan, kelas, semester, program/ program keahlian, mata pembelajaran atau tema pembelajaran, jumlah pertemuan. (Level of education, grade, term, course of study, learning theme, and total number of classes)	**2**	**5**	**4**	**9**	**9**	**Excellent**
B. Perumusan Indikator (Formulation of Achievement indicators)							
2	Kesesuain dengan SKL, KI dan KD. (Is in accordance with SKL, KI and KD)	**8**	**5**	**4**	**9**	**26**	**Excellent**
3	Kesesuain penggunaan kata kerja operasional dengan competensi yang diukur. (In accordance with operational verbs to measure the appropriate competent)		**5**	**4**	**9**		
4	Kesesuain materi ajar untuk mencapai SK/KD. (The learning material is in accord of the SK/KD achievements)		**4**	**4**	**8**		
C. Perumusan Tujuan Pembelajaran (Formulation of Learning Objectives)							
5	Kesesuain dengan proses dan hasil belajar yang diharapkan dicapai.(Is in accordance with the achieving the results of the teaching and learning process)	**6**	**4**	**4**	**8**	**25**	**Excellent**
6	Kesesuain dengan kompentensi dasar. (Is in accordance with the basic competences)		**5**	**4**	**9**		
7	Keberadaan langkah-langkah pembelajaran. (Conveying the learning process		**4**	**4**	**8**		

	steps with assessments undertaken)						
D. Pemilihan Materi Ajar (Selection of Teaching Materials)							
8	Kesesuain dengan materi matematika kontextual menggunakan dunia nyata pendidikan. (Is in accordance with contextual mathematics using real world education).	**8**	**4**	**4**	**8**	**33**	**Excellent**
9	Kesesuain dengan tujuan pembelajaran. (Is in accordance to objectives of the lesson).		**4**	**4**	**8**		
10	Kesesuain dengan karakteristik peserta didik. (Is suited to the education level at middle school and students characteristic).		**5**	**4**	**9**		
11	Kesesuain dengan alokasi waktu. (Is in accordance with the time allocated).		**4**	**4**	**8**		
E. Model dan Skenario Pembelajaran (Model & Scenario of the Teaching and Learning Process)							
12	Kesesuain dengan pendekatan scientific. (Is in accordance with the scientific method of learning)	**4**	**4**	**4**	**8**	**16**	**Excellent**
13	Kesesuain kegiatan dengan pendekatan scientific (Is in accordance with scientific approach activities)		**4**	**4**	**8**		
F. Penilaian (Class Assessments)							
14	Kesesuain dengan teknik dan bentuk penilain autentik. (Is in accordance with techniques of authentic assessment)	**8**	**4**	**4**	**8**	**34**	**Excellent**
15	Kesesuain dengan indikator pencapain kompetensi. (Is in accordance with achieving the desired competence)		**4**	**4**	**8**		
16	Kesesuain kunci jawaban dengan soal. (Prepared answers is in accord to the questions provided)		**5**	**4**	**9**		
17	Kesesuain pedoman penskoran dengan soal (Mark sheet is in accord with the		**5**	**4**	**9**		

	questions provided)						
TOTAL SCORE		**157**					**Excellent**
Maximun Score		**180**					
Minimum Score		**36**					
Xi		**108**					
ISD		**24**					
Overall Evaluations of the Teachers Lesson Plan (TLP)		**To be used for try-out without revision**					

Appendix 2c- Students Worksheet Validation Results & Analysis

STUDENTS WORKSHEET VALIDATION RESULTS AND ANALYSIS
DEVELOPING CONTEXTUAL BASED TEACHING MATERIALS

No	Evaluated Aspects	No. Item	Validators Evaluation		∑scores/item	X	Category
			I	II			
A. Kelayakan Materi Isi (Worthiness of the SW)							
1	Kesesuain dengan sandar isi (Is in accordance with standard contents)		**5**	**4**	**9**		**Excellent**
2	Kesesuain dengan RPP (Is in accordance with Teachers Lesson Plan)		**5**	**4**	**9**		
3	Kebenaran materi kontekstual matematika. (Using contextual mathematics materials)		**5**	**4**	**9**		
4	Kesesuain dengan perkembangan anak. (Is appropriate in developing students)		**4**	**4**	**8**		
5	Kesesuain dengan metode scientific yang digunakan. (Is in accordance with the scientific method)	**14**	**5**	**4**	**9**	**59**	
6	Kesesuain urutan materi. (The materials are in order as planned)		**4**	**4**	**8**		
7	Keajegan penggunaan isitilah (Material is suitable)		**4**	**3**	**7**		
B. Kesesuaian Penyajian (Appropriate Presentation)							
8	Kejelasan tujuan yang ingin dicapai (Explain the objectives needed to be achieved)		**5**	**4**	**9**		**Excellent**
9	Kemenarikan tampilan (Appealing and interesting presentation)		**4**	**4**	**8**		
10	Kesesuain penggunaan jenis huruf (Letters and characters are used	**8**	**4**	**4**	**8**	**33**	

	accordingly)						
11	e. Kesesuain ilustrasi/ gambar/ foto (Appropriate use of illustrations and pictures)		**4**	**4**	**8**		
C.Kesesuaian Bahasa (Appropriate Language Use)							
12	Kesesuain dengan kaidah Bahasa Indonesia yang baik dan benar (Indonesian language used is appropriate)	**4**	**4**	**4**	**8**	**17**	**Excellent**
13	Kalimat yang digunakan mudah dipahami. (Sentence used is simple and easy to understand)		**4**	**4**	**9**		
TOTAL SCORE		**103**					
Maximun Score		**109**					**Excellent**
Minimum Score		**78**					
Xi		**26**					
isd		**17.3**					
Overall Evaluations of the Students Worksheet (SW)		**To be used for trial out after revision**					

Appendix 2d- Self Efficacy Questionnaire Validation Results & Analysis

STUDENTS MATHEMATICS SELF EFFICACY QUESTIONNAIRE CONTENT VALIDITY RESULTS AND ANALYSIS DEVELOPING CONTEXTUAL BASED TEACHING MATERIALS

No	Evaluated Aspects	No. Item	Validators Evaluation		∑scores/item	X	Category
			I	II			
A. Isi (Contents)							
1	Kesesuaian kisi-kisi dengan definisi operasional.	**8**	**4**	**4**	**8**	**31**	**Excellent**
2	Kesesuain butir-butir angket dengan kisi-kisi.		**4**	**4**	**8**		
3	Keterwakilan setiap indikator pada butir-butir angket.		**4**	**4**	**8**		
4	Kecukupan jumlah butir.		**3**	**4**	**7**		
B. Bahasa (Language)							
5	Penggunaan bahasa ditinjau dari kaidah bahasa Indonesia.	**6**	**3**	**4**	**7**	**24**	**Very Good**
6	Struktur kalimat sederhana .		**4**	**4**	**9**		
7	Kalimat tidak mengandung ambiguitas.		**4**	**4**	**8**		
TOTAL SCORE		**55**					**Excellent**
Maximun Score		**70**					
Minimum Score		**14**					
Xi		**42**					
ISD		**9.3**					
Overall Evaluations of the students textbook (ST)		**Is fit to be used after revision**					

Appendix 2e- Achievement Test Content Validity Result & Analysis

ACHIEVEMENT TEST CONTENT VALIDITY RESULT
DEVELOPING CONTEXTUAL BASED TEACHING MATERIALS

No	Evaluated Aspects	No. Item	Validators Evaluation		∑scores/item	X	Category
			I	II			
	Kisi-kisi (Blue Print)						
1	Dapat digunakan sebagai pedoman untuk merancang penulisan butir soal. (Objectives of the blue-print are being fulflled)		**4**	**4**	**8**	**16**	**Excellent**
2	Dapat menjamin validasi isi tes dan relevansi kemampuan peserta didik yang diukur. (Is in accord with test validation contents and relevant to students capabilities)		**4**	**4**	**8**		
	B. Tes Hasil Belajar (Summative Assessment)						
3	Butir soal sudah sesuai dengan indikator yang ditetapkan. (The test items is in accord with the achievement indicators)		**4**	**4**	**8**	**31**	**Very Good**
4	Butir soal dirumuskan dengan singkat dan jelas. (The test items are well formulated and explained)		**4**	**4**	**8**		
5	Soal menggunakan bahasa yang sesuai dengan kaidah Bahasa Indonesia yang baik dan benar. (Language used is in accord with the principles of the Indonesian language)		**4**	**4**	**8**		
6	Rumusan kalimat soal komunikatif, menggunakan bahasa sederhana, mudah dimengerti dan menggunakan kata-kata yang dikenal peserta didik. (Language used is communicative, simple and easy to understand.		**4**	**3**	**7**		
	TOTAL SCORE	**47**					**Very Good**
	Maximun Score	**60**					
	Minimum Score	**12**					
	Xi	**36**					
	ISD	**8**					

Appendix 2.f – Teachers Evaluation on ST, TLP & SW

TEACHER'S EVALUATION RESULTS & ANALYSIS ON ST, TLP, SW & AT DEVELOPING CONTEXTUAL BASED TEACHING MATERIALS

No	Evaluated Aspects	No. Item	Teachers Evaluation	X	Category
A. Buku Siswa (Students Textbook)					
1	Kejelasan komponen buku (There is clarity in the students textbook)	**6**	**4**	**24**	**Most Probably Feasible**
2	Kesesuain standar kompetensi dengan kompetensi dasar (Basic competence is in accord with standard competence)		**5**		
3	Kejelasan materi (There is clarity in the material used)		**5**		
4	Ketepatan bahasa yang digunakan dengan kaidah bahasa Indonesia (The Indonesian language used is accurate)		**3**		
5	Kemudahan memahami bahasa yang digunakan (The language used is simple and easy to understand)		**3**		
6	Kejelasan sumber belajar yang digunakan (Clarify the sources/ reference of the lesson)		**4**		
B. Rencana Pelaksanaan (Teachers Lesson Plan)					
7	Kejelasan komponen RPP (There is clarity in the components of the TLP)	**7**	**5**	**25**	**Most Probably Feasible**
8	Kepraktisan komponen RPP dalam pembelajaran (There is praticality in the components of the TLP)		**5**		
9	Ketepatan bahasa yang digunakan dengan kaidah bahasa Indonesia (Accuracy in the use of the Indonesian lanuguage)		**3**		
10	Kemudahan memahami bahasa yang digunakan (The language used is simple and easy to understand)		**4**		
11	Kejelasan bahasa yang digunakan sehingga tidak menimbulkan penafsiran ganda (There is no multiple representations in the language used)		**4**		
12	Kesesuain/ kecukupan waktu yang disediakan untuk tahapan pembelajaran (Time allocated for the lessons were well utilized)		**4**		

13	Kejelasan setiap tahapan pembelajaran (Each step of the lesson were well executed)		**4**		
C. Lembar Kegiatan Siswa (Students Worksheet)					
14	Kesesuain dengan SK/KD (Is in accord with the Standard Competence and Basic Competence)	**5**	**4**	**20**	**Most Probably Feasible**
15	Kesesuain dengan kebutuhan bahan ajar (Is in accord with the requirements of the teaching materials)		**3**		
16	Pemfasilitasian pelibatan peserta didik dalam proses pembelajaran (Is students centered)		**5**		
17	Pemfasilitan peserta didik untuk presentasi bekerja secara individual atau kelompok (Facilitates students for group learning or indivudually)		**5**		
18	Kejelasan bahasa yang digunakan (There is clarity on the language used)		**3**		
D. Tes Hasil Belajar (Achievement Test)					
19	Kejelasan petunjuk megerjakan soal (Instructions on the questions are clearly explained)	**6**	**3**	**19**	**Feasible**
20	Kesesuain soal dengan indikator pencapaian hasil belajar (Is in accord with the achievement indicators)		**4**		
21	Tujuan soal dirumuskan dengan singkat dan jelas (Objectives of the problems are well explained and formulated)		**3**		
22	Bahasa yang digunakan sesuai dengan kaidah Bahasa Indonesia (Language used is appropriate and decent under the Indonesian language principles)		**3**		
23	Kemudahan memahami bahasa yang digunakan (Language is simple and easy to understand)		**3**		
24	Kejelasan bahasa yang digunakan, sehingga tidak menimbulkan penafsiran ganda. (There is no multiple representations in the language used)		**3**		
	TOTAL SCORE	**88**			**Most Probably feasible**
	Maximun Score	**120**			
	Minimum Score	**24**			
	Xi	**72**			
	ISD	**16**			
	Overall Evaluations of the Achievement Test (AT)	**The products are practical**			

Appendix 2.g – Teachers Evaluation on Teaching and Learning Process

TEACHER'S QUESTIONNAIRE RESULT & ANALYSIS ON LESSON IMPLEMENTATION DEVELOPING CONTEXTUAL BASED TEACHING MATERIALS

No	Evaluated Aspects	No. Item	Teacher Evaluators		∑scores/item	X	Category
			LI	L2			
A. Kegiatan Awal, Orientasi (Identifying the Course)							
1	Pembukaan pembelajran dengan salam dan do'a (Opening the lesson with prayer)	**10**	**5**	**5**	**10**	**40**	**Most Probably feasible**
2	Pengumuman hasil kuis atau PR. (Announcing homework or quiz results)		**4**	**5**	**9**		
3	Penyampaian tujuan pembelajaran oleh guru. (Delievering the lesson objectives)		**4**	**4**	**8**		
4	Penyampaian langkah-langkah pembelajaran oleh guru.(Delievering the activities and the learning process)		**4**	**3**	**7**		
5	Mendemonstrasikan sesuatu yang terkait dengan materi pembelajaran.(Demonstrating something that is related to the learning materials)		**3**	**3**	**6**		
B. Penyampain Kompetensi dan Rencana Kegitan (Announcing the competence and learning activities)							
6	Menyampaikan kemampuan yang akan dicapai peserta didik. (Stating the competencies required)	**4**	**4**	**3**	**7**	**14**	**Most probably feasible**
7	Menyampaikan rencana kegiatan misalnya, individual, kerja kelompok, dan melakukan observasi (Announcing the types of co-operative learning that will be used)		**3**	**4**	**7**		
C.Kegiatan Inti (Contents of the Lesson)							
8	Kemampuan menyesuiakan materi dengan tujuan pembelajaran. (The level of		**3**	**4**	**7**		

	material provided is in accord with the learning objectives)	**8**				**31**	**Is certainly feasible**
9	Kemampuan mengkaitkan materi dengan pengetahuan lain yang relevan, dan kehidupan nyata. (Using the contextual mathematics to connect relevant knowledge to daily living)		**4**	**4**	**8**		
10	Menyajikan pembahasan materi pembelajaran dengan tepat. (Accurate discussion presentation of the learning material)		**4**	**4**	**8**		
11	Menyajikan materi secara sistematis (mudah ke sulit, dari konkrit ke abstrak) (Materials are presented from concrete to abstract)		**4**	**4**	**8**		
D.Penerapan Strategi Pembelajaran yang Mendidik (Implementation of Learning Strategi)							
12	Melaksanakan pembelajaran sesuai dengan kompetensi yang akan dicapai. (Perform learning according to competence that needs to be achieved)	**12**	**3**	**5**	**8**	**48**	**Most Probably feasible**
13	Melaksanakan pembelajaran secara runtut. (Orderly flow of the lesson)		**4**	**4**	**8**		
14	Menguasai kelas. (There is class management)		**4**	**4**	**8**		
15	Melaksanakan pembelajaran yang bersifat kontekstual (Perform contextual learning)		**4**	**3**	**7**		
16	Melaksanakan pembelajaran yang memungkinkan tumbuhnya kebiasaan positif (nurturant effect)		**4**	**3**	**7**		
17	Melaksanakan pembelajaran sesuai dengan alokasi waktu yang direncanakan (Class activity is in accord with time allocation)		**5**	**5**	**10**		
E. Penerapan Pendekatan Scientific (Applying Scientific Method)							
18	Memberikan pertanyaan mengapa dan bagaimana (Providing why and how questions)	**14**	**5**	**5**	**10**		**Is certainly feasible**
19	Memancing peserta didik untuk bertanya (Encouraging students to ask)		**5**	**5**	**10**		
20	Memfasilitasi peserta didik untuk mencoba (Facilitate the practical sessions)		**4**	**4**	**8**		

21	Memfasilitasi peserta didik untuk mengamati (Facilitates the observation session)		**4**	**4**	**8**	**54**	
22	Memfasilitasi peserta didik untuk menganalisis (Facilitates students in their analysis)		**3**	**3**	**6**		
23	Memberikan pertanyaan peserta didik untuk menalar proses berfikir yang logis dan sistematis (Providing logical and sistematic questions)		**3**	**3**	**6**		
24	Menyajikan kegiatan peserta didik untuk berkomunikasi (Encourage students to communicate)		**3**	**3**	**6**		
Pelibatan Peserta Didik dalam Pembelajaran (Students Involvement in Learning)							
25	Menumbuhkan partisipasi aktif peserta didik melalui interaksi guru, peserta didik, sumber belajar (Generate students active participation through teachers interaction and sources of learning)	**6**	**4**	**4**	**8**	**25**	**Is certainly feasible**
26	Merespon positif partisipasi peserta didik. (Responding to students positive participation)		**4**	**4**	**8**		
27	Menunjukan sikap terbuka terhadap respons peserta didik (Showing open attitude with students responses)		**4**	**5**	**9**		
F. Kegiatan Penutup (Closing Activity)							
28	Melakukan refleksi atau membuat rangkuman dengan melibatkan peserta didik. (Involve students in summarizing and reflecting on the lesson)	**8**	**4**	**4**	**8**	**31**	**Is certainly feasible**
29	Memberikan tes lisan atau tulisan (Giving an oral or written test)		**3**	**4**	**7**		
30	Mengumpulkan hasil kerja sebagai bahan portfolio (Collecting worksheets for portfolio)		**4**	**4**	**8**		
31	Melaksanakan tindak lanjut dengan memberikan arahan kegiatan berikutnya dan tugas pengayaan (Giving out homework and the next lessons activities)		**4**	**4**	**8**		
	TOTAL SCORE	**243**					
	Maximun Score	**310**					**Is certainly Feasible**
	Minimum Score	**62**					
	Xi	**186**					
	ISD	**41.33**					
	Overall Evaluations of the students textbook (ST)	**Teaching and Learning Process is Practical**					

Appendix 2.h- Students Self Efficacy Questionnaire Analysis

STUDENTS QUESTIONNAIRE RESULT & ANALYSIS ON LESSON IMPLEMENTATION DEVELOPING CONTEXTUAL BASED TEACHING MATERIALS

No	Evaluated Aspects	No. Item	Students Evaluation	X	Category
PENILAIAN TERHADAP KEGIATAN PEMBELAJARAN. Bagaimana Pendapatmu Tentang:					
1	Kegiatan belajar yang dilaksanakan?		**118**		**Most Probably Feasible (B)**
2	Suasana pembelajaran?		**110**		
3	Cara pengelompokan dalam belajar?		**112**		
4	Kegiatan diskusi dalam kelompok seperti ini?		**118**		
5	Cara belajar dengan memecahkan masalah seperti ini?	**192**	**119**	**698**	
6	Pembelajaran selanjutnya dilaksanakan seperti ini?		**121**		
PENILAIAN TERHADAP KEGIATAN LKS. Bagaimana Pendapatmu Tentang:					
7	Pentunjuk yang disajikan dalam LKS		**119**		**Most Probably Feasible (B)**
8	Tujuan penggunaan LKS		**123**		
9	Tugas ada dalam LKS.		**115**		
10	Langkah-langkah kegiatan dalam LKS		**125**		
11	Ilustrasi gambar/ grafik/ diagram yang ada di LKS		**125**		
12	Pembelajaran selanjutnya menggunakan LKS seperti ini?	**192**	**117**	**724**	
PENILAIAN TERHADAP BUKU SISWA. Bagaimana Pendapatmu Tentang:					
13	Langkah –langkah belajar di buku siswa?		**121**		

14	Materi apersepsi dan motivasi	**160**	**114**	**597**	**Most Probably Feasible (B)**
15	Bahasa yang digunakan		**118**		
16	Gambar-gambar dan foto pada masalah kontektual?		**120**		
17	Latihan-latihan yang tersedia?		**124**		
	TOTAL SCORE	**2091**			**Most probably feasible (B)**
	Maximun Score	**2720**			
	Minimum Score	**544**			
	Xi	**1632**			
	ISD	**362.7**			
	Overall Evaluations of the Achievement Test (AT)	**The products are practical**			

Appendix 2i- Short Test Analysis

STUDENTS SHORT TEST RESULTS AND ANALYSIS

No.	Name	L/P	T1	100%	T2	100%	T3	100%	T4	100%	T5	100%
1	AFDALAIS FALIK FUTUH	L	54	**54**	15	**75**	5	**62,5**	3	**75**	**75**	54
2	AGUS PUTRA JUANDA	L	54	**54**	15	**75**	5	**62,5**	3	**75**	**75**	54
3	ALFIRA NUR NUGRAHANI	P	100	**100**	20	**100**	8	**100**	4	**100**	**75**	100
4	ANAS MARUF AL FAUZI	L	85	**85**	5	**25**	7	**87,5**	2	**50**	**75**	85
5	ANGGIT YUNAN FIRMANSYAH	L	80	**80**	15	**75**	4	**50**	3	**75**	**100**	80
6	ANINDITA AGNES NOVITASARI	P	90	**90**	15	**75**	7	**87,5**	3	**75**	**75**	90
7	ANTALENTA HIRBED PURRY	L	85	**85**	15	**75**	7	**87,5**	2	**50**	**50**	85
8	APRILIA EKA MELATI	P	100	**100**	20	**100**	6	**75**	3	**75**	**50**	100
9	ARIFAH TARA SALSABILA	P	86	**86**	15	**75**	6	**75**	2	**50**	**75**	86
10	ASTRID NABILAH ANWAR	P	100	**100**	15	**75**	7	**87,5**	2	**50**	**75**	100
11	ELIA PUTRI KUSUMANINGTYAS	P	45	**45**	10	**50**	4	**50**	2	**50**	**50**	45
12	ESTIKA PALUPI NUR AZIZAH	P	100	**100**	20	**100**	8	**100**	3	**75**	**100**	100
13	HEGA AISYAH MAHARDIKA	P	73	**73**	20	**100**	8	**100**	3	**75**	**75**	73
14	HERNANDITO YUDHISTIRA	L	75	**75**	15	**75**	4	**50**	2	**50**	**75**	75

15	IQBAL FUADI	L	100	**100**	15	**75**	8	**100**	3	**75**	**75**	100
16	ITA WAHYU WULANDARI	P	96	**96**	20	**100**	8	**100**	2	**50**	**75**	96
17	LULUK NUR FADHILAH	P	100	**100**	20	**100**	8	**100**	4	**100**	**75**	100
18	MARISA KURNIA SULISTYOWATI	P	49	**49**	20	**100**	4	**50**	3	**75**	**100**	49
19	MEILINA NOOR CAHYATI	P	86	**86**	20	**100**	8	**100**	3	**75**	**100**	86
20	MUHAMMAD FARHAN KURNIAWAN	L	70	**70**	15	**75**	8	**100**	3	**75**	**75**	70
21	MUHAMMAD MAULANA MALIK IBRAHIM	L	69	**69**	20	**100**	6	**75**	3	**75**	**75**	69
22	NUGROHO RIDHO PARWATI	P	88	**88**	15	**75**	6	**75**	3	**75**	**75**	88
23	NUROHMA ARTIKA PUTRI	P	61	**61**	0	**0**	4	**50**	3	**75**	**100**	61
24	RACHMADANI ESA ALEXANDER	P	63	**63**	10	**50**	5	**62,5**	3	**75**	**100**	63
25	RAYHAN AULIA RAMADHANI	L	95	**95**	15	**75**	4	**50**	3	**75**	**75**	95
26	RIFKA AYU RAHMAWATI	P	85	**85**	15	**75**	5	**62,5**	3	**75**	**75**	85
27	RINI WULANDARI	P	86	**86**	10	**50**	4	**50**	4	**100**	**75**	86
28	RM. LAKSA HANANTYO WICAKSONO	L	73	**73**	15	**75**	6	**75**	3	**75**	**50**	73
29	SANIARA AZKA WAHYU SANTOSA	P	90	**90**	20	**100**	6	**75**	3	**75**	**50**	90
30	SEPTI KURNIAWATI	P	57	**57**	10	**50**	4	**50**	3	**75**	**100**	57

31	YOHANA NUR ASJAD	L	68	**68**	15	**75**	8	**100**	4	**100**	**100**	68
32	ZALFA NIHAMUYASSARI KANILLA	P	95	**95**	15	**75**	6	**75**	3	**75**	**50**	95

ANALYSIS

	Test 1		Test 2		Test 3		Test 4		Test 5	
Highest	100	**100**	20	**100**	8	**100**	4	**100**	4	**100**
Lowest	45	**45**	0	**0**	4	**50**	2	**50**	2	**50**
Median	85	**85**	15	**75**	6	**75**	3	**75**	3	**75**
Mean	79,9375	**79,9375**	15,15625	**75,78125**	6,0625	**75,78125**	2,90625	**72,65625**	3,0625	**76,5625**
Range	55	**55**	20	**100**	4	**50**	2	**50**	2	**50**
SD	16,8080962	**16,8080962**	4,6635814	**23,3179072**	1,56447456	**19,555932**	0,5880188	**14,70047**	0,66901468	**16,7253671**
Variance	282,512097	**282,512097**	21,748992	**543,724798**	2,44758065	**382,434476**	0,3457661	**216,1038**	0,44758065	**279,737903**

Appendix 2j- Students Self Efficacy Analysis

STUDENTS MATHEMATICS SELF EFFICACY EVALUATIONS RESULTS AND ANALYSIS

Aspecct 1- Perceived Self Efficacy on Solving Algebraic Expressions - Pretest

No.	Names	EC 1		EC 2						EC 3		EC 4		EC 5		
		1	20	24	25	26	27	28	30	22	29	21	23	17	18	19
1	AFDALAIS FALIK FUTUH	3	4	2	2	2	2	2	2	3	3	2	3	3	2	3
2	AGUS PUTRA JUANDA	4	5	1	3	1	1	2	5	3	3	4	5	2	4	3
3	ALFIRA NUR NUGRAHANI	4	4	3	5	4	3	4	3	3	4	3	5	3	4	3
4	ANAS MARUF AL FAUZI	4	4	3	3	3	3	3	3	4	4	2	5	3	3	3
5	ANGGIT YUNAN FIRMANSYAH	4	5	2	4	3	2	3	1	3	2	4	5	3	2	3
6	ANINDITA AGNES NOVITASARI	3	4	3	3	3	3	3	3	4	4	5	4	3	3	4
7	ANTALENTA HIRBED PURRY	4	5	3	4	3	3	4	4	4	4	3	4	4	3	3
8	APRILIA EKA MELATI	5	5	4	5	3	3	3	4	4	5	4	5	5	4	3
9	ARIFAH TARA SALSABILA	2	4	2	3	3	3	3	4	4	3	3	2	3	2	4
10	ASTRID NABILAH ANWAR	3	5	3	4	3	3	3	3	4	3	3	3	2	2	2
11	ELIA PUTRI KUSUMANINGTYAS	2	3	2	4	2	4	3	2	2	4	3	2	3	2	2
12	ESTIKA PALUPI NUR AZIZAH	4	4	3	3	3	4	3	3	3	3	5	4	3	3	4
13	HEGA AISYAH MAHARDIKA	3	5	3	4	3	3	3	4	3	3	3	4	3	2	2
14	HERNANDITO YUDHISTIRA	4	5	3	4	3	3	4	4	4	3	3	3	4	3	3
15	IQBAL FUADI	4	5	3	2	3	3	3	3	3	4	3	4	3	2	3
16	ITA WAHYU WULANDARI	2	4	3	5	4	3	3	4	3	5	5	5	3	2	3
17	LULUK NUR FADHILAH	4	4	3	5	3	4	3	3	4	4	4	4	4	3	3
18	MARISA KURNIA SULISTYOWATI	3	5	2	2	2	2	3	4	3	5	3	2	1	1	1
19	MEILINA NOOR CAHYATI	3	4	3	4	3	3	4	3	3	3	4	4	3	3	4

20	MUHAMMAD FARHAN KURNIAWAN	4	5	3	3	3	3	3	3	3	3	3	4	3	3	3
21	MUHAMMAD MAULANA MALIK IBRAHIM	4	5	2	3	1	1	2	5	1	5	5	5	2	4	3
22	NUGROHO RIDHO PARWATI	3	4	3	3	4	4	3	4	4	3	3	3	4	2	2
23	NUROHMA ARTIKA PUTRI	3	4	2	4	4	3	2	2	3	4	4	4	2	2	3
24	RACHMADANI ESA ALEXANDER	5	5	4	5	5	3	5	5	4	5	5	5	5	5	4
25	RAYHAN AULIA RAMADHANI	4	5	3	4	4	3	3	3	3	4	3	4	4	3	4
26	RIFKA AYU RAHMAWATI	4	5	4	4	3	3	4	3	4	4	3	3	4	3	3
27	RINI WULANDARI	3	3	3	4	4	3	3	3	3	4	4	4	3	2	3
28	RM. LAKSA HANANTYO WICAKSONO	3	3	3	3	3	4	3	4	3	4	3	3	4	4	4
29	SANIARA AZKA WAHYU SANTOSA	3	3	3	4	3	3	4	4	3	3	3	4	3	1	2
30	SEPTI KURNIAWATI	4	4	3	4	3	3	4	3	4	3	4	4	3	4	4
31	YOHANA NUR ASJAD	3	5	3	3	2	2	3	1	3	2	4	4	3	2	3
32	ZALFA NIHAMUYASSARI KANILLA	3	5	3	4	5	3	3	3	4	4	4	4	4	4	4
Total		111	140	90	117	98	93	101	105	106	117	114	124	102	89	98

Aspecct 1- Perceived Self Efficacy on Solving Algebraic Expressions - Postest

No.	**Names**	**EC 1**		**EC 2**						**EC 3**		**EC 4**		**EC 5**		
		1	**20**	**24**	**25**	**26**	**27**	**28**	**30**	**22**	**29**	**21**	**23**	**17**	**18**	**19**
1	AFDALAIS FALIK FUTUH	3	4	3	3	3	3	3	3	3	3	3	3	3	3	3
2	AGUS PUTRA JUANDA	4	5	2	3	3	3	3	5	3	3	4	5	3	4	3
3	ALFIRA NUR NUGRAHANI	4	4	3	5	4	4	4	3	4	4	4	5	4	4	3
4	ANAS MARUF AL FAUZI	4	4	3	3	3	3	3	3	5	5	3	5	3	3	3
5	ANGGIT YUNAN FIRMANSYAH	4	5	3	4	3	3	3	2	3	3	4	5	3	3	3
6	ANINDITA AGNES NOVITASARI	3	4	3	3	3	3	3	3	4	4	5	4	3	3	4
7	ANTALENTA HIRBED PURRY	5	5	3	5	3	3	4	4	4	5	3	4	5	3	3

8	APRILIA EKA MELATI	5	5	4	5	3	3	3	4	4	5	4	5	5	4	3
9	ARIFAH TARA SALSABILA	3	4	3	3	3	3	3	4	4	3	3	2	3	3	4
10	ASTRID NABILAH ANWAR	3	5	3	4	3	3	3	3	4	3	3	3	2	2	3
11	ELIA PUTRI KUSUMANINGTYAS	2	3	2	4	2	4	3	3	2	4	3	2	3	2	2
12	ESTIKA PALUPI NUR AZIZAH	4	4	3	3	3	4	3	3	3	3	5	4	3	3	4
13	HEGA AISYAH MAHARDIKA	3	5	3	4	3	3	3	4	3	3	3	4	3	3	3
14	HERNANDITO YUDHISTIRA	4	5	4	4	3	3	4	4	4	4	3	3	4	3	4
15	IQBAL FUADI	4	5	3	3	3	3	3	3	3	4	3	4	3	3	3
16	ITA WAHYU WULANDARI	3	4	4	5	5	3	4	4	3	5	5	5	3	3	3
17	LULUK NUR FADHILAH	4	4	3	5	3	4	3	3	4	4	4	4	4	3	3
18	MARISA KURNIA SULISTYOWATI	3	5	3	3	3	3	3	4	3	5	3	2	2	2	1
19	MEILINA NOOR CAHYATI	3	4	3	4	4	4	4	3	3	3	4	4	4	4	4
20	MUHAMMAD FARHAN KURNIAWAN	4	5	4	4	4	4	4	4	3	4	3	4	4	4	3
21	MUHAMMAD MAULANA MALIK IBRAHIM	4	5	2	3	2	2	2	5	2	5	5	5	3	4	3
22	NUGROHO RIDHO PARWATI	3	4	3	3	4	4	3	4	4	3	4	3	4	3	3
23	NUROHMA ARTIKA PUTRI	3	4	3	4	4	3	3	3	3	4	4	4	3	3	3
24	RACHMADANI ESA ALEXANDER	5	5	4	5	5	3	5	5	4	5	5	5	5	5	4
25	RAYHAN AULIA RAMADHANI	4	5	3	5	5	3	3	3	4	4	4	4	4	3	4
26	RIFKA AYU RAHMAWATI	4	5	4	4	3	3	4	3	4	4	3	3	4	4	4
27	RINI WULANDARI	3	3	4	4	4	3	3	3	4	4	4	4	3	3	3
28	RM. LAKSA HANANTYO WICAKSONO	3	4	4	4	3	4	3	4	4	4	4	4	4	4	4
29	SANIARA AZKA WAHYU SANTOSA	3	3	3	4	3	3	4	4	3	3	3	4	3	1	3
30	SEPTI KURNIAWATI	4	4	3	4	3	3	4	3	4	3	4	4	3	4	4
31	YOHANA NUR ASJAD	3	5	3	3	2	2	3	2	3	2	4	4	3	2	3
32	ZALFA NIHAMUYASSARI KANILLA	3	5	3	4	5	4	4	3	4	4	4	4	4	4	4
Total		114	141	101	124	107	103	107	111	112	122	120	125	110	102	104

Aspecct 2- Perceived Self Efficacy on Learning Algebra – Pretest

No	Names	EC6		EC7				EC8						EC9		
		3	6	7	8	9	10	4	12	13	14	15	16	2	5	11
1	AFDALAIS FALIK FUTUH	2	3	4	4	3	3	3	4	4	4	4	4	3	3	2
2	AGUS PUTRA JUANDA	3	2	2	3	3	4	3	2	4	4	4	4	4	3	3
3	ALFIRA NUR NUGRAHANI	4	3	4	4	3	4	4	3	4	4	5	5	3	3	4
4	ANAS MARUF AL FAUZI	3	3	2	2	3	4	3	3	4	3	4	4	3	2	4
5	ANGGIT YUNAN FIRMANSYAH	3	2	4	3	5	3	2	2	2	3	5	4	4	1	4
6	ANINDITA AGNES NOVITASARI	2	4	4	4	4	3	2	3	3	3	4	2	2	3	3
7	ANTALENTA HIRBED PURRY	4	3	4	4	3	3	3	4	3	5	4	4	3	3	4
8	APRILIA EKA MELATI	4	4	4	5	5	4	4	5	4	4	5	5	5	4	4
9	ARIFAH TARA SALSABILA	3	2	3	4	3	3	2	3	2	4	4	3	3	3	2
10	ASTRID NABILAH ANWAR	4	2	3	3	3	3	3	3	4	3	4	4	3	2	3
11	ELIA PUTRI KUSUMANINGTYAS	4	3	4	3	3	3	3	3	3	2	3	3	3	2	3
12	ESTIKA PALUPI NUR AZIZAH	3	4	5	4	4	3	3	4	3	4	4	3	4	4	4
13	HEGA AISYAH MAHARDIKA	3	3	3	4	5	5	3	5	4	5	4	5	4	3	4
14	HERNANDITO YUDHISTIRA	4	3	4	4	4	3	3	4	3	4	4	5	3	3	3
15	IQBAL FUADI	3	4	3	4	4	3	4	3	3	4	4	4	4	3	5
16	ITA WAHYU WULANDARI	3	3	4	4	3	2	2	4	4	4	3	3	3	2	3
17	LULUK NUR FADHILAH	3	4	4	4	4	4	3	4	4	3	4	4	4	3	4
18	MARISA KURNIA SULISTYOWATI	3	3	2	4	2	4	2	5	4	3	5	5	5	2	1
19	MEILINA NOOR CAHYATI	3	3	4	3	3	4	3	4	3	3	4	3	4	3	3
20	MUHAMMAD FARHAN KURNIAWAN	4	3	4	3	4	4	3	4	4	4	4	5	4	3	4
21	MUHAMMAD MAULANA MALIK IBRAHIM	3	2	2	3	3	2	3	4	4	4	4	4	4	3	2
22	NUGROHO RIDHO PARWATI	3	4	4	4	3	2	3	4	4	3	3	4	2	3	4

23	NUROHMA ARTIKA PUTRI	3	2	4	4	3	4	4	3	4	4	4	4	4	2	3
24	RACHMADANI ESA ALEXANDER	4	5	5	5	5	5	4	5	4	4	5	5	5	4	4
25	RAYHAN AULIA RAMADHANI	3	3	2	4	3	2	4	4	4	4	4	3	3	4	3
26	RIFKA AYU RAHMAWATI	3	3	4	4	3	3	4	4	3	4	4	3	3	3	3
27	RINI WULANDARI	3	2	2	3	3	4	3	3	2	4	2	4	4	2	3
28	RM. LAKSA HANANTYO WICAKSONO	2	4	4	4	3	4	3	4	4	4	5	4	3	3	3
29	SANIARA AZKA WAHYU SANTOSA	4	3	4	4	3	4	4	3	3	4	3	3	3	3	4
30	SEPTI KURNIAWATI	4	4	4	4	2	4	3	4	4	4	5	4	2	3	4
31	YOHANA NUR ASJAD	3	3	4	4	3	4	3	4	4	4	5	4	3	1	4
32	ZALFA NIHAMUYASSARI KANILLA	4	4	4	4	4	5	3	3	3	4	3	4	4	3	3
Total		104	100	115	119	110	112	99	117	112	120	129	126	113	89	107

Aspecct 2- Perceived Self Efficacy on Learning Algebra – Postest

No	Names	EC6		EC7				EC8						EC9		
		3	6	7	8	9	10	4	12	13	14	15	16	2	5	11
1	AFDALAIS FALIK FUTUH	3	3	4	4	3	3	3	4	4	4	4	4	3	3	3
2	AGUS PUTRA JUANDA	3	3	3	3	3	4	3	3	4	4	4	4	4	3	3
3	ALFIRA NUR NUGRAHANI	4	3	4	4	3	4	4	4	4	4	5	5	3	3	4
4	ANAS MARUF AL FAUZI	3	3	3	3	3	5	3	3	4	3	4	4	3	3	4
5	ANGGIT YUNAN FIRMANSYAH	3	3	4	3	5	3	3	3	3	3	5	4	4	3	4
6	ANINDITA AGNES NOVITASARI	3	4	4	4	4	3	3	3	3	3	4	3	3	3	3
7	ANTALENTA HIRBED PURRY	5	3	4	4	3	3	3	5	3	5	4	4	3	3	4
8	APRILIA EKA MELATI	4	4	4	5	5	4	4	5	4	4	5	5	5	4	4
9	ARIFAH TARA SALSABILA	3	2	3	4	3	3	3	3	3	4	4	3	3	3	3
10	ASTRID NABILAH ANWAR	4	3	3	3	3	3	3	3	4	3	4	4	3	3	3
11	ELIA PUTRI KUSUMANINGTYAS	4	3	4	3	3	3	3	3	3	2	3	3	3	2	3
12	ESTIKA PALUPI NUR AZIZAH	3	4	5	4	4	3	3	4	3	4	4	3	4	4	4

13	HEGA AISYAH MAHARDIKA	3	4	4	4	5	5	3	5	4	5	4	5	4	4	4
14	HERNANDITO YUDHISTIRA	4	3	4	4	4	3	3	4	4	4	4	5	3	3	3
15	IQBAL FUADI	4	4	4	4	4	3	4	3	3	4	4	4	4	5	5
16	ITA WAHYU WULANDARI	3	3	4	4	3	3	3	4	4	4	3	3	3	3	3
17	LULUK NUR FADHILAH	3	4	4	4	4	4	3	4	4	3	4	4	4	4	4
18	MARISA KURNIA SULISTYOWATI	3	3	2	4	2	4	3	5	4	3	5	5	5	1	1
19	MEILINA NOOR CAHYATI	4	3	4	3	3	4	4	4	3	3	4	4	4	3	3
20	MUHAMMAD FARHAN KURNIAWAN	4	3	4	3	4	4	3	4	4	4	4	5	4	4	4
21	MUHAMMAD MAULANA MALIK IBRAHIM	3	3	3	3	3	3	3	4	4	4	4	4	4	3	3
22	NUGROHO RIDHO PARWATI	4	4	4	4	3	3	4	4	4	3	3	4	2	4	4
23	NUROHMA ARTIKA PUTRI	3	3	4	4	3	4	4	3	4	4	4	4	4	3	3
24	RACHMADANI ESA ALEXANDER	4	5	5	5	5	5	4	5	4	4	5	5	5	4	4
25	RAYHAN AULIA RAMADHANI	3	3	3	4	3	3	4	4	4	4	4	3	3	3	3
26	RIFKA AYU RAHMAWATI	3	4	4	4	3	4	4	4	3	4	4	3	3	4	4
27	RINI WULANDARI	3	2	4	4	2	4	3	3	2	4	2	4	2	3	3
28	RM. LAKSA HANANTYO WICAKSONO	2	4	4	4	3	4	3	4	4	4	5	4	3	3	3
29	SANIARA AZKA WAHYU SANTOSA	4	3	4	4	4	5	4	3	3	4	3	4	4	4	4
30	SEPTI KURNIAWATI	4	4	4	3	4	4	3	4	4	4	5	4	4	4	4
31	YOHANA NUR ASJAD	3	3	4	4	3	3	3	4	4	4	5	5	4	4	4
32	ZALFA NIHAMUYASSARI KANILLA	4	4	3	3	3	4	3	3	3	4	3	3	4	3	3
Total		110	107	121	120	110	117	106	98	115	120	129	128	114	98	111

Appendix 2k – Achievement Test Analysis

ACHIEVEMENT TEST RESULTS AND ANALYSIS

No.	Names	Marks Achieved	100%
1	Afdalais Falik Futuh	15	75
2	Agus Putra Juanda	15	75
3	Anas Maruf Al Fauzi	17	85
4	Anggit Yunan Firmansyah	16	80
5	Anindita Agnes Novitasari	15	75
6	Antalenta Hirbred Purry	12	60
7	Aprilika Eva Melati	12	60
8	Arifah Tara Salsabila	12	60
9	Astrid Nabilah Anwar	15	75
10	Elia Putri Kusumaning tyas	17	85
11	Estika palupi Nur Azizah	12	60
12	Hega Aisyah Mahadrika	17	85
13	Hernandito Yudhistira	12	60
14	Iqbal Fuadi	15	75
15	Ita Wahyu Wulandari	11	55
16	Luluk Nur Fadhilah	15	75
17	Marisa Kurnia Sulistyowati	15	75
18	Meilina Noor Cahyati	18	90
19	Muhammad Farhan Kurniawan	15	75
20	Muhammad Maulana Malik	15	75
21	Nugroho Ridho	15	75
22	Nugroho Artika Putri	13	65
23	Rachmadani Esa Alexander	13	65
24	Rayhan Aulia Ramadhani	16	80
25	Rifka Ayu Rahmawati	13	65
26	Rini Wulandari	15	75
27	RM. Laksa Hanantyo	19	95
28	Saniara Azka Wahyu	20	100
29	Septi Kurniawati	12	60
30	Yohana Nur Asjad	15	75
31	Zalfa Nihamuyassari Kanilla	12	60
ANALYSIS			
Highest Score		**20**	**100**
Lowest Score		**12**	**60**
Range		**8**	**40**
Mean		**14.65**	**73**
Median		**15**	**75**
Standard Deviation		**2.244**	**11**
Variance		**5.037**	**126**

APPENDIX 3

EVALUATION SHEET RESULTS

APPENDIX 4

RESEARCH DOCUMENTATION & OTHERS

Kompetensi dasar pada bab ini adalah:

- 2.1 Mengenali bentuk aljabar dan unsur-unurnya.
- 2.2 Melakukan operasi pada bentuk aljabar.
- 2.3 Menyelesaikan persamaan linear satu variabel.
- 2.4 Menyelesaikan pertidaksamaan linear satu variabel.

Kata Pengantar

Penulis mengucapkan terima kasih kepada Tuhan yang Maha Esa limpahan kekuatan rohani, kognitif dan fisik untuk menulis buku ini.

Sebagian konsep matematika dapat diperkenalkan kepada siswa dengan menggunakan aktivitas sehari-hari. Penekanan pada buku ini adalah memperkenalkan konsep-konsep matematika dengan aktivitas sehari-hari dengan penggunaan gambar dan contoh, serta latihan yang berhubungan dengan situasi dunia nyata.

Sistem pembelajaran dalam buku ini dititikberatkan pada keaktifan siswa dalam menggunakan kemampuan logika dan penalaran yang dimiliki siswa untuk memahami dan menemukan sendiri setiap konsep materi yang diajarakan. Buku ini tidak semata-mata berisi teori tentang hal-hal yang harus siswa ketahui. Lebih dari itu, dalam penyusunannya mengacu pada sistem yang lebih mutakhir, yaitu discovery learning dan pendekatan kontekstual matematis dalam hal teori dam aplikatif penyajiannya.

Besar harapan kami kehadiran buku ini dapat meningkatkan kompeteni siswa Indonesia dalam proses penaralan, pemahaman, dan kebermaknaan dari konsep-konep matematika.

Yogyakarta, May 2014.

Daftar Isi

1 – Mengenal Bentuk Aljabar

Konsep Matematika

1. Konstanta

2. Variabel

3. Koefisien

4. Suku

5. Bentuk Aljabar

Tujuan Pembelajaran

Setelah mengikuti pembelajaran ini, diharapkan siswa dapat:

1. Menjelaskan pengertian variabel, konstanta, koefisien, suku dan bentuk aljabar.

2. Membuat dan menyelesaikan model matematika dari masalah nyata yang berkaitan dengan bentuk-bentuk aljabar.

A. Materi Apersepsi dan Motivasi

1. (i) Apakah 4×3 berarti $4 + 4 + 4$ ataukah $3 + 3 + 3 + 3$?

   Alasan?

   (ii) Apakah arti dari $3 \times a$? Alasan?

2. Apakah arti dari 3^2, 5^3 dan a^3?

3. Banyaknya kelereng milik Amir 10 kurangnya dari banyak kelereng milik Budi.

   Berilah contoh banyaknya kelereng Amir dan Budi, berdasarkan situasi tersebut.

   Mengapa demikian? Mewakili bilangan manakah p?

B. Pengantar

Kegiatan Kontextual
Relating

Bentuk aljabar adalah istilah yang mungkin telah sering kalian dengar. Bentuk aljabar terdiri dari beberapa istilah yang perlu kalian ketahui. Dalam bentuk aljabar ada; ***konstanta, variabel, koefisien dan suku.***

Kita peroleh empat komponen pada bentuk aljabar tersebut dari masalah dunia nyata sebagai berikut.

Contoh Masalah Kontextual 1 – HARI UJIAN

Pada suatu hari, saat ujian, di kelas 7C, setiap lakilaki memiliki 3 pensil dan setiap perempuan memiliki 2 pensil. Terdapat x perempuan dan y laki-laki di kelas 7C tersebut.

(i) Susunlah bentuk aljabar yang menyatakan jumlah seluruh pensil yang dibawa semua peserta didik pada hari ujian tersebut.

(iii) Adakah variabel, konstanta, suku, koefisien pada bentuk Aljabar tersebut? Tunjukkan.

Penyelesain:

(i) Jika ada ***x*** perempuan dan ***y*** laki-laki pada suatu kelas itu, maka jumlah siswa adalah ***x + y.***

Jika setiap perempuan milik 2 pensil dan setiap laki-laki milik 3 pensil, maka jumlah pensil adalah ***2x + 3y.***

(ii) Terdapat bentuk aljabar $2x + 3y$:

- Konstanta adalah 0
- Variabel adalah x dan y
- Koefisien adalah 2 dan 3
- Suku-suku adalah $2x$ and $3y$ (ada 2 suku atau ***binom***)

Contoh Masalah Kontextual 2 - BIOLOGI

Keluarga hiu putih besar memiliki w spesies yang berbeda. Keluarga hiu biru memiliki sembilan kali w ditambah tiga spesies yang berbeda.
(i) Susunlah bentuk aljabar yang menggambarkan jumlah spesies di keluarga hiu putih
(ii) Adakah variabel, konstanta, suku, koefisien pada bentuk aljabar tersebut? Tunjukkan.

Penyelesaian:

(i) Jika, keluarga hiu putih memiliki *w* species yang berbeda dan,

keluarga hiu biru, memiliki sembilan kali w ditambah tiga spesies yang berbeda

maka, hiu biru memiliki $9x + 3$ species

(ii) Terdapat $9x + 3$:

- Konstanta = 3
- Variabel = x
- Koefisien = 9
- Suku-suku adalah $9x$ dan 3.

Definisi Konsep

1. ***Konstanta*** - adalah suku dari suatu bentuk aljabar yang berupa bilangan dan tidak memuat variabel. Contoh: konstanta di $x + 5$ adalah 5, konstanta di $3xy - 6$ adalah -6 dan konstanta di $n - 1$ adalah -1**.**

2. ***Variabel*** **-** adalah lambang pengganti suatu bilangan yang belum diketahui nilainya dengan jelas. Variabel disebut juga peubah. Contoh: x^2 dan *y* adalah variabel di $-4x^2 - 2y$, *xy* adalah variabel di $3xy$ - 6 dan *n* adalah variabel di $n - 1$.

3**.** ***Koefisien***- adalah faktor konstanta dari suatu suku pada bentuk aljabar. Contoh: koefisien pada suku $4xy$ adalah 4, koefisien pada suku $5ab$ adalalah 5 dan koefisien pada suku -18a^2b^3 adalah -18.

4. ***Suku*** – adalah variabel beserta koefisiennya atau konstanta pada bentuk aljabar yang dipisahkan oleh operasi jumlah atau selisih. Contoh: $4xy$ dan – 6, $2ab$ dan a^2.

6. ***Bentuk Aljabar*** – suatu bentuk matematika yang dalam penyajiannya memuat huruf-huruf untuk mewakili bilangan yang belum diketahui. Contoh: $3x + y$ dan $4ab - 3ab^2 + 1$.

C.LEMBAR KEGITAN SIWA

Kegiatan Kontextual - *Experience & Cooperating*

Indikator Pencapain – *Menyusun model matematika dalam bentuk aljabar dari masalah duni nyata dan mengidentifikasi unsur-unsur bentuk aljabar sebagai sebuah konstanta, variabel, koefisien dan suku.*

Aktivitas – 1

Menabung Uang

Mengamati

Orang tua Pasa memberinya Rp100.000,00 untuk modal awal tabungan di kotak uang. Tabel yang diberikan di bawah menunjukan kegiatan yang terjadi jika Pasa menambahkan banyak uang dalam kotak uangnya.

Modal awal	Uang yang ditabung	Cara menghitung	Jumlah uang di kotak.
Rp100.000,00	Rp50.000,00	100 + 50	Rp 150.000,00
	Rp48.000,00	100 + 48	Rp 148.000,00
	n		

Menanya

Buatlah pertanyaan berdasarkan situasi yang diberikan dalam aktivitas 1.

.....
.....
.....

Mengasosiasi

Buatlah bentuk aljabar berdasarkan situasi pada aktivitas yang diberiakn atas.

.....
.....
.....

Mencoba

(i) Lengkapilah tabel di bawah ini dengan jumlah uang yang dikumpulkan.

Modal awal	**Jika Pasa tambahan...**	**Kegiatan melakukan**	**Jumlah uang di kotak**
Rp100.000,00	Rp50.000,00	100 + 50	Rp 150.000,00
	Rp48.000,00	100 + 48	Rp 148.000,00
	n		
	Tanda aljabar untuk menumukan tambahan n		

(ii) Dari tabel di atas, tulislah tanda aljabar yang didapatkan untuk menemukan jumlah uang.

(iii) Di dalam tanda aljabar di atas, identifikasilah;

(a) konstanta - .....

(b) variabel - .....

(c) Suku(s) - .....

Aktivitas - 2

Perpustakaan

Mengamat

Yowanda membaca kitab suci setiap minggu. Disamping itu, dia membaca buku-buku cerita lain. Berapa banyak buku yang akan dibaca Yowanda selama 6 minggu? Tabel yang diberikan di bawah menunjukan kegiatan yang terjadi jika Yowand

Buku yang dibaca setiap minggu	Jika Yowanda membaca .... buku untuk satu minggu	Kegiatan melakukan selama 6 minggu	Jumlah buku yang dibacakan
1 (kitab suci)	2	1 + 2 (6)	13
	3	1 + 3 (6)	19
	x	...	...

Menanya

Buatlah pertanyaan berdasarkan situasi yang diberikan dalam aktivitas 2.

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Mengasosiasi

Buatlah bentuk aljabar berdasarkan situasi pada aktivitas yang diberiakn di atas.

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Mencoba

(ii) Lengkapilah tabel di bawah ini untuk menemukan tanda aljabar dari jumlah buku yang dibaca Yowanda selama 6 minngu**.**

Buku yang dibaca setiap minggu	**Jika Yowanda membaca .... buku untuk satu minngu**	**Kegiatan melakukan selama 6 minggu**	**Jumlah buku yang dibacakan**
1 (kitab suci)	2	1 + 2 (6)	13
	3	1 + 3 (6)	19
	x		
Tanda aljabar jumlah buku yang dibaca Seema dalam 6 minggu.			

(ii) Dari tabel di atas, tulislah tanda aljabar yang didapatkan untuk menemukan banyaknya buku dibaca oleh Yowanda selama 6 minnggu.

(iii) Di dalam bentuk aljabar di atas, identifikasilah;

(a) konstanta - .....

(b) variabel - .....

(c) Suku(s) - .....

D. Masalah Matematis

Kegiatan Kontextual
Applying

1.Manakah dari bentuk berikut yang equivalen dengan y^3 ?

A. $y + y + y$ B. $y \times y \times y$ C. $3y$ D. $y^2 + y$

a. Apakah y^3 merupakan bentuk Aljabar? Jelaskan.

b. Apakah y^3 merupakan suku? Jelaskan.

c. Tunjukan variabel, konstanta dan koefisien variabelnya.

Variabel.....

Koefisien.....

Variabelnya.....

2. Tentukan suku, variabel, dan koefisien dari bentuk-bentuk aljabar berikut!.

a) $2x^2 - x + 1$ b) $x^2 - 2xy + x^2 + 3$ c) $\frac{3}{4}x^2 - \frac{1}{2}x + \frac{5}{4}$

3. TRIGNOMETRI – Teorema Pythagoras menyatakan bahwa , jumlah kuadrat kedua sisi adalah sama dengan kuadrat sisi ketiga . Susunlah bentuk aljabar Teorema Pythagoras.

4. MENGEMBALIKAN BOTOL-BOTOL – Sinta mengumpulkan botol air kosong untuk didaur ulang. Dia hanya mengumpulkan botol kosong dengan merek Aqua dan Nestle. Susunlah bentuk aljabar untuk mewakili jumlah botol kosong yang dia mengumpulkan pada akhir setiap minggu.

E. Latihan 1

Kegiatan Kontextual
Transfering

1. Ringkasanlah kesimpulan kelompokmu tentang bentuk aljabar dari 2 aktivitas di bagian C dan masalah matematis di bagian D. Pilihlah dua siswa di dalam kelompokmu untuk mempresentasikan temuan-temuanmu. Buatlah tabel seperti di bawah ini untuk mempresentasikan.

Soal No.	Bentuk aljabar	Banyak suku	Variabel	Koefisien	Konstanta
Kegiatan kontextual 1 dan 2 – Bagian C					
1					
2					
Masalah Matematis – Bagian D					
1					
2					
3					
4					

2. PERUSAHAN – Erlyka membuka toko percetakan dan fotokopi. Harga cetak setiap halaman Rp300,00 sedangkan biaya fotokopi Rp200.00 untuk satu halaman. Susunlah bentuk aljabar untuk mewakili jumlah biaya halaman yang dicetak dan difotokopi dalam sehari, jika a = jumlah halaman yang dicetak sementara b = jumlah halaman difotokopi.

3. **MEMBELI SECARA KREDIT**-. Paulus membeli tablet baru secara kredit. Dia membayar deposit sebesar Rp200.000,00 dan kemudian Rp50.000,00 setiap minggu untuk d minggu. Susunlah bentuk aljabar untuk mewakili jumlah uang yang Paulus perlu bayarkan untuk tabletnya.

4. `Menulis Di Matematika`.. Tulislah situasi dunia nyatamu sendiri dan tuliskan dalam bentuk aljabarnya. Bentuk-bentuk aljabar itu harus memuat konstanta, variabel dan koefisien dan jelaskan jawaban anda.

2 – Menyelesaikan Bentuk Aljabar

Konsep Matematika

1. Suku Sejenis

2. Suku Tidak Sejenis

3. Monomials

4. Pecahan Bentuk Aljabar

Tujuan Pembelajaran

Setelah mengikuti pembelajaran ini, diharapkan siswa dapat:

1. Mengenal suku sejenis dan berbeda jenis.

2. Menjumlakan, mengurangi, mengalikan dan membagi bentuk-bentuk aljabar (monomial).

3. Menjumlakan, mengurangi, mengalikan dan membagi bentuk pecahan Aljabar.

A. Materi Apersepsi dan Motivasi

1. Jika;

   a) $y = 1y$, maka $y + y + y + y =$ .....

   b) $a = 1a \; dan - a = -1a$, maka $a + a + a + a + a - a - a - a =$ .....

   c) $mn = 1mn$, maka $mn + mn + mn + mn =$ .....

2. Ubalah bentuk perkalian berulang berikut menjadi bilangan berpangkat!

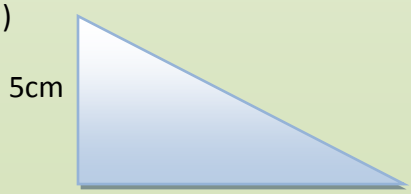
   a) $5 \cdot 5 \cdot 5 \cdot 5 \cdot 5$ b) $x \cdot x \cdot x \cdot x \cdot x$ c) $a \cdot a \cdot b \cdot b \cdot b$ d) $\frac{1}{3} \cdot \frac{1}{3} \cdot \frac{2}{5} \cdot \frac{2}{5}$

3. Sederhanakanlah operasi bilangan berpangkat berikut!

   a) 4^3 b) $(-7)^2$ c) $\left(\frac{2}{5}\right)^2$ d) $\left(-\frac{3}{4}\right)^2$

4. Carilah luas gambar berikut!

   a)

   b)

2.1 –Penjumlahan dan Pengurangan Suku-suku Sejenis

B. Pengantar

Kegiatan Kontextual
Relating

Kami mendapat suku sejenis dan suku berbeda jenis dari ilustrasi dunia nyata.

Contoh Masalah Kontextual 1 – BELANJA HP

SAMSUNG GALAXY Grand **SAMSUNG GALAXY 4**

Jika **SAMSUNG GALAXY Grand** = X, maka;

SAMSUNG GALAXY 4 = X^2, **karena specifikasinya berbeda**

Selama ada diskon di Jogjiatronik, Pak Budi membeli ponsel Samsung sebagai stok di toko keluarga. Dia membuat pembelian selama minggu sebagai berikut.

Senin – 2 **SAMSUNG GALAXY Grand** dan 4 **SAMSUNG GALAXY 4.**

Selasa - 6 **SAMSUNG GALAXY Grand** dan 9 **SAMSUNG GALAXY 4.**

Rabu - 3 **SAMSUNG GALAXY Grand** dan 8 **SAMSUNG GALAXY 4.**

Membuat bentuk aljabar dari pembelian tersebut.

Senin = $2x + 4x^2$; Selasa = $6x + 9x^2$; Rabu = $3x + 8x^2$

Jumlah Ponsel yang dibeli :

$= (2x + 4x^2) + (6x + 9x^2) + (3x + 8x^2)$ (pembelian dalam 3 hari)

$= 2x + 6x + 3x + 4x^2 + 9x^2 + 8x^2$ (mengumpulkan suku sejenis)

$= 11x + 21x^2$. (jumlah ponsel yang dibeli dan tidak boleh ditambah, karena berdua suku ini tidak sejenis)

Pak Budi membeli 11 SAMSUNG GALAXY GRAND dan 21 SAMSUNG GALAXY 4.

Contoh Masalah Kontextual 2- PENGIMPORAN MOBIL

Firma Mitsubishi mengimpor mobil dari Jepang. Mobil yang mengimporkan adalah model Avanza 2006 dan model Avanza 2013. Pada bulan Juni, Mitsubishi diimpor 14 model 2006 dan 9 model 2013. Pada bulan Juli dia diimpor 12, model 2013 dan model 6. Tulislah bentuk-bentuk aljabar untuk jumlah mobil yang diimporkan selama dua bulan.

Penyelesaian:

Dikarenakan dua mobil berbeda spesifikasi, model tahun 2013 seharusnya lebih mahal daripada model tahun 2006 sehingga tidak sama.

Mialkan y = model tahun 2006 dan y^2 = mobil model 2013.

Juni = $14y + 9y^2$ dan Juli = $12y + 6y^2$ (perjualan selama dua bulan)

Maka, jumlah mobil yang dibeli selama dua bulan: $(14y + 9y^2) + (12y + 6y^2)$

$14y + 12y + 9y^2 + 6y^2$ (mengumpul suku sejenis)

$= 26y + 15y^2$ (tidak boleh ditambah, karena berdua suku ini tidak sejenis)

Jadi ada 26 model 2006 dan 15 model 2013 yang dijual selama dua bulan tersebut.

Pengertian Suku Sejenis dan Suku Tidak Sejenis

1. ***Suku seenis –*** adalah dua suku atau lebih memiliki variabel yang sama. Contoh: $3x$ dan $10x$, $4r^2t^3$s dan $6\ r^2t^3$s.

2. ***Suku Tidak Sejenis*** – adalah dua suku atau lebih memiliki variabel yang berbeda. Contoh: $2y$ dan $2x$, $4r^2t^3$s and $6r^3t^2$s.

Untuk lebih jelasnya perhatikan tabel di bawah ini.

	Suku	Sejenis/ Tak Sejenis	Alasan
1	$5a$, $10a$ dan $3a$	Sejenis	Karena peubahnya sama.
2	$4m^2n$, $6m^2$n dan $-4m^2$n	Sejenis	Karena peunbahnya dan pangkat sama.
3	$6x^2y$, $3xy^2$ dan $8x^2y^3$	Tidak sejenis	Karena pangkat peubahnya tidak sama.
4	$5ab^3$, $9mn^2$ dan $6cd$	Tidak sejenis	Karena peubahnya tidak sama dan pangkat peubahnya tidak sama.

Pengertian Monomials

3. *Monomials* – adalah angka, variabel, atau hasil kali angka dan satu atau lebih variabel. Misalnya 4, y, $3x^2$ dan $10ab$.

Bentuk aljabar yang mempunyai suku yang tidak sejenis lebih dari satu disebut suku banyak atau *polinomial*. Misalnya $3x^2 + 4x,\ 3 + 2x + 4x^2, dan\ 6a + 8b + c + 3d$

Pada operasi bentuk aljabar juga dikenal suku banyak sebagai berikut.

- Suku dua atau *binomial* adalah suku banyak dengan dua suku, misalnya $2x + 3x^2, 2c + d$.
- Suku tiga atau *trinomial* adalah suku banyak dengan tiga suku, misalnya $x^2 + x + 4$, $3x + 2y + z$.

.

Keterampilan

Bentuk aljabar yang mengandung suku sejenis dapat disederhanakan dengan cara menjumlahkan atau menguranginya

C. LEMBAR KERJA SISWA

Kegiatan Kontextual - *Experience & Cooperating*

Indikator Pencapain – (i) *Mengidentifikasi suku sejenis dan berbeda jenis; (ii) Menambah dan mengurangi bentuk aljabar monomial.*

Aktivitas – 1

Mengamati

A - MENIUAL BUAH DI PASAR

Setiap Sabtu pagi, Widi harus menata buah-buahan di warung untuk dijual setiap hari. Saat ini musim buah-buahan, sehingga ada banyak buah di bawah sekitar warung. Widi harus meletakkannya sesuai dengan jenisnya. Jika rambutan dilambangkan x dan salak dilambankang y, mengamatilah kegiatan Widi di bawah ini.




$3y$ + $6x$ + $8y$ + $6y$

Aktivitas – 2

B - MENU MAKAN

6 teman memesan tiga menu terpisah yang berbeda. Setiap menu yang ada dipesan dua kali. Jika Menu 1 dilambangkan wxy, Menu 2 dilambangkan wx dan Menu 3 dilambangkan wy, amatilah kegiatan dibawah ini:



Menu 1	Menu 2	Menu 3
Nasi, Telur dan Tahu	**Nasi dan Telur**	**Nasi dan Tahu**
wxy	wx	wy

Menanya

Buatlah pertanyaan berdasarkan situasi yang diberikan dalam aktivitias 1 dan 2.

.....
.....
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.....

Mengasosiasi

Buatlah bentuk aljabar berdasarkan situasi pada aktivitas 1 dan 2.

.....
.....
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.....

Mencoba

Aktivitas 1

Setelah mengamati kegiatan tersebut, buatlah bentuk aljabar di ruang tersedia bawah ini dan sederhanakanlah bentuk tersebut, dengan menentukan jumlah rambutan dan salak yang dijual.

Tuliskan apa yang anda ketahui tentang:

a. Suku sejenis - .....

b. Berbeda jenis - .....

Aktivitas 2

Setelah menganalisasi kegiatan yang dilakukan oleh 6 teman, buatlah bentuk aljabar yang menyatakan kegiatan matematika di ruang tersedia bawah ini.

Setelah membuat membuat bentuk aljabar, kumpulkanlah suku sejenis dengan menyederhanakan bentuk aljabarmu.

Tuliskan apa yang anda ketahui tentang:

a. Suku sejenis - .....

b.Suku berbeda jenis - .....

2.2 –Perkalian dan Pembagian Monomial

Perkalian Monomials

D. Pengantar

Kegiatan Kontextual
Relating

Kami mendapat menggunakan sifat- sifat perkalian dan pembagian dari illustrasi dunia nyata.

Contoh Masalah Kontextual 1 – SCHOOL COURT

Pelataran sekolah anda perlu direnovasi. Perlu paving baru. Dalam rangka untuk mendapatkan jumlah paving yang tepat, guru olahraga sekolah telah meminta anda menemukan luas pelataran . Tentukan bentuk-bentuk aljabar luas tersebut jika panjangnya $3x^2y$ dan lebar adalah $2xy^3$. Jika $x = 3$ dan $y = 2$, tentukan luasnya dalam meter.

Penyelesaian:

Pelataran sekolah berbentuk persegi panjang.

Luas persegi panjang = P x L ; Panjang = $3x^2y$; Lebar = $2xy^3$

Maka, Luas = $3x^2y \cdot 2xy^3 = 3 \cdot 2 \cdot x^2 \cdot x \cdot y \cdot y^3 = 6 \cdot x^3 \cdot y^4 = \boldsymbol{6x^3y^4}$

Jika x = 3 and y = 2, maka, L= $6(3)^3 (2)^4 = 6 (27) (16) = 2592$, $\therefore \boldsymbol{Luas = 2592m^2}$

Contoh Masalah Kontextual 2 – PERUSAHAN ES KRIM

Ginagar membuka usaha menjual es krim. Untuk mencegah pemborosan, dia perlu mengetahui jumlah tepat es krim yang dibeli kaitannya dengan jumlah kerucut. Jadi dia harus mengetahui volume kerucut. Jika jari-jari kerucut diberikan sebagai 4x dan tingginya diberikan sebagai 9y, menemukan volume es krim kerucut.

Penyelesaian:

Kerucut volume V = $\frac{1}{3}\pi r^2 h$

Jika, h = 9y dan r = 4x, maka V = ⅓ x $\frac{22}{7} \times (4x)^2 \times 9y$

maka, V = $\frac{22 \times 4\, x \times 4x \times 9y}{3 \times 7} = \frac{3168\, x^2 y}{21} = 150.86\, x^2 y$

Ingat kembali!

Perkalian Monomial

Kamu mendapat perkalian dan pembagian pada bentuk-bentuk aljabar dengan cara yang serupa seperti pada perkalian dan pembagian pada bilangan bulat.

Jika: 2 x 3 = 3 + 3 = 6

maka 2 x u = 1u + 1u = 2u

3 x b = 1b + 1b + 1b = 3b

2 x 3b = 3b + 3b = 6b ,

2u x 3b = (u + u) x (b + b + b) = ub + ub + ub + ub + ub + ub = 6ub

atau; 2u x 3b = 2 x 3 x u x b = 6ub.

Pembagian Monomial

(i) Jika $\frac{6}{3} = \frac{2.3}{3} = 2$

maka $\frac{6u}{3} = \frac{2.3u}{3} = 2u.$

(ii) $\frac{6u}{4b} = \frac{2.3u}{2.2b} = \frac{3u}{2b}$

Sifat-sifat Pangkat Bulat Positif – Perkalian dan Pembagian

	Sifat	Contoh
Perkalian pangkat	$a^r \cdot a^t = a^{r+t}$	$a^3 \cdot a^2 = a^{3+2} = a^6$ $5x^3 \cdot 2x^2 = (5\ x\ 2)(x^{3+2}) = 10x^5$
Pangkat dari bilangan berpangkat	$(a^r)^t = a^{rt}$	$(x^2)^3 = x^{2\times 3} = x^6$ $(5^2)^3 = 5^{3\times 2} = 5^6 = 15625$
Pangkat dari hasil perkalian	$(a\ x\ b)^r = a^r\ x\ b^r = a^r\ b^r$	$(2n^3)^2 = 2^2 n^{3\times 2} = 4n^6$

	Sifat-sifat	Contoh
Pembagian bilangan berpangkat	$\frac{a^r}{a^t} = a^{r-t}\ \ (a \neq 0)$	$\frac{a^6}{a^3} = a^{6-3} = a^3$
Pangkat bilangan pembagian	$\left(\frac{a}{b}\right)^n = \frac{a^n}{b^n}\ \ (b \neq 0)$	$\left(\frac{x}{3}\right)^3 = \frac{x^3}{3^3} = \frac{x^3}{27}$ $\left(\frac{5^2}{5}\right)^3 = \frac{5^{2\cdot 3}}{5^3} = 5^3 = 125$
Pangkat Nol	$a^0 = 1\ (a \neq 0)$	$(3xy)^0 = 1$

Perkalian Suku Satu dengan Suku Dua

Perkalian suku satu dengan suku dua dapat dilakukan dengan menggunakan aturan distributif perkalian terhadap penjumlahan atau pengurangan.

$$a \times (b + c) = (a \times b) + (a \times c). \textbf{Contoh; } 5(x + 2y) = 5x + 10y$$

$$a \times (b - c) = (a \times b) - (a \times c). \textbf{Contoh; } 7(2a - 3) = 14a - 21.$$

E.LEMBAR KERJA SISWA

Kegiatan Kontextual - *Experience & Cooperating*

Indikator Pencapain – *mengalikan dan membagi bentuk aljabar monomial.*

Mengamati

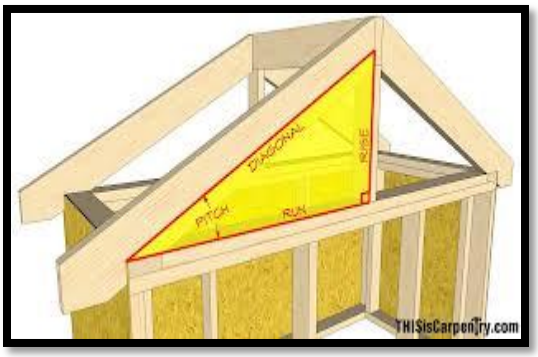
C – MENGECAT LAPANGAN FUTSAL SEKOLA

Aktivitas - 3

Cat di lapangan futsal di sekolahmu telah pudar. Guru olah raga memintamu menghitung luas lapangan, sehingga dia bisa membeli cat dan kamu serta teman-temanmu kemudian dapat mengecat lapangan. Panjang lapangan 7d dan lebar 5 c.

Aktivitas - 4

D - ARSITEKTUR



Budi sedang mendesain sebuah rumah untuk pelanggannya. Pelanggannya ingin memasang dinding kaca dengan bentuk segitiga di atap. Untuk mendapatkan dimensi yang benar dari kaca tersebut, dia ingin menemukan luasnya. Alasnya 10xy dan tingginya 5xy.

Menanya

Buatlah pertanyaan berdasarkan situasi yang diberikan dalam aktivitas 1 sampai 4.

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Mengasosiasi

Buatlah bentuk aljabar berdasarkan situasi pada aktivitas 1 sampai 4.

.....
.....
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.....

Mencoba

Aktivitas 3

Dalam ruang di bawah ini, buatlah bentuk-bentuk aljabar dan sederhanakanlah untuk menentukan luas lapangan futsal tersebut.

Aktivitas 4

Di dalam mengamati kegiatan D di atas, buatlah bentuk-bentuk aljabar di ruang di bawah ini dan sederhanakanlah untuk menemukan luas kaca yang akan dipasang di atap rumah.

F. Masalah Matematis

Kegiatan Kontextual
Applying

Sederhanakan bentuk-bentuk aljabar berikut!

1. $-4n\,(-2n\,-3) - 2n\,(1 + 2n)$ 2. $19a + 16b - 5a + 4b + 4$ 3. $-29n + 5 + 3n^2$

4. Tentukan hasil dari $(4y - y)^3 - (4 - xy - 2)$ jika $x = -2$ dan y =3.

Sederhanakan bentuk-bentuk aljabar berikut!

5. $(mn^4)(mn^3)$ 6. $(-7c^3)(4d^3)$ 7. $(-3j^2k^3)\,(-8j\text{k})$

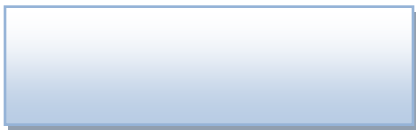
8. $\frac{x^8y^9}{x^2y^5}$ 9. $\left(\frac{4a^2b}{2c^3}\right)^2$ 10. $\left(\frac{3x^2y}{6x^3}\right)^0$

SEGITIGA DAN SEGI EMPAT

11. Sebuah segitiga sama sisi memiliki keliling $9x + 6$. Berapakah panjangnya dari setiap sisi segitiga tersebut?

12. Sebuah persegi panjang memiliki panjang lima kali dari pada lebarnya. Susunlah bentuk aljabar untuk keliling persegi panjang tersebut. Berapakah kelilingnya, jika lebarnya 5m?

13. Hitunglah panjang persegi empat dengan luas $24x^5y^3$ satuan persegi.



$8x^2y^2$

G. Latihan 2

Kegiatan Kontextual
Transfering

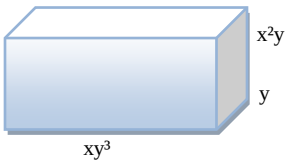
1. Tuliskan kesimpulan kelompokmu tentang penjumalahan, pengurangan, perkalian dan pembagian monomial dari 4 aktivitas di bagian C dan E masalah matematis di bagian D. Pilihlah dua siswa di dalam kelompokmu untuk mempresentasikan temuan-temuanmu.

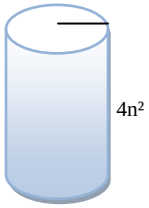
2. Sebuah persegi panjang memiliki panjang empat kali lebarnya. Salah satu bentuk aljabar untuk menemukan kelilingnya adalah $4t + 4t + t + t$. Tulislah kembali di dalam bentuk aljabar yang lain.

3. Tentukan hasil dari $2r + 3s - (6 - rs - 3rs)$ jika r = 6 dan s = 5.

GEOMETRI

Tuliskan volume bangun berikut dalam sebuah monomial.

4. 

5. 

6. **OPEN ENDED** Tuliskan tiga ekspresi yang equivalen dengan x^5 .

7.**PEMIKIRAN**

Bandingkan setiap pasangan monomials. Jelaskan mengapa masing-masing pasangan tidak equivalen.

a) $4c$ dan $(4c)^2$ b) $(vw)^5$ dan v^5w^5 c) $-3a^3$ dan $(-3a)^2$ d) $2^2\,(c^8)^2$ dan $4c^{16}$

2.3 – Operasi Hitung Pecahan Bentuk Aljabar

A. Materi Apersepsi dan Motivasi

1. Selesaikan soal-soal di bawah ini. (Penambahan dan Pengurangan)

   a) $\frac{2}{3} + \frac{1}{3}$ b) $\frac{4}{5} - \frac{3}{5}$

   Dengan menggunakan teknik yang sama pada bagian a dan b selesaikan soal berikut.

   c) $\frac{2}{a} + \frac{3}{a}$ d) $\frac{3}{2b} - \frac{1}{2b}$

2. Selesaikan soal-soal di bawah ini.

   a) $\frac{1}{3} + \frac{1}{2}$ b) $\frac{3}{4} + \frac{1}{3}$

   Dengan menggunakan teknik yang sama pada bagian a dan b selesaikan soal berikut.

   c) $\frac{1}{a} + \frac{1}{b}$ d) $\frac{2}{b} + \frac{3}{d}$

3. Selesaikan soal-soal di bawah ini. (Perkalian dan Pembagian)

   a) $\frac{6}{8} \times \frac{3}{4}$ b) $\frac{3}{5} \div \frac{10}{15}$

   Dengan menggunakan teknik yang sama pada bagian a dan b selesaikan soal berikut.

   c) $\frac{b}{2} \times \frac{4c}{3b}$ d) $\frac{2x}{3} \div \frac{5}{2y}$

2.3.1 –Penjumlahan dan Pengurangan pada Bentuk Pecahan Aljabar

B. Pengantar

Masih ingatlah kalian dengan pecahan yang telah kalian pelajari sebelumnya? Bentuk pecahan adalah $\frac{a}{b}$ dengan a, b Ɛ bilangan bulat, b $\neq 0$. Pada pecahan tersebut a disebut pembilang dan b disebut penyebut.

Bentuk pecahan aljabar adalah bentuk pecahan yang mengandung variabel, misalnya $\frac{1}{a}$, $\frac{a}{b,}$, $\frac{xy}{pq}$, dan $\frac{x}{yz}$.

Kecakapan Penjumlahan dan Pengurangan pada Bentuk Pecahan

Ada dua kasus dalam penjumlahan atau pengurangan pecahan bentuk aljabar, yaitu sebagai berikut.

1. Jika dua pecahan yang memiliki penyebut sama dan pada keduanya dikenakan operasi aljabar (penjumalahan dan pengurangan), maka hasil operasi aljabar tersebut dapat dilakukan dengan menjumlahan atau mengurangan pembilang pecahan-pecahan itu.

a) $\frac{a}{x} + \frac{b}{x} = \frac{a+b}{x}$, x$\neq$ 0 b) $\frac{a}{x} - \frac{b}{x} = \frac{a-b}{x}$, x$\neq$0

2. Dua pecahan yang penyebutnya tidak sama dapat diubah menjadi pecahan-pecahan senilainya terlebih dahulu. Cara untuk menentukan pecahan senilai mencari KPK dari kedua penyebutnya.

Mengamati dan Menanya

Ingat kembali!!

Kasus 1 – Penyebut Sama

Sederhanakan pecahan aritmetika dan aljabar berikut.

1. $\frac{4}{6} + \frac{1}{6}$ (penyebut sama)

   $= \frac{4+1}{6}$ (maka, menjumalahan pembilangnya)

   $= \mathbf{\frac{5}{6}}$

2. $\frac{5}{7n} - \frac{3}{7n}$ (penyebut sama)

   $= \frac{5-3}{7n}$ (maka, mengurangan pembilangnya)

   $= \mathbf{\frac{2}{7n}}$

Kasus 2 – Penyebut tidak sama, mencari KPK dari kedua penyebutnya

1. $\frac{7}{24} - \frac{2}{8}$ (penyebut tidak sama, tetapi KPK dari 24 dan 8 adalah 24)

   $= \frac{7}{24} - \frac{5}{8} = \frac{7-6}{24} = \frac{1}{24}$

2. $\frac{3}{a} - \frac{5}{ab}$ (penyebut tidak sama, tetapi KPK dari ab dan b adalah ab)

   $= \frac{3}{a} - \frac{5}{ab} = \frac{3a-5}{ab}$ (pembilang tidak sejenis, maka tidak bisa dikurangi)

2.3.2 –Perkalian dan Pembagian pada Bentuk Pecahan Aljabar

Mengalikan dan membagian pecahan aljabar mirip dengan mengalikan dan membagi pecahan hitung.

Kecakapan Perkalian dan Pembagian pada Bentuk Pecahan

Pada perkalian bentuk pecahan aljabar;

Pembilang dikalikan dengan pembilang dan penyebut dikalikan dengan penyebut. $\frac{a}{b} \times \frac{c}{d} = \frac{a \times c}{b \times d} = \frac{ac}{bd}$

Pada pembagian bentuk pecahan aljabar;

Mengalikan suku pertama dengan invers suku kedua sebagai;

$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$

Mengamati dan Menanya

Ingat kembali!!

Hitunglah hasil perkalian berikut!

1. $\frac{5}{2} \times \frac{2}{6} = \frac{5 \times 2}{2 \times 6} = \frac{10}{12} = \frac{5}{6}$

2. $\frac{3}{7} \times \frac{5}{5} = \frac{3 \times 5}{7 \times 5} = \frac{15}{35} = \frac{3}{7}$

3. $\frac{6}{8} \div \frac{2}{5} = \frac{6}{8} \times \frac{5}{2} = \frac{30}{16} = \frac{15}{8} = 1\frac{7}{8}$

4. $\frac{4}{9} \div \frac{6}{3} = \frac{4}{9} \times \frac{3}{6} = \frac{12}{54} = \frac{2}{9}$

5. $\frac{b}{2} \times \frac{4c}{3b} = \frac{b \times 4c}{2 \times 3b} = \frac{4bc}{6b} = \frac{2c}{3}$

6. $\frac{2x}{3} \div \frac{5}{2y} = \frac{2x}{3} \times \frac{2y}{5} = \frac{4xy}{15}$

Mengasosiasi dan Mencoba

Sederhankanalah bentuk-bentuk aljabar berikut!

1. $\frac{4x+7}{6x} - \frac{2x-4}{6x}$ 2. $\frac{-8t}{27} + \frac{5t}{9}$ 3. $3 + \frac{5}{X}$ 4. $\frac{5}{y} - 5$

5. $\frac{2}{3} \times \frac{5a}{7}$ 6. $\frac{5}{d} \times d^2$ 7. $\frac{2x}{3} \div \frac{7}{5y}$ 8. $\frac{3d}{5} \div \frac{2e}{7}$

C. Latihan 3

Sederhanakan bentuk-bentuk aljabar berikut.

1. $\frac{5}{25s} + \frac{7}{5s}$ 2. $\frac{-13d}{64} - \frac{8e}{36}$ 3. $\frac{2}{b} + \frac{3}{d}$ 4. $\frac{1}{a} + \frac{1}{b}$

5. $\frac{12ac}{5b} \times \frac{10b}{4ac}$ 6. $\frac{5a}{2c} \times \frac{4c}{a}$ 7. $\frac{4ac}{3} \div \frac{16bc}{6a}$ 8. $\frac{9ac^2}{8} \div \frac{3c}{4}$

9. $\frac{6xy^2}{7ac} \div \frac{12x^2y}{14bc^2}$

3 – Penyelesaian Persamaan Linear Satu Variabel

Konsep Matematika

- ***Kalimat Terbuka***
- ***Persamaan Linear Satu Variabel***
- ***Bentuk Setara Persamaan Linear Satu Variabel***

Tujuan Pembelajaran

Setelah mengikuti pembelajaran ini, diharapkan siswa dapat:

1. Membuat dan menyelesaikan model matematika dan masalah nyata yang berkaitan dengan persamaan.

A. Materi Apersepsi dan Motivasi

1. Lengkapilah ruas kanan supaya kedua ruas memiliki nilai yang sama.

   a) $10 + 3 =$ ..... b) $(2 + 3) \times 4 =$ .....

   c) $27 : 9 =$ ..... d) $(48 : -8) + 2 =$ .....

2. Tulislah kalimat matematika dari pernyataan-pernyataan berikut!

   a) Dua ditambah tiga sama dengan lima.

   b) Empat kali negatif tiga sama dengan negatif duablas.

3. Tulislah kalimat matematika dari pernyataan-pernyataan berikut dan temukan fakta-fakta berkaitan dengan kalimatnya supaya benar.

   a) x dikurangi tujuh sama dengan delapan

   b) Enam dibagi y sama dengan dua

4. Membuat kalimat matematika dari masalah nyata berikut dan temukan fakta-fakta berkaitan dengan kalimatnya supaya benar.

   a) Harga 5 buah alpukat adalah Rp20.000,00

   b) Tiga kali uang ayah sama dengan Rp100.000,00.

B. Pengantar

Kegiatan Kontextual
Relating

Kami mendapat konsep persamaan linear satu variabel dari dunia nyata sebagai berikut.

Contoh Masalah Kontextual 1 – BELANJA COKELATE

Mas Randy membeli cokelat. Dia memiliki Rp60.000, 00. Setelah membeli 20 cokelat, uangnya tinggal Rp10.000,00. Berapakah biaya setiap cokelat?

Buatlah x biaya satu cokelat

Jadi, $60{,}000 - 20x = 10{,}000$ (bentuk persamman linear)

Tentukan nilai x; $60{,}000 - 20x = 10{,}000$

$60{,}000 - 60{,}000 - 20x = 10{,}000 - 60{,}000$ (kedua ruas dikurangi 60.000)

$-20x = -50{,}000$ (kedua ruas dibagi -20)

$\therefore \quad x = 2500$

Maka, biaya satu cokelat adalah Rp2.500,00.

Contoh Masalah Kontextual 2 – JALAN JALAN

Mbak Ninda melakukan perjalanan ke Bali dengan teman-teman sekelasnya. Biaya perjalanan itu Rp300,000.00. Termasuk didalamnya harga adalah Rp 120,000.00 tiket pesawat dan biaya 2 tas koper. Setiap tas koper biaya harga yang sama. Tentukan persamaan yang mewakili biaya perjalanan dan menentukan harga satu tas bagasi.

Jika x = biaya satu bagasi, maka biaya 2 bagasi adalah $2x$

120,000 + $2x$ = 300,000 (bentuk persamaan linear)

Tentukan nilai x : 120,000 – 120,000 + $2x$ = 300, 000 – 120, 000 (kedua ruas dikurangi 120.000)

$2x$ = 180 (kedua ruas dibagi 2)

$\therefore$ x = 90,000.

Maka biaya satu bagasi adalah Rp90.000,00.

Pengertian Kalimat Terbuka

Pernyataan Matematika

Pernyataan – adalah kalimat yang memiliki nilai kebenaran (bernilai benar saja atau salah saja)
Kalimat yang benar – adalah kalimat yang mengandung informasi benar. Misalnya; 4 -3 = 1 atau " Jakarta adalah ibu kota Republik Indonesia".
Kalimat yang salah – adalah kalimat yang mengandung informasi salah. Misalnya; 3 + 5 = 10 atau "Dalama satu minggu terdapat 4 hari".

Kalimat Terbuka – adalah kalimat yang dapat bernilai benar atau salah tergantung dari nilai yang digunakan atau kalimat yang memuat variabel. Misalnya:
a. $7x$ = 35 b. $f + 4 = 10$ c. x adalah faktor dari 4.

Pengertian Persamaan Linear Satu Variabel

Persamaan Linear Satu Variabel – adalah kalimat terbuka dengan satu variabel yang memiliki hubungan sama dengan, dan variabelnya hanya berpangkat satu. Misalnya;

a. $x + 8 = 15$ b. $3y - 7 = 20$ c. $\frac{a}{5} + 9 = 12$ d. $6p - 8 = 4p + 2$

Bentuk Setara Persamaan Linear

Dua persamaan atau lebih dikatakan **setara** jika persamaan-persamaan tersebut memiliki penyelesaian yang sama. Misalnya;

(i) $x + 5 = 12$ dan $2x + 10 = 24$ (ii) $x + 5 = 12$ dan $2x + 15 = 29$

(iii) $2x + 10 = 24$ dan $2x + 15 = 29$

.

Operasi Matematika dalam kata

Operasi Matematika	Dalam Kata
+	jumlah, tambah, lebih dari
-	minus, kurang, kurang dari.
÷	Pembagian
×	Perkalian
=	sama dengan, hasilnya

Menyelesaikan soal-soal dalam kehidupan sehari – hari yang berbentuk cerita.

Untuk menyelesaikan soal-soal dalam kehidupan sehari-hari yang berbentuk cerita, makah langkah-langkah berikut dapat membantu mempermudah penyelesaianya.

1. Jika memerlukan diagram (sketsa), misalnya untuk oal yang berhubungan dengan geometri, buatlah diagram (sketsa) berdasarkan kalimat cerita tersebut.

2. Salah satu besaran yang belum diketahui dimisalkan dengan sebuah variabel.

3. Menerjemahkan kalimat cerita menjadi model matematika dalam bentuk persamaan.

4. Menyelesaikan persamaan tersebut, kemudian menjawab sesuai yang ditanyakan.

C. LEMBAR KERJA SISWA

Kegiatan Kontextual - *Experience & Cooperating*

Indikator Pencapain – ***membuat model matematika dari masalah nyata yang berkaitan persamaan linear satu dan menyelesaikan model matematika tersebut.***

Mengamati

Mengamatilah aktivitas A sampai C dibawah ini!

A. ALAT-ALAT RUMAH TANGGA

Neti pergi ke pasar. Dia membeli beberapa piring dan cangkir seharga Rp24,000.00. Dia membeli piring-piring berwarna biru seharga Rp12,000.00. Dia juga membeli 2 mug, masing-masing satu untuk anak-anaknya. Kedua mug sama harganya. Ini akan menghabiskan semua uangnya.

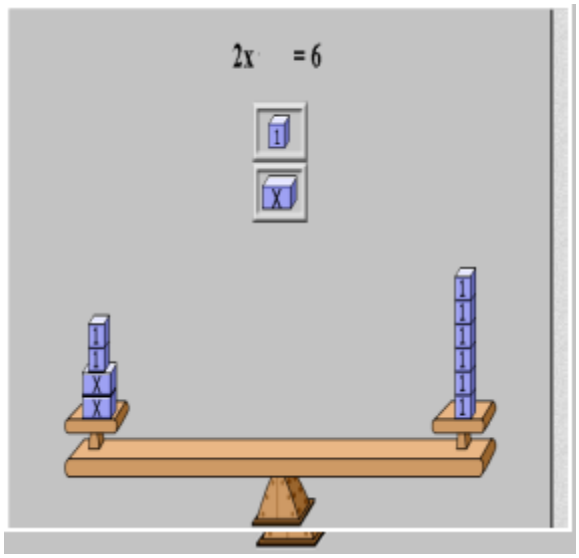
B. BELANJA ALAT-ALAT SEKOLAH

Andi mempunyai Rp 90,000.00. Dia ingin membeli sebuah kelkulator seharga Rp20,000.00, satu rautan seharga Rp10,000.00, sebuah stapler kecil dan sebuah pensil. Harga stapler dua kali harga pensil. Ini akan menghabiskan semua uangnya.

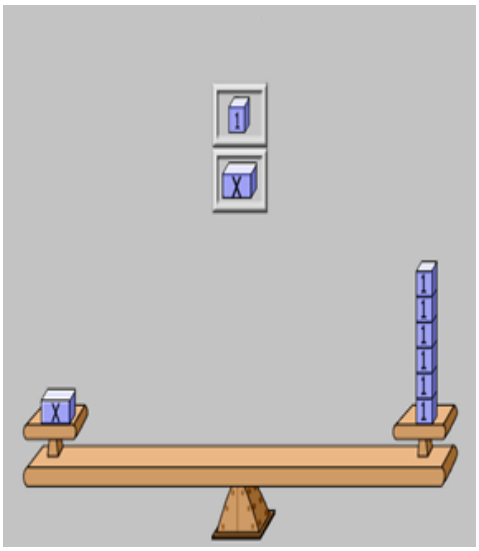
C. MODEL TIMBANG

Fakta C – 1

(b)

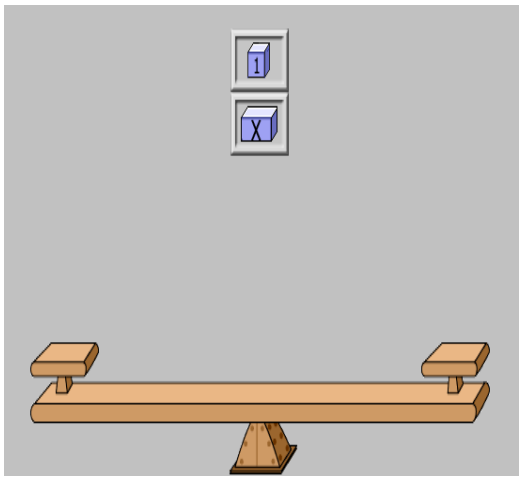


(a)

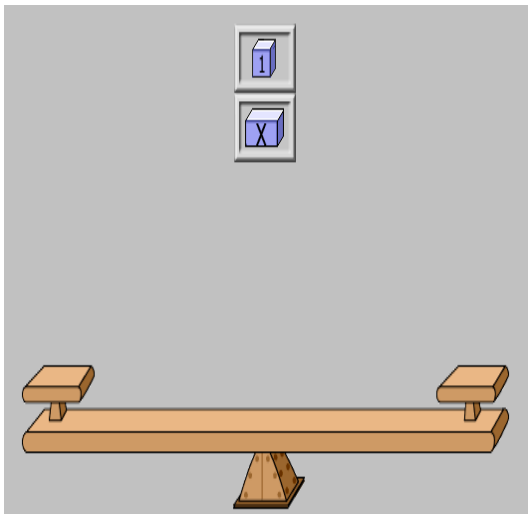


Fakta C-2

(a) $x = 3$



(b) $3x + 1 = 7$



Menanya

Buatlah pertanyaan berdasarkan situasi yang diberikan dalam aktivitas A sampai C.

.....
.....
.....
.....
.....
.....
.

Mengasosiasi

Bersama anggota kelompok diperiksa, didiskusikan dan diberikan masukan yang dapat dibuat dari kegiatan di atas.

.....
.....
.....
.....
.....

Mencoba

Fakta A

(i) Setelah mengamati fakta B, rumuskanlah persamaan di ruang bawah ini!

(ii) Setelah mendapatkan persamaan, pecahkanlah persamaan dan tentukanlah harga sebuah mug di ruang bawah ini.

Fakta B

(i) Setelah mengamati fakta B, rumuskanlah persamaan di ruang bawah ini!

(ii) Setelah mendapatkan persamaan, pecahkanlah persamaan dan tentukanlah harga sebuah pensil di ruang bawah ini.

Fakta C - 1

Menggunakan prinsip timbangan untuk menentukan nilai x.

(a)

$x =$ .....

(b)

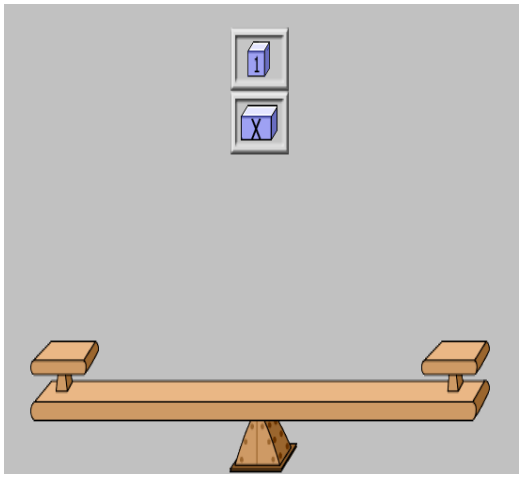
$2x = 6$

$x =$ .....

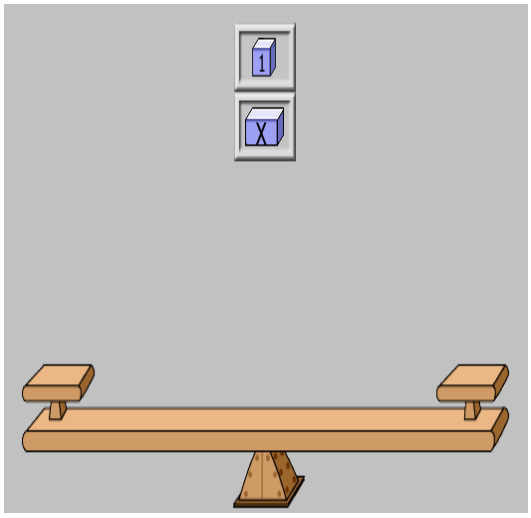
Fakta C – 2

Gambar timbangan yang menyatakan hubungan persamaan berikut.

(a) $\boldsymbol{x = 3}$



(b) $\boldsymbol{3x + 1 = 7}$



Bagaimana cara untuk menemukan x, jelaskan:

(a) .....

.....

(b) .....

.....

D. Masalah Matematis

Kegiatan Kontextual
Applying

Tulislah kalimat matematika dari pernyataan-pernyataan berikut dan menentukan nilai variabel.

1. Sebuah bilangan h dikurangi delapan sama dengan delapan puluh
2. Enam kali penjumlahan m dan n sama dengan tujuh kali n.
3. Sebuah bilanagn kuadrat adalah sama besarnya duablas lebihnya dari bilangan.

BELANJA

4. Youwanda membeli sepatu dengan semua uangnya. Dia hanya memiliki Rp150.000, 00. Biaya satu pasangan sepatu adalah Rp 40.000,00. Dia membeli dua pasangan sepatu lainnya untuk adik-adiknya. Setiap sepasang sepatu biaya harga yang sama. Tentukan harga satu pasang sepatu.

5. Ingrid memiliki Rp60.000, 00. Setelah membeli 5 jepit rambut, dia punya Rp30.000, 00. Berapa banyak setiap klip rambut termasuk biaya pajak?

E. Latihan 5

Kegiatan Kontextual
Transfering

1. Ringkasanlah kesimpulan kelompokmu tentang penjumalahan, pengurangan, perkalian dan pembagian monomial dari 4 aktivitas di bagian C dan E masalah matematis di bagian D. Pilihlah dua siswa di dalam kelompokmu untuk mempresentasikan temuan-temuanmu.

2. **MENABUNG**. Agisna memiliki Rp2.000.000,00 di bank. Dia ingin meningkatkan akunnya menjadi total Rp2, 600,000.00 dengan mendepositokan Rp 30,000.00 per minggu dari gajinya. Gunakan persamaan untuk menemukan berapa minggu dia perlu untuk mencapai tujuannya.

PENGGUNAAN PERSAMAAN LINEAR SATU VARIABEL

3. Atsnan bekerja di pabrik minyak. Dia mendapat Rp 45.000 per hari. Dia mendapat 10% kenaikan gaji. Dia bekerja 24 hari sebulan. Berapa banyak uang semakin dia akan mendapatkan untuk bulan itu.

6. Seorang penjaga toko menjual beberapa produk. Hasil jumlah produk yang dijual ditunjukkan sebagai berikut. Produk yang memiliki persentase terbesar dari persediaan yang dijual adalah...

a. 40 jeli mangga dari 80 dijual

b. 68% dari jus apel dijual

c. 0.475 dari kue yang dijual

4 – Penyelesaian Pertidaksamaan Linear satu Variabel

Konsep Matematika

- ***Ketidaksamaan***
- ***Pertidaksamaan Satu Variabel.***

Tujuan Pembelajaran

Kepada Siswa,

Pada akhir kelas ini anda mendapat;

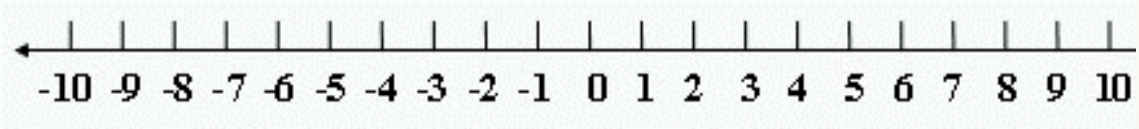
1. ***Membuat dan menyelesaikan model matematika dan masalah nyata yang berkaitan dengan pertidaksamaan.***

Materi Apersepsi dan Motivasi

1. Tulis kembali simbol $<, >, \geq, \leq$ dan $\neq$. Definisikan menggunakan kata-katamu sendiri untuk setiap simbol.

(i) < (ii) > (iii) ≤ (iv) ≥ (v) ≠

2. Tunjukan pada garis bilangan dibawah ini untuk bilangan -5, 7,5, 3 dan -1.5



Isilah ☐ dibawah ini dengan tanda " < " atau " > " supaya kalimatnya benar.

(i) - 5 ☐ 7,5 (ii) 5 ☐ -5 (iii) -1.5 ☐ -2 (iv) -8 ☐ -8.5

3. Tulislah kalimat matematika dari pernyataan-pernyataan berikut.

(i) Jumlah suatu bilangan dan negatif enam adalah lebih besar dari sembilan
.....

(ii) Negatif lima kali sebuah bilangan adalah lebih kecil dari duapuluh
.....

(iii) Harga sebuah senter Rp35.000,00 dan sebuah baterei kurang dari Rp 55.000,00

.....

B. Pengantar

Kegiatan Kontextual
Relating

Kami mendapat konsep pertidaksamaan linear satu variabel dari dunia nyata sebagai berikut.

Contoh Masalah Kontextual 1 - MUSIK

Pasa ditambahkan banyaknya 19 lagu-lagu di MP3 player. Jadi jumlah lagu-lagu dalam MP3 lebih dari 56. Berapakah banyak lagu-lagu awalnya pada player tersebut?

Jika x = lagu-lagu yang sudah ada di MP3 player,

Maka, $19 + x > 56$ (berbentuk pertidaksamaan)

memecahkan $19 - 19 + x > 56 - 19$ (kedua ruas dikurangi 19)

$x > 37$

Jadi total lagu-lagu yang sudah di MP3 player lebih dari 37.

Contoh Masalah Kontextual 2

Suhu di kolam renang meningkat 4˚F sejak pagi ini. Suhu kini kurang dari 81˚F. Berapa suhu kolam ini?

Jika t = suhu di kolam renang pagi ini

Maka, $t + 4 < 81$

Jadi $t + 4 - 4 = 81 - 4$ (kedua ruas dikurangi 4)

$t < 78$

Jadi, suhu dalam kolam renang pagi ini kurang dari 78.

Pengertian Ketidaksamaan

Ketidaksamaan – adalah kalimat yang menggunakan tanda ketidaksamaan. Misalnya

a. $3 < 2 + 4$ b. $4 + 5 > 7$ c. $3 \neq 5$

Pengertian Pertidaksamaan Linear Satu Variabel

Pertidaksamaan – adalah kalimat yang menggunakan tanda ketidaksamaan.

Pertidaksamaan linear satu variabel (PtLSV) – adalah pertidaksamaan yang hanya memiliki satu variabel dengan pangkat tertinggi dari variabelnya adalah 1.Misalnya

a. $x + 1 > 5$ b. $y < 10$ c. $2a + 4 = 8$ d. $\frac{3}{5}m + 6 \geq 5$

Mengekspresikan ketidaksamaan dalam kata

Ketidaksamaan			
<	>	≤	≥
kurang dari	lebih besar dari	Paling sedikit	Paling banyak

Sifat – Sifat Pertidaksamaan

(i) Jika kedua ruas pertidaksamaan ditambah atau dikurang dengan sebuah bilangan maka tanda pertidaksamaan tetap.

(ii) Jika kedua ruas pertidaksamaan dikali atau dibagi dengan sebuah bilangan positif maka tanda pertidakamaan tetap.

(iii) Jika kedua ruas pertidaksamaan dikali atau dibagi dengan sebua bilangan negatif maka tanda pertidakamaan harus diubah (< menjadi >, ≤ menjadi ≥ dan sebaliknya).

Grafik Penyelesaian Pertidakamaan Linear Satu Variabel

1. Menggambar bilangan rasional pada garis bilangan.

Jika kamu ingin menggambarkan $x > 4$ dengan x bilangan asli pada garis bilangan maka grafik ynag kamu peroleh sebagai berikut.

2. Akan tetapi, jika kamu ingin menggambarkan $x > 4$ dengan x bilangan rasional maka grafik yang kemu peroleh adalah sebagai berikut.

Mengapa grafiknya seperti itu? Karena penyelesaian dari $x > 4$ tidak hanya berupa bilangan bulat seperti -2 atau -1 melainkan juga berupa bilangan pecahan seperti $\frac{1}{3}$ atau $\frac{-5}{2}$.

Untuk $x \geq 4$ dengan x bilangan rasional.

Catatan

- Jika menggunakan tanda ≤ atau ≥.

  Jika menggunakan tanda < atau >.

.

Kegiatan Kontextual - *Experience & Cooperating*

Indikator Pencapain – ***membuat model matematika dari masalah nyata yang berkaitan pertidaksamaan linear satu dan menyelesaikan model matematika tersebut.***

C. LEMBAR KERJA SISWA

Aktivitas-aktivitas 1

Mengamatilah semua fakta A dan B dibawah ini!

A - DI TAMAN

30 + *x*

Berat badan dua anak sebelah kiri adalah (30 + x)kg sementara berat tiga anak di sebelah kanan adalah 48kg.

48kg

B- BERITA TERKINI

Rp48.000.000,00

Di surat kabar Jogja, diumumkan bahwa Mas Ahmed memenangkan undian sebesar Rp104.000.000,00. Dia ingin membeli mobil dan menghabiskan sisanya untuk membeli speed boat. .

Berikut harga macam-macam speed boat.

Daftar Harga Speed Boat

No	Merek Speed Boat	Harga
1	Yamaha	Rp 40 juta
2	Mitsubihi	Rp 50 juta
3	Honda	Rp 56 juta
4	Suzuki	Rp 60 juta
5	Toyota	Rp 70juta

Menanya

Buatlah pertanyaan situasi yang diberikan aktivitas A sampai C

.....

.....

.....

Mengasosiasi

Bersama anggota kolompok diperiksa, didiskusikan dan diberikan masukan yang dapat dibuat dari kegiatan di atas.

.....

.....

.....

Mencoba

Fakta A

(i) Setelah mengamati fakta A, rumuskanlah pertidaksamaan di ruang bawah ini!

(ii) Setelah mendapatkan pertidaksamaan, tentukanlah nilai x di ruang bawah ini.

(iii) Jika anda diminta permainan jungkir balik itu harus seimbang, nilai x harus sama dengan? Dikerjakan di ruang bawah ini.

Fakta B

(i) Setelah mengamati fakta C, rumuskanlah pertidaksamaan di ruang bawah ini!

(ii) Setelah mendapatkan pertidaksamaan, tentukanlah merek speed boat yang mana dapat dibeli Mas Ahmed dengan menggunakan daftar harga speed boat tersedia.

AKTIVITAS 2

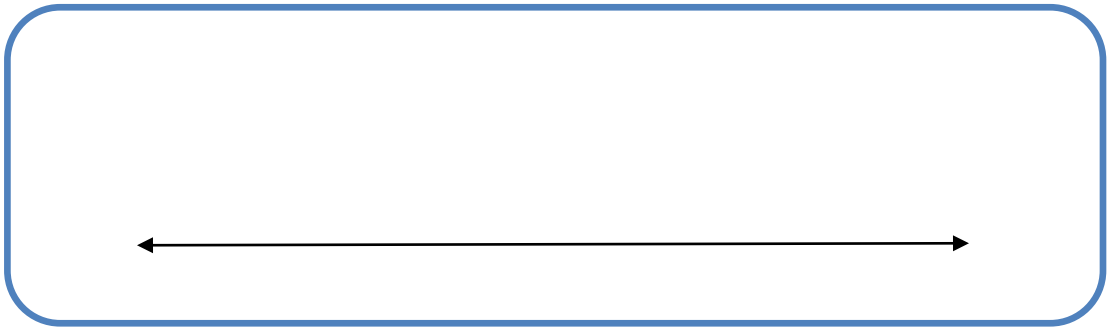
1. (i) Tentukanlah nilai f yang memenuhi $f > 7$, dengan f bilangan asli: .....

(ii) Gambarkan nilai f tersebut dengan garis bilangan

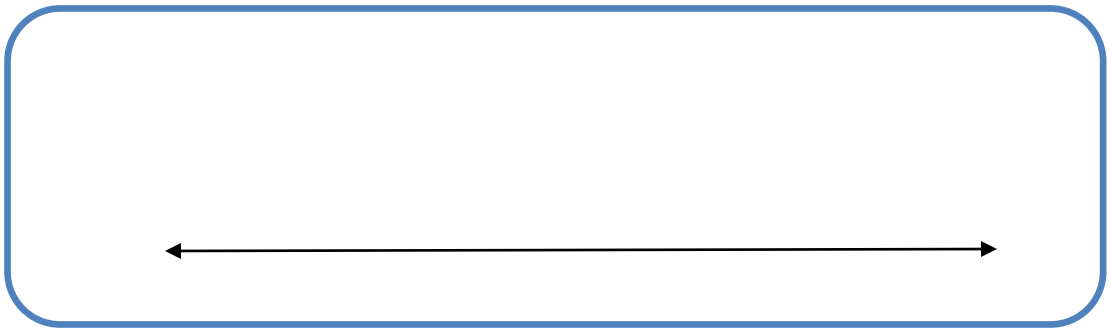
(i) Tentukanlah beberapa nilai $z \geq -5$ dengan z Ɛ bilangan raional.....

(ii) Gambarkan nilai z tersebut dengan garis bilangan

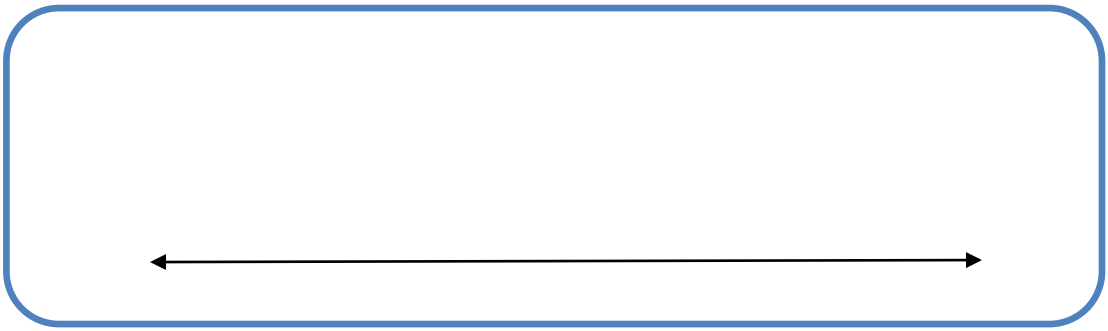
2. (i) Pecahkanlah pertidakamaan $y - 3 \geq -10$ dan kemudian kemudian gambarkan nilai y dengan y Ɛ bilangan rasional.



(ii) Pecahkanlah pertidaksamaan 8d < 24 dan kemudian gambarkan nilai d dengan d Ɛ bilangan asli.



(iii) Pecahkanlah pertidaksamaan $-3v + 7 > 22$ dan kemudian gambarkan nilai $\boldsymbol{v}$ dengan v Ɛ bilangan rasional.



D. Masalah Matematis

Kegiatan Kontextual
Applying

1. Tulislah kalimat matematika dari pernyataan-pernyataan berikut

   a. Jumlah suatu angka dan 16 setidaknya 47.

   b. Suatu angka menurun sebesar 9 adalah kurang dari 55.

   c. Dua kali suatu angka lebih dari jumlah angka itu dan 12.

   d. Jumlah kedua angka paling banyak 20, dan salah satu angka adalah -7.

2. **BELANJA**. Vivi membeli barang pembersihan gigi untuk Rp25, 000.00 dan sikat gigi untuk Rp15, 00.00. Dia menghabiskan sisa dari uangnya pada sabun. Pada awalnya dia memiliki Rp80, 000.00. Setiap sabun adalah Rp5, 000.00. Berapakah banyak ia dapat membeli?

3. **BIOLOGI** Beratnya sebuah buaya dewasa di GEMBIRA LOKA ZOO, 2200 pound. Jika buaya muda beratnya 147pounds, berapa kilogram itu bisa diharapkan untuk mendapatkan seumur hidup

4. Tentukan penyelesaian pertidaksamaan-pertidaksamaan berikut!.

a. $r - 6 \geq 32$ b. $7p \leq 5p - 4$ c. $11 > x - 1$ d. $8f + 6 < 5f$.

E. Latihan 5

Kegiatan Kontextual
Transfering

1. Ringkasanlah kesimpulan kelompokmu tentang pertidaksamaan dari 2 aktivitas di bagian C dan D. Pilihlah dua siswa di dalam kelompokmu untuk mempresentasikan temuan-temuanmu.

2. **PERTANIAN**. Pak Jono memiliki kebun jangun berbentuk persegi panjang. Lebar kebun tersebut adalah x m dan panjangnya (4x + 5)m. Pak Jono berencana untuk memagari sekeliling kebun tersebut dengan bambu. Tentukan nilai x agar sekeliling kebun terebut dapat dipagari bambu sepanjang 200 meter.

3. Tentukan penyelesaian pertidaksamaan-pertidaksamaan berikut!

a. $10 + (3x - 2) < -1$ b. $\frac{x}{5} - \frac{x}{3} \leq 2$ c. $5 - 2k \leq 3k$

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RENCANA PELAKSANAAN PEMBELAJARAN

Nama Sekolah **: SMPN 2 Mlati, Sleman, Yorgyakarta**

Mata Pelajaran **: Matematika**

Topik **: Persamaan dan Pertidaksamaan Linear dalam Satu Variabel**

Semester **: 1 (Satu)**

Kelas **: 7**

Alokasi Waktu **: 13 x 40 menit (7 Pertemuan)**

A. Standar Kompetensi

2. Memahami bentuk aljabar, persamaan dan pertidaksamaan linear satu variabel.

B. Kompetensi Dasar

2.1 Mengenali bentuk aljabar dan unsur-unsurnya.

2.2 Melakukan operasi pada bentuk aljabar.

2.3 Menyelesaikan persamaan linear satu variabel.

2.4 Menyelesaikan pertidaksamaan linear satu variabel.

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2.3 Menyelesaikan persamaan linear satu variabel.

2.4 Menyelesaikan pertidaksamaan linear satu variabel.

PEMBELAJARAN 1

C. Indikator Pencapaian

(i) Mengidentifikasi unsur-unsur bentuk aljabar sebagai sebuah konstanta, variabel, koefisien dan suku.

(ii) Menyusun model-model matematika dalam batasan bentuk aljabar dari masalah-masalah dunia nyata.

(iii) Menjelaskan pengertian unsur-unsur bentuk aljabar.

D. Tujuan Pembelajaran

Setelah mengikuti pembelajaran pendekatan kontextual melalui metode saintifik siswa dapat**:**

(i) Menunjukkan semangat selama proses belajar.

(ii) Menanggung jawab di dalam diskusi kelompok dan menyelesaikan tugas-tugas kelompok.

(ii) Mengenali unsur-unsur aljabar dalam kejadian-kejadian sehari-hari.

(iii) Mengenali unsur-unsur aljabar sebagai konsep-konsep matematika

(v) Menyusun bentuk aljabar dari kejadian-kejadian dunia nyata.

(vi) Menyusun bentuk aljabar dari permasalahan matematika

E. Materi Pokok

(i) Pokok Bahasan: Unsur-unsur bentuk aljabar.

(ii) Sasaran Matematika: Konsep-konsep – Konstanta, variabel-variabel, koefisien-koefisien, istilah-istilah, pangkat/ eksponen dan tanda aljabar.

Konsep-konsep Matematika Dasar/ Wajib

Definisi.

1. *Konstanta* –Konstanta adalah nilai atau angka yang tidak berubah di dalam sebuah persamaan. Konstanta juga merupakan dapat merupakan kwantitas atau nilai tetap yang tidak berubah atau berganti, misalnya sebuah angka. Misalnya, 5 merupakan konstanta dari $x + 5$.

2. Variabel – adalah sebuah simbol yang dapat merepresentasikan kwantitas-kwantitas yang tidak diketahui. Variabel-variabel di dalam sebuah tanda aljabar mengubah nilai-nilai bila

tanda aljabar tersebut tidak ditulis di dalam sebuah persamaan. Misalnya, x^2 dan y merupakan variabel di dalam -$4x^2-2y$.

3. *Koefisien Bilangan* – adalah angka dikalikan dengan variabel atau angka variabel. Misalnya di dalam $4xy$, $5ab$ dan $-18a^2b^3$, koefisiennya adalah 4, 5 dan -18.

4. *Pangkat/ Eksponen* – adalah pangkat dari variabel atau angka di dalam tanda aljabar. Misalnya $4xy$, 1 adalah pangkat dari variabel x dan y, sementara di dalam $-18a^2b^3$, 2 dan 3 berturut-turut merupakan pangkat a dan b.

5. Suku – terdiri dari sebuah angka atau variabel, yang dikombinasikan melalui perkalian atau pembagian atau terdiri dari sebuah angka saja. Misalnya $4xy$ adalah sebuah suku sementara $3xy + 5x - 6$ memiliki 3 suku.

6. *Tanda Aljabar* – adalah jumlah atau perbedaan suku-suku. Tanda aljabar merupakan tanda yang terdiri sekurang-kurangnya satu variabel dan sebuah pengoperasian matematika. Misalnya, $3xy - 6, -5vu^3 + 3fg - 1$.

F. Metode Pembelajaran

Saintifik atau Metode Ilmiah.

G. Kegiatan Mengajar dan Belajar

Alokasi Waktu	Kegiatan	Gambaran Kegiatan	Saran
15 menit	**Pendahuluan**	1. Guru mengucapkan salam pada pembelajar dan berdoa. 2. Guru mengecek kehadiran pembelajar. 3. Guru menjelaskan tujuan-tujuan pembelajaran[1]. 4. Guru menjelaskan kepada para pembelajar tentang metode-metode dan teknik-teknik pembelajaran dan penilaian yang akan dilakukan dalam Pokok Bahasan ini[2]. Metode dan teknik untuk pembelajarn ini ada di Lampiran 1. 6. Guru memberikan apersepsi dan motivasi. Ada berapa soal agar dikerjakan oleh pembelajar dan pada saat yang sama mendiskusikannya dengan pembelajar. Materi apersepsi dan motivasi ada di buku bagian A, halaman 5.	

[1]Sumber: Bell, F. H, (1978) – Lampiran 1 Bagian 1

[2] Sumber: Bell, F.H, (1978).- Lampiran 1 Bagian 2 – Metode Saintifik dan Penilaian Otentik

50 menit	**Inti Kegiatan Mengajar dan Belajar**	1. Berdasarkan hasil apersepsi dan motivasi guru membuat koneksi antara aritmetika dan aljabar. 2. Pembelajar melalui bagian B di buku berhubungan situasi dunia nyata dengan konsep matematika yang dipelajari sebagai kegiatan *Relating*. Ada 2 contoh masalah kontextual di halaman 6. 3. Pembelajar melalui bagian C di halaman 8-11 menyelesaikan aktivitas kontextual 1 dan 2 dengan menggunakan metode saintifik dengan langkah-langkah *mengamati*, *menanya*, *mengasosiasi* dan *mencoba* sebagai kegitan *Experience*. Belajar Bersama (Learning Together) digunakan di dalam diskusi kelompok[3] *(Cooperating).* 4. Pembelajaran mengerjakan masalah matematis di bagian D sebagai kegiatan *Applying*. 5. Pembelajar mendiskusikan (*membentuk jejaring*) hasil pengerjaan yang di bagian C dan D. Setiap anggota ikut ambil bagian dengan mengecek, mengoreksi dan memberikan umpan balik. 6. Dua pembelajar merepresentasikan kelompok mereka dalam upaya melaporkan hasil tugas mereka sebagai kegitan *Transfering*. Pembelajar secara acak dipilih oleh guru. 7. Guru memfasilitasi pembelajar dengan memberi umpan balik ketika pembelajar menuliskan jawaban-jawaban di papan tulis.	
15 menit	Penutup	1. Guru mereview pembelajaran dengan mendiskusikan tujuan pembelajaran. 2. Pembelajar merefleksikan apa yang mereka pelajari dan menjelaskan keraguan mereka. 3. Guru memberikan pekerjaan rumah yang tersedia di buku bagian E nomor 2 ke 4.	

[3] Sumber Membentuk Jejaring: KEMENTARIAN PENDIDIKAN DAN KEBUDAYAAN (2013: 201)

H. Strategi Assessmen

1. Prosedur Penilaian

Aspek-aspek yang dinilai	Teknik Penilaian	Waktu Penilaian
Pengetahuan dan Keterampilan	Tes Pendek	Awal Pembelajaran 2
Keingintahuan	Observasi	Kegiatan Inti;1 , 2,
Tanggung jawab	Observasi	Kegiatan Inti: 3, 4,5,6

(i) Instrumen Penilaian - TES PENDEK

Tes Pendek 1 **Waktu: 10 menit**

Petunjuk:

1. Kerjakan soal berikut secara individu, tidak boleh menyontek dan tidak boleh bekerjasama.
2. Pilihan jawaban soal kemudian jawablah pertanyaan/ perintah di bawahnya.

Soal:

Putri ingin mengetahui seberapa banyak dia menghabiskan pembelian pulsa telepon. Lamba ʊ menunjukkan jumlah uang yang digunakan untuk membeli pulsa telepon dalam seminggu. Nyatakan dalam lamba ʊ jumlah uang yang digunakan untuk membeli pulsa telepon dalam 5 minggu?

A. 5 + ʊ B. 5 ʊ C. ʊ + 5 D. 5 (ʊ + ʊ)

1. Pilihan Jawaban ...
   Alasan pilihan jawaban...

2. Bilangan apakah yang diwakili oleh symbol ʊ?
   Jawab...
   Alasan jawaban...

3. Adahkah suku pilihan jawabanmu?

Answer:… YA/ Tidak (Lingkarilah jawabanmu)

Alasan...

4. Apakah pilihanmu di (a) merupakan bentuk Aljabar?

Jawab: … YA/TIDAK

Alasan:...

5. Manakah variabel, konstanta dan koefisien pada pilihan jawabanmu?

Variabel :..

Konstanta :..

Koefisien :..

Jawaban Tes Pendek 1

1. Pilihan yang benar : B 5 ʊ

Alasan: ʊ = jumlah uang yang digunakan dalam pembelian pulsa selama 5 minggu, ∴ ʊ + ʊ + ʊ + ʊ + ʊ

2. Tipe angka: Angka Nyata Positif

Alasan: Karena jumlah uang dapat merupakan keseluruhan dan bilangan-bilangan rasional.

3. Apakah jawabanmu sebuah Suku: Ya 5 ʊ adalah sebuah suku

Alasan: definisi suku ialah bahwa suku terdiri dari sebuah variabel dan sebuah bilangan yang dikombinasikan melalui perkalian.

4. Apakah jawabanmu di dalam (a) merupakan bentuk aljabar: YA

Alasan: Bentuk aljabar terdiri dari sebuah simbol ʊ yang merupakan karakter utama dari sebuah tanda aljabar, yang menyatakan jumlah uang yang digunakan di dalam seminggu.

5. Variabel: ʊ; Konstanta: Tak ada; Koefisien: 5.

Rubrik Tes Pendek

No.	Aspek-aspek Penilaian	Rubric Penilaian	Skor	Skor Maksimum
1	Jawaban Pilihan	Benar	10	25
		Salah	3	
		Tak ada jawaban	0	
	Alasan	Benar	15	
		Sebagaian Benar	5	
		Tak ada alas an	0	
2	Jawaban	Benar	10	20
		Salah	3	
		Tak ada jawaban	0	
	Alasan	Benar	10	
		Sebagaian Benar	5	
		Tak ada alas an	0	
3	Jawabaan Pilihan	Benar	8	15
		Salah	3	
		Tak ada jawaban	0	
	Alasan	Benar	7	
		Salah	3	
		Tak ada jawaban	0	
4	Jawabaan Pilihan	Ya	10	25
		Tidak	5	
		Tak ada jawaban	0	
	Alasan	Benar	15	
		Sebagaian benar	5	
		Tak ada jawaban	0	
5	Identifikasi benar	3 jawaban benar	15	15
		2 jawaban benar	10	
		1 jawaban benar	5	
		Semua jawaban	2	

		salah		
		Skor Maksimum =		100
		Skor Minimum =		0

(ii) Lembar Observasi – KEINGINTAHUAN DAN TANGGUNG JAWAB

Mata Pelajaran : Matematika
Kelas/ Semester : 7/1
Tahun Akademik : 2013/2014
Waktu Observasi : May 2014
Kompetensi Dasar : 2.1

Indikator-indikator Perkembangan - Keingintahuan

1. Kurang – Pembelajar tidak ada usaha menjawab pertenyaan atau tidak perduli dalam proses mengajar belajar.
2. Bagus – Pembelajar menunjukkan usaha untuk mencoba dan menjawab di dalam proses belajar tetapi belum konsisten.
3. Sangat Bagus –Pembelajar telah menunjukkan usaha untuk menjawab pertanyaan dan konsisten di dalam proses mengajar dan belajar

Indikator-indikator Perkembangan – Tanggung jawab di dalam kegiatan-kegiatan kelompok

1.Kurang –Tidak ada usaha di dalam kerja kelompok
2. Bagus –Sedikit ada usaha di dalam kerja kelompok
3. Sangat Bagus –Menunjukkan usaha keras di dalam kerja kelompok

No.	Nama	KEINGINTAHUAN			TANGGUNG JAWAB		
		K	B	SB	K	B	SB
1							
2							
3							
4							
N							

K = Kurang B = Bagus SB = Sangat Bagus

Lampiran 1

Pembelajaran 1 – Catatan-catatan Pendahuluan

Bagian 1

4. Tujuan-tujuan Pembelajaran (Tujuan-tujuan ini seharusnya dikaji secara individual oleh setiap pembelajar pada akhir perlajaran sehingga mereka dapat mengevaluasi dan menilai pemahaman mereka tentang tujuan pelajaran).

1. Pembelajar menunjukkan semangat selama proses belajar.
2. Setiap anggota bertanggung jawab dalam menyelesaiakan tugas-tugas kelompok.
3. Mengenali unsur-unsur aljabar di dalam kejadian sehari-hari.
4. Mengenali unsur-unsur aljabar sebagai konsep-konsep matematika.
5. Menyusun bentuk aljabar dari kejadian-kejadian nyata.
6. Menyusun bentuk alajabar sebagai konsep-konsep matematika.

Bagian 2

5. Metode Pengajaran dan Penilaian

(i) Metode Pengajaran – Guru akan menggunakan Pendekatan Ilmiah yang terdiri dari 5 langkah, yaitu observasi, pertanyaan, asosiasi, eksperimen dan jejaring.

(ii) Metode Penilaian – Guru akan menggunakan Penilaian Otentik, yaitu penialaian formatif, portofolio, kerja kelompok dan penilaian keikutsertaan pembelajar.

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PEMBELAJARAN 2

A. Indikator Pencapaian

(i) Mengidentifikasi suku sejenis dan berbeda jenis.

(ii) Menambah, mengurangi, mengalikan dan membagi bentuk aljabar monomial.

B. Tujuan Pembelajaran

Setelah mengikuti pembelajaran pendekatan kontekstual melalui metode saintifik siswa dapat:

(i). Meyakinkan bahwa siswa secara terus menerus menunjukkan keingintahuan, semangat dan ketekunan selama proses belajar.

(ii). Bertanggung jawab di dalam tugas kelompok dan diskusi.

(iii). Mengidentifikasi suku sejenis dan berbeda jenis.

(iv). Menambah, mengurangi, mengalikan dan membagi monomial.

(v). Menambah, mengurangi, mengalikan dan membagi bentuk pecahan aljabar.

C. Materi Pokok

(i). Pokok Bahasan: mengidentifikasi suku sejenis dan berbeda jenis, penambahan, pengurangan. perkalian dan pembagian monomial.

(ii). Sasaran Matematika

(a) Konsep – suku sejenis, suku berbeda jenis, monomial.

(b) Keterampilan - penambahan, pengurangan, perkalian dan pembagian monomial,

(c) Fakta – Sifat Eksponen

Konsep-konsep Matematika Dasar/ Wajib

Definisi:

1.*Suku Sejenis* – adalah suku aljabar yang memiliki variabel dan eksponen yang sama. Suku sejenis dapat ditambahkan atau dikurangkan. Contoh suku sejenis, $3x$ dan $10x$, $4vp$ dan $2vp$, $5s^3u^2t$ dan $-8s^3u^2t$.[1]

2. *Suku Berbeda Jenis* – adalah suku aljabar yang tidak memiliki variabel dan eksponen yang sama. Suku berbeda jenis tidak dapat ditambah atau dikurangkan. Contoh suku berbeda jenis, $4r$ dan $6s$, $2e^3f^2x$ dan $3e^3f^2y$, $5nm$ dan $-4nmt$.

3. *Monomial* – adalah angka, variabel, atau hasil kali angka dan atau lebih variabel. Misalnya 4, $y, 3x^2\ dan\ -10abc$.

D. Metode Pembelajaran

Saintifik atau Metode Ilmiah untuk Indikator Pencapaian (i) dan (ii).

E. Kegiatan Mengajar dan Belajar

Alokasi Waktu	Kegiatan	Deskripsi Kegiatan	Saran
30 menit	**Pendahuluan**	1. Guru memberi salam dan berdoa bersama. 2. Guru memeriksa dan membahas pekerjaan rumah pada pembelajaran 1. 3. Guru memberikan Tes Pendek 1 untuk Pembelajaran 1 dan pada saat yang sama mengecek kehadiran. 4. Guru membahas tujuan pembelajaran. 5. Guru memberikan apersepsi dan motivasi. Ada berapa soal agar dikerjakan oleh pembelajar dan pada saat yang sama mendiskusikannya dengan pembelajar. Materi apersepsi dan motivasi di buku halaman 15.	
40 mnt	**Inti Pembelajaran**	1. Berdasarkan hasil apersepsi dan motivasi guru membangun koneksi di pikiran pembelajar tentang suku sejenis, suku tak jenis, penambahan, pengukuran, perkalian dan pembagian monomial.	

[1] Sumber: Lynch & Parr, 2008. OXFORD MATHEMATICS STUDY DICTIONARY, pg 123.

		2. Pembelajar melalui bagian B halaman 16 dan D di buku halaman 22 menghubungkan situasi dunia nyata dengan konsep matematika yang dipelajari sebagai kegiatan *Relating*. Ada 4 contoh masalah kontekstual tentang penambahan, pengukuran, perkalian dan pembagian monomial. 3.Pembelajar melalui bagian C di halaman 19 dan E di halaman 25 menyelesaikan aktivitas kontextual 1 sampai 4 dengan menggunakan metode saintifik dengan langkah-langkah *mengamati*, *menanya*, *mengasosiasi* dan *mencoba* sebagai kegitan *Experience*. Belajar Bersama (Learning Together) digunakan di dalam diskusi kelompok[2] *(Cooperating).* 4. Pembelajaran mengerjakan masalah matematis di bagian F halaman 28 sebagai kegiatan *Applying.* 5. Pembelajar mendiskusikan (*membentuk jejaring*) hasil pengerjaan yang di bagian C, E dan F. Setiap anggota ikut ambil bagian dengan mengecek, mengoreksi dan memberikan umpan balik. 6. Dua pembelajar merepresentasikan kelompok mereka dalam upaya melaporkan hasil tugas mereka sebagai kegitan *Transfering*. Pembelajar secara acak dipilih oleh guru. 7. Guru memfasilitasi pembelajar dengan memberi umpan balik ketika pembelajar menuliskan jawaban-jawaban di papan tulis..	
10 mnt	**Penutup**	1. Guru mereview tujuan pembelajaran dengan pembelajar sambil mengecek pemahaman tentang perkalian dan pembagian dari tanda aljabar. 2. Pembelajar merefleksikan pembelajaran 3. Guru memberikan pekerjaan rumah yang ada di buku siswa Latihan 2, halaman 29, bagian G, nomor 2- 7.	

[2] Sumber Membentuk Jejaring: KEMENTARIAN PENDIDIKAN DAN KEBUDAYAAN (2013: 201)

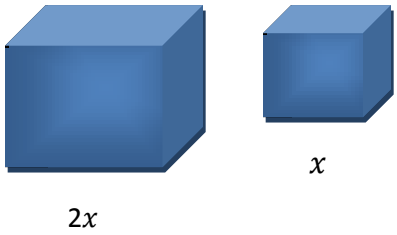
F. Strategi Assessmen

1. Prosedur Penilaian

Aspek yang dinilai	Teknik Penilaian	Waktu Penilaian
Pengetahuan	Tes Pendek (Pilihan Ganda)	Awal pembelajaran 3

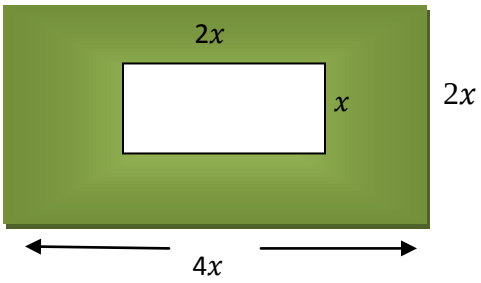
(i) Instrumen Penilaian – TES PENDEK

Tes Pendek 2 – Pilihan Ganda **Waktu: 15 menit**

1. 

Berapa perbandingan volume kubus yang lebih besar dengan volume kubus yang lebih kecil?

A. 4 B. 2 C. 8 D. 6

2. 

Nyatakan luas bagian yang diarsir dalam x.

A. $2x^2$ B. $8x^2$ C. $6x^2$ D. $3x^2$

3. Sederhanakanlah $\left(\frac{b}{3c}\right)^2 x\ 9c^3b^4$

A. b^6c B. $3a^5b^2$ C. $4a^3b^4$ D. $2b^3c^2$

4. Sederhanakanlah $\frac{3x^2+8xy-x^2-5xy}{xy}$

A. $\frac{4x^2+13xy}{x}$ B. $\frac{2x^2+3xy}{xy}$ C. $\frac{2xy+3x^2y}{x}$ D. $\frac{x+y}{x}$

Jawaban dan Rubrik Tes Pendek 2.

No	Pembahasan	Jawaban	Skor
1	Volume kubus yang lebih besar = $l^3 = 2x \cdot 2x \cdot 2x$ $= 8x^3$. Volume kubus yang lebih kecil = $l^3 = x \cdot x \cdot x = x^3$ Maka, $8x^3 : x^3 = 8$	C	5
2	Luas untuk bagian yang diarsir = bagian persegipanjang lebih besar dikurangi bagian persegipanjang yang lebih kecil. Bagian peregipanjang besar = $p \times l = 4x \times 2x = 8x^2$ Bagian persegipanjang kecil = $p \times l = 2x \times x = 2x^2$ Maka, $8x^2 - 2x^2 = 6x^2$.	C	5
3	$\left(\frac{b}{3c}\right)^2 \times 9c^3b^4 = \frac{b^2}{9c^2} \times \frac{9c^3b^4}{1} = \frac{9c^3b^6}{9c^2}$ $= cb^6$	A	5
4	$\frac{3x^2+8xy-x^2-5xy}{xy}$ $= \frac{3x^2-x^2+8xy-5xy}{xy}$ $= \frac{2x^2+3xy}{xy}$	B	5

Total Nilai	20

PEMBELAJARAN 3

A. Indicator Pencapaian

Menambah, mengurangi, mengalikan dan membagi bentuk aljabar.

B. Tujuan Pembelajaran

Setelah menggikuti pembelajaran pendekatan kontextual melalui metode saintifik siswa dapat:

Memilik kemampuan menambah, mengurangi, mengalikan dan membagi bentuk pecahan aljabar.

C. Materi Pokok

(i) Pokok Bahasan: Penambahan, pengurangan, perkalian dan pembagian pecahan aljabar.

(ii) Sasaran Matematika:

Keterampilan: penambahan, pengurangan, perkalian dan pembagian pecahan aljabar.

D. Metode Pembelajaran

Saintifik atau Metode Ilmiah

E. Kegiatan Mengajar dan Belajar

Alokasi Waktu	Kegiatan	Deskripsi Kegiatan	Saran
30 menit	**Pendahuluan**	1. Guru memberi salam dan berdoa bersama. 2. Guru memeriksa dan membahas pekerjaan rumah pada pembelajaran 2. 3. Guru memberikan Tes Pendek 2 untuk Pembelajaran 2 dan pada saat yang sama mengecek kehadiran. 4. Guru membahas tujuan pembelajaran. 5. Guru memberikan apersepsi dan motivasi. Ada berapa soal agar dikerjakan oleh pembelajar dan pada saat yang sama mendiskusikannya dengan pembelajar. Materi apersepsi dan motivasi di buku halaman 30.	

40 mnt	**Inti Pembelajaran**	1. Berdasarkan hasil apersepsi dan motivasi guru membangun koneksi di pikiran pembelajar tentang penjumlahan, pengurangan, perkalian dan pembagian pecahan bentuk aljabar. 2. Pembelajar melalui bagian B halaman 31 sampai 32 membaca, mengamati dan pada saat yang sama bertanya kepada guru tentang penjumlahan dan pengurangan bentuk pecahan aljabar. 3. Pembelajar melalui bagian B halaman 33 membaca, mengamati dan pada saat yang sama bertanya kepada guru tentang perkalian dan pembagian bentuk pecahan aljabar. 4. Pembelajar melalui halaman 34, bersama anggota kelompoknya mengerjakan soal-soal tersedia sebagai kegiatan mengasosiasi dan mencoba. 5. Pembelajar mendiskusikan (*membentuk jejaring*) hasil pengerjaan. Setiap anggota ikut ambil bagian dengan mengecek, mengoreksi dan memberikan umpan balik. 6. Dua pembelajar merepresentasikan kelompok mereka dalam upaya melaporkan hasil tugas mereka sebagai kegitan *Transfering*. Pembelajar secara acak dipilih oleh guru. 7. Guru memfasilitasi pembelajar dengan memberi umpan balik ketika pembelajar menuliskan jawaban-jawaban di papan tulis..	
10 mnt	**Penutup**	1. Guru mereview tujuan pembelajaran dengan pembelajar sambil mengecek pemahaman tentang perkalian dan pembagian dari tanda aljabar. 2. Pembelajar merefleksikan pembelajaran 3. Guru memberikan pekerjaan rumah yang ada di buku halaman 34, nomor 1 sampai 9.	

F. Strategi Assessmen

1. Prosedur Penilaian

Aspek-aspek yang dinilai	Teknik Penilaian	Waktu Penilaian
Pengetahuan	Tes Pendek (Esai)	Awal Pembelajaran 2

Instrumen Penilaian - TES PENDEK

Tes Pendek 3 – Esai **Waktu: 10 menit**

Selesaikan soal-soal di bawah ini.

1. $\frac{5}{4a} + \frac{b}{2a}$ 2. $\frac{4}{e} - \frac{6}{b}$ 3. $\frac{8}{2k} \times \frac{3}{2k^2}$ 4. $\frac{3}{5b} \div \frac{6}{c}$

Jawaban dan Rubrik Tes Pendek 3

No	Pembahasan	Nilai
1	$\frac{5}{4a} + \frac{b}{2a} = \frac{5+2b}{4a}$	Sebagian benar = 1 Benar = 2
2	$\frac{4}{e} - \frac{6}{b} = \frac{4b-6e}{be} = \frac{2(2b-3e)}{be}$	Sebagian benar = 1 Benar = 2
3	$\frac{8}{2k} \times \frac{3}{2k^2} = \frac{8\times3}{2k\times2k^2} = \frac{24}{4k^3} = \frac{6}{k^3}$	Sebagian benar = 1 Benar = 2
4	$\frac{3}{5b} \div \frac{6}{c} = \frac{3}{5b} \times \frac{c}{6} = \frac{3\times c}{5b\times6} = \frac{3c}{30b} = \frac{c}{10b}$	Sebagian benar = 1 Benar = 2
Total Nilai		**8**

PEMBELAJARAN 4

A. Indikator Pencapaian

(i) Menentukan nilai variabel dari suatu persamaan linear satu variabel.

(ii) Membuat model matematika dari masalah nyata yang berkaitan dengan persamaan linear satu variabel.

(iii) Menyelesaikan model matematika dari masalah nyata yang berkaitan dengan persamaan linear satu variabel.

B. Tujuan Pembelajaran

Setelah mengikuti pembelajaran pendekatan kontekstual melalui metode saintifik siswa dapat:

(i) Setiap anggota bertanggung jawab dalam menyelesaikan tugas-tugas kelompok.

(ii) Menunjukkan semangat selama proses belajar.

(iii) Menggunakan variabel untuk merepresentasikan kwantitas dan menyusun dunia nyata dan permasalahan matematika ke dalam persamaan linear sederhana kemudian memecahkan permasalahan melalui pemikiran tentang kwantitas-kwantitas.

C. Materi Pokok

(i) Pokok Bahasan: memecahkan masalah persamaan linear satu variable.

(ii) Sasaran Matematika:

(a) Konsep – Kalimat Terbuka, Persamaan Linear Satu Variabel dan

(b) Keterampilan – Memecahkan Masalah Persamaan Linear

Konsep Matematika Dasar/ Wajib

1. *Persamaan Linear Satu Variabel* – adalah suatu persamaan yang berbentuk $ax + b = 0$. Misalnya $3x + 2 = 4, y = 7 - 3\ dan\ 89m - 6 = 78$.

2. *Kalimat Terbuka* – adalah kalimat yang belum dapat ditentukan nilai kebenarannya. Misalnya, $15{,}50 + 5n = 135\ dan\ 2x^2 + 4y = 8$.

3. *Bentuk Setara Persamaan Linear* – adalah dua persamaan atau lebih dikatakan setara jika persamaan-peramaan tersebut memiliki penyelesaian yang sama. Misalnya; $x + 5 = 12$ dan $2x + 10 = 24$.

D. Metode Pembelajaran

Saintifik atau Metode Ilmiah.

E. Kegiatan Mengajar Belajar

Alokasi Waktu	Kegiatan	Gambaran Kegiatan	Tanda
20 menit	**Pendahuluan**	1.Guru memberikan salam dan berdoa bersama. 2.Guru memeriksa dan membahas pekerjaan rumah pada pembelajaran 3. 3. Guru memberikan Tes Pendek 3 dan pada saat yang sama mengecek kehadiran. 4.Guru membahas tujuan pembelajaran 5.Guru membahas Metode Penilaian untuk pembelajaran saat itu. 6.Guru memberikan apersepsi dan motivasi agar dikerjakan oleh pembelajar dan pada saat yang sama mendiskusikannya dengan pembelajar. Materi apersepsi dan motivasi di buku halaman 34.	
50 menit	**Inti Pembelajaran**	1. Berdasarkan hasil apersepsi dan motivasi guru membangun pengertian persamaan di pikiran pembelajar. 2. Pembelajar melalui bagian B di buku halaman 35, berhubungan situasi dunia nyata dengan konsep matematika yang dipelajari sebagai kegiatan *Relating*. Ada 2 contoh masalah kontextual tentang persamaan linear satu variabel. 3.Pembelajar melalui bagian C di halaman	

		38 menyelesaikan aktivitas kontextual 1 dan 2 dengan menggunakan metode saintifik dengan langkah-langkah *mengamati*, *menanya*, *mengasosiasi* dan *mencoba* sebagai kegitan *Experience*. Belajar Bersama (Learning Together) digunakan di dalam diskusi kelompok[1] *(Cooperating).* 4. Pembelajaran mengerjakan masalah matematis di bagian D halaman 43 sebagai kegiatan *Applying.* 5. Pembelajar mendiskusikan (*membentuk jejaring*) hasil pengerjaan yang di bagian C, dan D. Setiap anggota ikut ambil bagian dengan mengecek, mengoreksi dan memberikan umpan balik 6. Dua pembelajar merepresentasikan kelompok mereka dalam upaya melaporkan hasil tugas mereka sebagai kegitan *Transfering*. Pembelajar secara acak dipilih oleh guru. 7. Guru memfasilitasi pembelajar dengan memberi umpan balik ketika pembelajar menuliskan jawaban-jawaban di papan tulis.	
10 menit	**Penutup**	1. Guru mereview tujuan pembelajaran sambil mengecek pemahaman pembelajar tentang persamaan linear dan memecahkan masalahnya[2] 2. Pembelajar merefleksikan pembelajaran 3. Guru member pekerjaan rumah yang ada di buku siswa halaman 43.	

F. Strategi Assessmen

[1] Sumber Membentuk Jejaring: KEMENTARIAN PENDIDIKAN DAN KEBUDAYAAN (2013: 201)
[2] Teachers Instruction is provided in Appendix 2

1. Procedure Penilaian

Aspek yang Dinilai	Teknik Penilaian	Waktu Penilaian
Pengetahuan dan keterampilan.	Tes Pendek (pilihan ganda)	Awal Pembelajaran 5
	Penilaian Keterampilan Presentasi.	Selama Pembelajaran 3

(i) Instrument Penilaian – TES PENDEK

Tes Pendek 4 – Pilihan Ganda **Waktu: 15 menit**

1. Alvin mempunyai Rp30.000,00 untuk membeli peralatan kantor. Setelah membeli 5 rim kertas, dia memiliki sisa Rp15.500,00. Tulislah persamaan yang merepresentasikan perjualan Alvin.

   A. $30.00 - 15.500 = 5x$ B. $15.500 + 5x = 30.000$

   C. $30.000 - 5x = 15.500$ D. $5x - 30.000 = 15.500$

2. Dari soal di atas tentukan harga setiap rim kertas termasuk pajaknya

   A. Rp 2,000,00 B. Rp 3,500,00

   C. Rp 2,900,00 D. Rp 5,000,00

3. Nilai x dari: $6x + 4\,(7x - 3) = 192$ adalah:

   A. 6 B 7 C. 4 D. 13

4. Pernyataan manakah yang tidak bersesuaian dengan sifat persamaan linear?

   A. Persamaan linear adalah kalimat terbuka yang dihubungkan oleh sebuah tanda "="

B. Persamaan linear adalah pernyataan matematika dengan 2 variabel?

C. Persamaan linear adalah pernyataan mathematika yang memiliki pangkat tertinggi dari variabel seperti 1.

D. Persamaan linear adalah pernyataan matematika dengan hanya satu variabel.

Jawaban dan Rubrik Tes Pendek 4.

No.	Pekerjaan	Jawaban dan Skor
1	Persamaan: $30.000 - 5x = 15.500$	C = nilai 5
2	Persamaan: $30.000 - 5x = 15.500$ $30.000 - 30.000 - 5x = 15.500 - 30.000$ $-5x = -14500$ $x = 2900$ Harga satu rim adalah Rp 2.900,00	C = nilai 5
3	$6x + 4\,(7x - 3) = 192$ $6x + 28x - 12 = 192$ $34x - 12 = 192$ $34x = 192 + 12$ $34x = 204$ $\boldsymbol{x = 6}$	A = nilai 5
4	Sifat Persamaan Linear adalah A, C, dan D.	B = nilai 5
TOTAL		**20**

(ii) Lembar Observasi Penilaian Presentasi

Observasi Presentasi Kelas

Kelas:

Nama : Tanggal:

1. Subyek. Pembelajar memahami pertanyaan dan tujuan?

1 .....2 .....3..... 4... .....5..... 6..... 7

jelek .....hebat

2. Penalaran / Pembenaran. Penalaran logika dan pembenaran dari satu langkah ke langkah.

1..... 2..... 3..... 4..... 5 ..... 6 7

jelek ..... hebat

3. **Pengorganisasian/ kejelasan**: Apakah langkah-langkah yang diambil dalam menemukan jawaban mudah diikuti?

1.....2.....3.....4.....5.....6.....7

jelek.....hebat

4. **Sensitivityas kepada pembelajar lain**. Apakah pembicara mengadakan kontak mata dengan audiens? Bagaimanakah bahasa tubuh pembicara?

Apakah pembicara menggunakan jeda, isyarat, perubahan pada kecepatan dan tekanan?

1..... 2 ..... 3..... 4..... 5 ..... 6..... 7

jelek .....hebat

5. Alat Bantu Visual. Apakah pembicara menggunakan lembar kertas halaman depan dengan efektif? Apakah cetakan cukup besar untuk dilihat setiap orang?

1..... 2 ..... 3..... 4 ..... 5..... 6 7

jelek..... hebat

6. Partisipasi audiens: Bila ada pertanyaan dari audiens, apakah pembicara menjawabnya dengan baik?, apakah dia menjelaskannya dengan baik? Apakah dia mempresentasikan semua item dengan benar? Mengakhirinya dengan baik?

1.....2.....3.....4.....5.....6.....7

jelek.....hebat