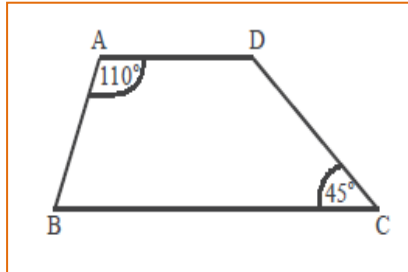


ANSWER KEY

LEARNING ACTIVITY 1

Challenge 1.1

1. a.



$$\angle A + \angle B = 180^0 \text{ (The sum of its adjacent interior angles between two parallel sides is } 180^0\text{)}$$

$$110^0 + \angle B = 180^0$$

$$\angle B = 180^0 - 110^0$$

$$\angle B = 70^0$$

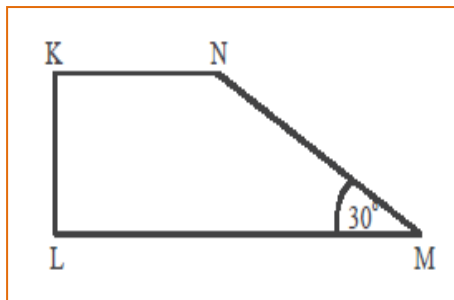
$$\angle C + \angle D = 180^0 \text{ (The sum of its adjacent interior angles between two parallel sides is } 180^0\text{)}$$

$$45^0 + \angle D = 180^0$$

$$\angle D = 180^0 - 45^0$$

$$\angle D = 135^0$$

b.



$$\angle K = 90^0$$

$$\angle L = 90^0$$

$$\angle K + \angle L + \angle M + \angle N = 360^0 - \angle K - \angle L - \angle M$$

$$\angle N = 360^0 - \angle K - \angle L - \angle M$$

$$\angle N = 360^0 - 90^0 - 90^0 - 30^0$$

$$\angle N = 150^0$$

2. **Remember!** The sum of its adjacent interior angles between two parallel sides is 180°

$$60^\circ + 3a = 180^\circ$$

$$3a = 180^\circ - 60^\circ$$

$$3a = 120^\circ$$

$$a = \frac{120^\circ}{3}$$

$$a = 40^\circ$$

Remember !! The base angles are equal in measurement

$$6c = 60^\circ$$

$$c = \frac{60^\circ}{6}$$

$$c = 10^\circ$$

Remember! The sum of its adjacent interior angles between two parallel sides is 180°

$$60^\circ + 5b = 180^\circ$$

$$5b = 180^\circ - 60^\circ$$

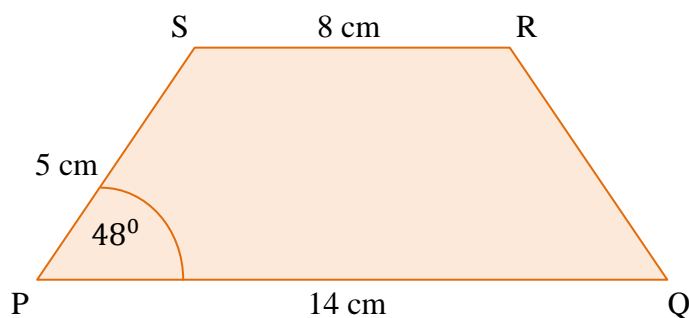
$$5b = 120^\circ$$

$$b = \frac{120^\circ}{5}$$

$$b = 24^\circ$$

So the value of $a = 40^\circ$, the value of $b = 24^\circ$ and the value of $c = 10^\circ$

3.



$$\begin{aligned}
 4. \quad \angle K + \angle M &= 180^0 \\
 (3x - 12)^0 + \angle M &= 180^0 \\
 \angle M &= 180^0 - (3x - 12)^0 \\
 \angle M &= 192^0 - 3x
 \end{aligned}$$

Remember! The base angles in isosceles trapezoid are equal in measurement

$$\begin{aligned}
 \angle M &= \angle N \\
 192^0 - 3x &= (2x + 7)^0 \\
 192^0 - 7^0 &= 3x + 2x \\
 185^0 &= 5x \\
 x &= \frac{185^0}{5} \\
 x &= 37^0
 \end{aligned}$$

So the measure of $\angle M = 192^0 - 3(37^0) = 81^0$

$$\begin{aligned}
 \angle N + \angle L &= 180^0 \\
 (2x + 7)^0 + \angle L &= 180^0 \\
 \angle L &= 180^0 - ((2 \times 37) + 7)^0 \\
 \angle L &= 99^0
 \end{aligned}$$

So the measure of $\angle L = 99^0$

Challenge 1.2

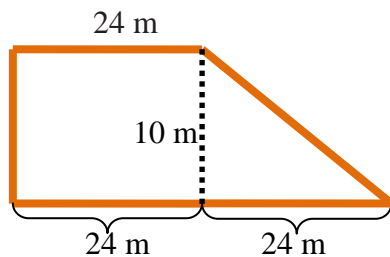
1. The area of the wall that will be painted = the area of right angle trapezoid

$$\begin{aligned}
 &= \frac{1}{2} \times \text{the sum of parallel sides} \times t \\
 &= \frac{1}{2} \times (2.5 + 4.5) \times 2 \\
 &= 7 \text{ m}^2
 \end{aligned}$$

The perimeter of the wall that will be painted = the perimeter of right angle trapezoid

$$\begin{aligned}
 &= 2 + 2.5 + 2.8 + 4.5 \\
 &= 11.8 \text{ m}
 \end{aligned}$$

2.



- a. The length of hypotenuse = $\sqrt{10^2 + 24^2}$
- $$\begin{aligned}
 &= \sqrt{100 + 576} \\
 &= \sqrt{676} \\
 &= 26 \text{ m}
 \end{aligned}$$

- b. The area of park = $\frac{1}{2} \times \text{the sum of parallel sides} \times t$
- $$\begin{aligned}
 &= \frac{1}{2} \times (24 + 48) \times 10 \\
 &= 360 \text{ m}^2
 \end{aligned}$$

3. Total area of the roof = $2 \times \left\{ \left(\frac{\text{jumlah sisi sejajar} \times t}{2} \right) + \frac{a \times t}{2} \right\}$
- $$\begin{aligned}
 &= 2 \times \left\{ \left(\frac{15 \times 6.5}{2} \right) + \frac{8 \times 4.5}{2} \right\} \\
 &= 133.5 \text{ m}^2
 \end{aligned}$$

Number of roof-tiles required = area of the roof \times number of roof-tiles per m^2

$$\begin{aligned}
 &= 133.5 \times 30 \\
 &= 4005 \text{ roof-tiles}
 \end{aligned}$$

4. Area of park = area of isosceles trapezoid

$$180 = \frac{1}{2} \times \text{the sum of parallel sides} \times t$$

$$180 = \frac{1}{2} \times (x + 4 + 3x + 2) \times (2x)$$

$$180 = x(4x + 6)$$

$$180 = 4x^2 + 6x$$

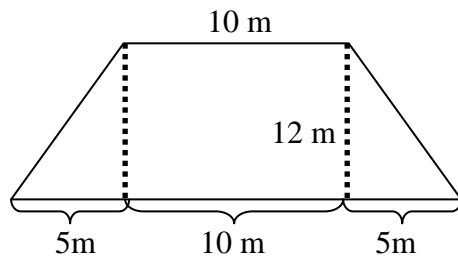
$$0 = 4x^2 + 6x - 180$$

Get the value of $x_1 = 6$

$$x_2 = -\frac{15}{2} \text{ (not satisfied)}$$

So, the value of $x = 6$.

The length of parallel sides are 10 m and 20 m thus the altitude of trapezoid 12 m.



$$\begin{aligned} \text{The length of hypotenuse} &= \sqrt{12^2 + 5^2} \\ &= \sqrt{144 + 25} \\ &= \sqrt{169} \\ &= 13 \text{ m} \end{aligned}$$

So, the perimeter of park = $10 + 13 + 20 + 13 = 56$ m.

5. The area of the region = $\frac{1}{2} \times \text{the sum of parallel sides} \times t$
 $= \frac{1}{2} \times (107 + 85) \times 51$
 $= 4896 \text{ km}^2$

So the area of the region which is shown by the trapezoid figure is 4896 km^2 .



Formative test 1

1. Those are the properties of right angle trapezoid, *except*:

- the diagonals are equal in length;
- the base angles are equal in measurement

Answer : C

$$\begin{aligned} 2. \text{ Total area of the roof} &= 2 \times \left\{ \left(\frac{\text{the sum of parallel sides} \times t}{2} \right) + \frac{a \times t}{2} \right\} \\ &= 2 \times \left\{ \left(\frac{15 \times 6.5}{2} \right) + \frac{8 \times 4.5}{2} \right\} \\ &= 133.5 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Number of roof-tiles required} &= \text{area of the roof} \times \text{number of roof-tiles per m}^2 \\ &= 133.5 \times 40 \\ &= 5340 \text{ roof-tiles} \end{aligned}$$

Answer : C

$$\begin{aligned} 3. \text{ The length of fence required} &= \text{the perimeter of isosceles trapezoid} \\ &= 50 + 30 + 50 + 40 + 30 + 40 \\ &= 240 \end{aligned}$$

So the length of fence to fence off Mr. Arka's garden is 240 m.

Answer : A

$$\begin{aligned} 4. \text{ The area of a wall that will be painted} &= \frac{1}{2} \times \text{the sum of parallel sides} \times \text{altitude} \\ &= \frac{1}{2} \times (2.5 + 3.5) \times 2 \\ &= 6 \end{aligned}$$

So the area of a wall that will be painted is 6 m²

Answer : A

$$\begin{aligned} 5. \text{ The area of whole sold land} &= \text{Total area of land} - \text{area of square land} \\ &= \left\{ \left(\frac{1}{2} \times (100 + 40) \times 40 \right) - \{ 40 \times 40 \} \right\} \end{aligned}$$

$$= 2800 - 1600$$

$$= 1200$$

The price of the land is Rp75,000.00/ m^2

The total price of whole sold land = 75.000×1200

$$= 90.000.000$$

So the total price of whole sold land is Rp90.000.000,00.

Answer : B

$$\begin{aligned} 6. \text{ Area of the region} &= \frac{1}{2} \times \text{the sum of parallel sides} \times \text{altitude} \\ &= \frac{1}{2} \times (80 + 120) \times 200 \\ &= 20.000 \end{aligned}$$

So the area of the region which is shown by the trapezoid figure is 20.000 km^2 .

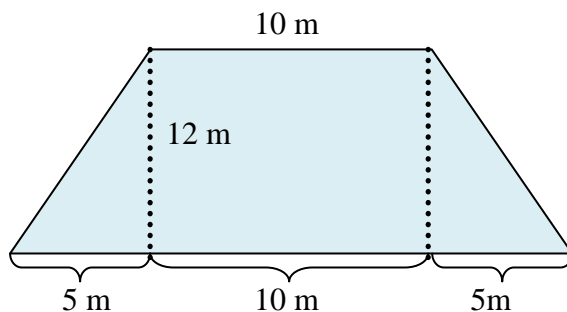
Answer : B

$$\begin{aligned} 7. \text{ Area of park} &= \frac{1}{2} \times \text{the sum of parallel sides} \times \text{altitude} \\ 180 &= \frac{1}{2} \times (x + 4 + 3x + 2) \times 2x \\ 180 &= \frac{1}{2} \times (4x + 6) \times 2x \\ 180 &= 4x^2 + 6x \\ 4x^2 + 6x - 180 &= 0 \end{aligned}$$

$$x = 6 \text{ (satisfied)}$$

$$x = -7.5 \text{ (not satisfied)}$$

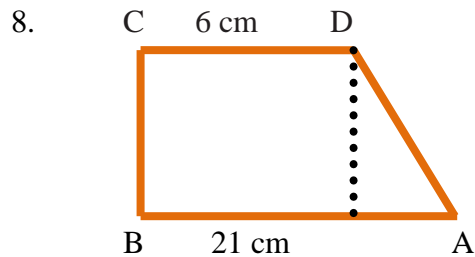
If $x = 6$, so : the length of parallel sides are 10 m and 20 m



$$\begin{aligned} \text{The perimeter of park} &= 13 + 10 + 13 + 20 \\ &= 56 \end{aligned}$$

So the perimeter of park is 56 m

Answer : B



$$\text{The area of trapezoid } ABCD = \frac{1}{2} \times (AB + CD) \times BC$$

$$108 = \frac{1}{2} \times (21 + 6) \times BC$$

$$BC = 8 \text{ cm}$$

$$AD = \sqrt{8^2 + 15^2} = 17 \text{ cm}$$

$$\begin{aligned} \text{The perimeter of trapezoid } ABCD &= AB + BC + CD + AD \\ &= 21 + 8 + 6 + 17 \\ &= 52 \text{ cm} \end{aligned}$$

Answer : D

9. The area of table's surface $= \frac{1}{2} \times (50 + 100) \times 50 = 3750 \text{ cm}^2$

If 1 cm^2 of the table's surface which is made from granite costs Rp250,00, then the price of all table's surfaces costs $= 3750 \times \text{Rp}250,00$
 $= \text{Rp}937.500,00$

Answer : D

10. The perimeter of park = the perimeter of trapezoid
 $= 20 + 15 + 25 + 30 = 90 \text{ m}$

The number of tree seedlings = perimeter of park : distance between two tree seedlings
 $= 90 : 1$
 $= 90 \text{ tree seedlings}$

If the price of one tree seedlings Rp1.500,00, then the total price to buy all these seedlings $= 90 \times \text{Rp}1.500,00 = \text{Rp}135.000,00$

Answer : B

LEARNING ACTIVITY 2

Challenge 2.1

1. a.

$$\begin{aligned}\angle P + \angle Q &= 180 \\ (x + 10) + (2x + 20) &= 180 \\ 3x + 30 &= 180 \\ 3x &= 150 \\ x &= \frac{150}{3} \\ x &= 50\end{aligned}$$

$$\begin{aligned}\angle S &= \angle Q \\ 3y &= (2x + 20) \\ 3y &= (100 + 20) \\ 3y &= 120 \\ y &= \frac{120}{3} \\ y &= 40\end{aligned}$$

b.  $\angle R = \angle P = 60$

 $\angle S = 120^\circ$

2. a. $\angle B = \angle D$

$$x + 40 = 2x$$

$$x - 2x = -40$$

$$-x = -40$$

$$x = 40$$

b. $\angle P + \angle S = 180$

$$30 + 3x + 30 = 180$$

$$3x + 60 = 180$$

$$3x = 120$$

$$x = 40$$

3. a. **Remember!** Parallelogram has the opposite sides that have the same length, so:

$$\left(\frac{6b-5}{5}\right) = (3b - 217)$$

$$(6b - 5) = 15b - 1085$$

$$6b - 15b = -1085 + 5$$

$$-9b = -1080$$

$$b = 120$$

b. Substitute $b = 120$ into $\left(\frac{6b-5}{5}\right)$ or to $(3b - 217)$ to find the length of opposite sides. Let, substitute $b = 120$ into $(3b - 217)$.

$$(3b - 217) = (360 - 217) = 143$$

So, the length of the opposite sides is 143 cm.

Challenge 2.2

1. a. The perimeter of parallelogram KLMN $= KL + LM + MN + KN$
 $= 28 + 16 + 28 + 16$
 $= 88$

So the perimeter of parallelogram is 88 cm.

b. The area of parallelogram KLMN $= a \times t$
 $= 16 \times 18$
 $= 288$

So the area of parallelogram KLMN is 288 cm^2

c. The area of parallelogram KLMN $= KL \times NP$
 $288 = 28 \times NP$
 $NP = 10.28$

So the length of NP is 10.28 cm.

2. The area of floor $= a \times t$
 $= 1200 \text{ cm} \times 1000 \text{ cm}$
 $= 1.200.000 \text{ cm}^2$

The area of tiles $= a \times t$
 $= 25 \text{ cm} \times 20 \text{ cm}$
 $= 500 \text{ cm}^2$

The number of tiles are required $= \text{the area of floor} : \text{the area of tiles}$
 $= 1.200.000 : 500$
 $= 2.400$

So, the number of the tiles are required to cover the floor 2.400 tiles.

3. The area of emblem $= a \times t$
 $= 10 \times 8$
 $= 80 \text{ cm}^2$

The price of every 10 cm^2 of the emblem $= 100$

The price of the emblem that Yudha made $= \frac{100}{10} \times 80 = 800$

So, the price of the emblem that Yudha made is Rp800,00

$$\begin{aligned} 4. \text{ The area of parallelogram} &= a \times t \\ 192 &= 4y \times 3y \\ 192 &= 12y^2 \\ y^2 &= 16 \\ y &= \sqrt{16} \\ y &= 4 \end{aligned}$$

The base length of parallelogram = $4y = 4 \times 4 = 16$

The altitude of parallelogram = $3y = 3 \times 4 = 12$

So :

The base length of parallelogram is 16 cm and the altitude of parallelogram is 12 cm.

5. Let the base length = $3x$ and the altitude = $2x$

$$\begin{aligned} \text{The area of parallelogram} &= a \times t \\ 54 &= 3x \times 2x \\ 54 &= 6x^2 \\ x^2 &= 9 \\ x &= \sqrt{9} \\ x &= 3 \end{aligned}$$

So :

$$\begin{aligned} \text{a. The base length of parallelogram} &= 3x \\ &= 3 \times 3 \\ &= 9 \text{ meter} \\ \text{b. The altitude of parallelogram} &= 2x \\ &= 2 \times 3 \\ &= 6 \text{ meter} \end{aligned}$$



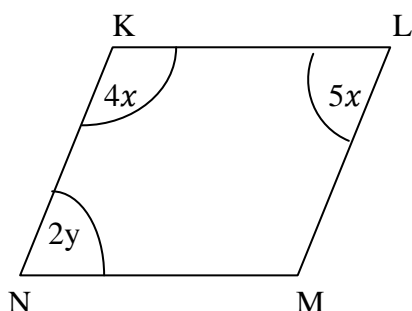
Formative Test 2

1. The properties of parallelogram are :

- (i) the sides which are facing each other have the same length and parallel.
- (ii) the angles which are facing each other are in the same size.
- (iii) the sum of two near-off angles is 180° .

Answer : C

2.



$$\angle K + \angle L = 180^\circ$$

$$4x + 5x = 180^\circ$$

$$9x = 180^\circ$$

$$x = 20^\circ$$

$$\angle L = \angle N$$

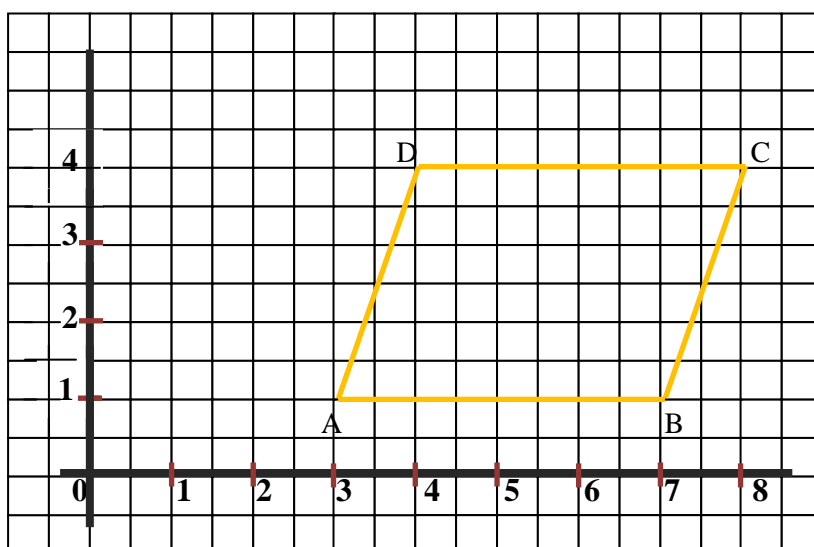
$$100^\circ = 2y$$

$$y = 50^\circ$$

The value of x and y respectively are 20° and 50° .

Answer : B

3.



The area of parallelogram $ABCD = a \times t = 4 \times 3 = 12$ an area ones

Answer : A

$$\begin{aligned}
 4. \text{ The area of parallelogram} &= a \times t \\
 &= 10 \times 8 \\
 &= 80
 \end{aligned}$$

So, the area of parallelogram is 80 m^2 .

Answer : C

$$\begin{aligned}
 5. \text{ The area of the emblem} &= a \times t \\
 &= 16 \times 12 \\
 &= 192
 \end{aligned}$$

$$\begin{aligned}
 \text{The price of every } 10 \text{ cm}^2 \text{ of the emblem} &= 1.000 : 100 \\
 &= 10
 \end{aligned}$$

$$\begin{aligned}
 \text{The price of the emblem} &= 192 \times 10 \\
 &= 1.920
 \end{aligned}$$

The price of the emblem that Kiki made is Rp1.920,00.

Answer : A

$$\begin{aligned}
 6. \text{ The number of ceramics are required} &= \text{the area of the floor} : \text{the area of the ceramics} \\
 &= (1500 \times 1200) : (20 \times 18) \\
 &= 1.800.000 : 360 \\
 &= 5.000
 \end{aligned}$$

Answer : C

$$\begin{aligned}
 7. \text{ The area of parallelogram PQRS} &= PS \times QU \\
 144 &= PS \times 9 \\
 PS &= 16 \text{ cm}
 \end{aligned}$$

$$\begin{aligned}
 \text{The perimeter of parallelogram PQRS} &= PQ + QR + RS + SP \\
 &= 18 + 16 + 18 + 16 \\
 &= 68 \text{ cm}
 \end{aligned}$$

Answer : B

8. The area of parallelogram = base \times altitude

$$648 = 6p \times 3p$$

$$648 = 18p^2$$

$$p^2 = 36$$

$$p = 6$$

So the base length of parallelogram = 36 cm and the altitude of parallelogram = 18 cm.

Answer : B

9. The area of the frame = base \times altitude

$$3200 = \frac{1}{2}t \times t$$

$$\frac{1}{2}t^2 = 3200$$

$$t^2 = 6400$$

$$t = 80$$

So, the length of the base frame is 40 cm

Answer : A

10. $\frac{\text{The base length of flower garden}}{\text{the base length of swimming pool}} = \frac{\text{the width of flower garden}}{\text{the width of swimming pool}}$

$$\frac{10}{15} = \frac{\text{the width of flower garden}}{12}$$

$$\text{The width of the flower garden} = \frac{12 \times 10}{15}$$

$$\text{The width of the flower garden} = 8$$

$$\begin{aligned}\text{So, the perimeter of the flower garden} &= 10 + 8 + 10 + 8 \\ &= 36 \text{ m}\end{aligned}$$

Answer : D

LEARNING ACTIVITY 3

Challenge 3.1

1.

a.	False
b.	True
c.	True
d.	False

2. a. $BC = AD$

$$2x = 4$$

$$x = 2$$

b. $AB = DC$

$$6 = 3y$$

$$y = 2$$

c. $5n^0 = 90^0$

$$n = \frac{90^0}{5^0}$$

$$n = 18$$

3. **Remember!** Rectangle has the diagonals that equal in length, so:

$$(5p - 4) = 6$$

$$5p = 6 + 4$$

$$5p = 10$$

$$p = \frac{10}{5}$$

$$p = 2$$

4.

a. $AC = BD$

$$\left(\frac{3x-5}{2}\right) = (x + 10)$$

$$3x - 5 = 2x + 20$$

$$x = 25$$

So, the length of diagonal $AC =$

$$BD = 35 \text{ cm}$$

b. $AB = DC$

$$(2y + 5) = (3y - 3)$$

$$y = 8$$

The length of $AB = DC = 21 \text{ cm}$

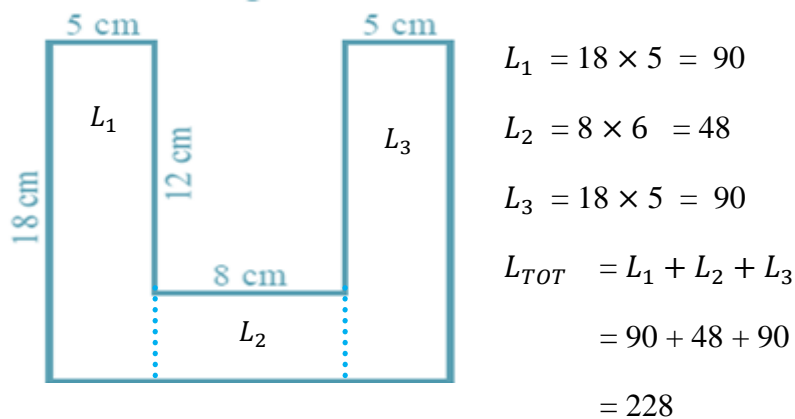
The length of $BC = AD = 8 \text{ cm}$

Challenge 3.2

$$\begin{aligned}
 1. \quad \text{The perimeter of garden} &= \text{the perimeter of rectangle} \\
 &= 2 \times (p + l) \\
 &= 2 \times (20 + 12) \\
 &= 64
 \end{aligned}$$

$$\begin{aligned}
 \text{The number of trees are planted} &= 64 : 2 \\
 &= 32 \text{ trees}
 \end{aligned}$$

2.



So, the area of that figure is 228 cm^2 .

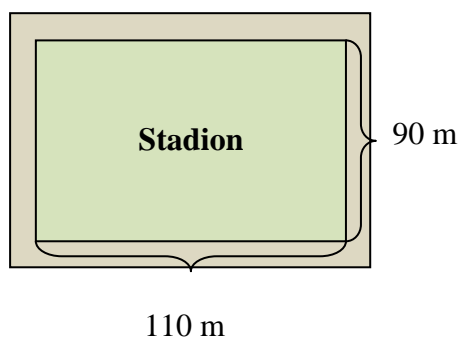
$$\begin{aligned}
 3. \quad \text{a.} \quad \text{The width of field} &= \text{area} : \text{length} \\
 &= 432 : 24 \\
 &= 18
 \end{aligned}$$

So, the width of field is 18 m.

$$\begin{aligned}
 \text{b.} \quad \text{The total cost} &= 150.000 \times 432 \\
 &= 64.800.000
 \end{aligned}$$

So the total cost to buy his field is Rp64.800.000,00.

4.



$$\begin{aligned}\text{a. The street's area} &= 2 \times (3 \times 116) + 2 \times (3 \times 90) \\ &= 1236 \text{ m}^2.\end{aligned}$$

$$\begin{aligned}\text{b. The total cost} &= 75.000 \times 1164 \\ &= 92.700.000\end{aligned}$$

So the total cost to street reconstruction is Rp92.700.000,00.



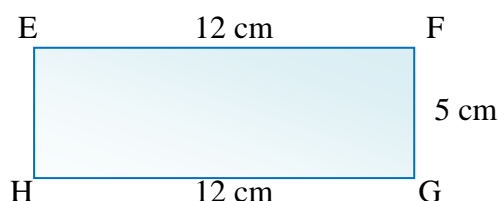
Formative Test 3

1. Which is the properties of a rectangle are

- (i) The opposite sides are parallel
- (ii) The opposite sides are equal in length
- (iii) The diagonals are equal in length

Answer : A

2.



- The length of EF = 12 cm
- The length of GH = 12 cm
- The length of EH = 5 cm
- The length of FG = 5 cm
- The length of EG = 13 cm
- The length of FH = 13 cm

Answer : C

3. Let, the length of flower's park = x , so the width of the flower's park = $(x - 5)$

$$\text{The area of park} = 126$$

$$p \times l = 126$$

$$x \times (x - 5) = 126$$

$$x^2 - 5x = 126$$

$$x^2 - 5x - 126 = 0$$

$$(x - 14) (x + 9) = 0$$

$$x = 14 \text{ (satisfy)}$$

$$x = -9 \text{ (not satisfy)}$$

$$\text{The perimeter of the flower park} = 2 \times (p + l)$$

$$= 2 \times (14 + (14 - 5))$$

$$= 2 \times (14 + 9)$$

$$= 46$$

So the perimeter of Mr. Radit's flower park is 46 m

Answer : C

4. The area that is used = the total area – the area that is used to plant flowers to plant bananas

$$= (60 \text{ m} \times 40 \text{ m}) - (8 \text{ m} \times 60 \text{ m})$$

$$= 2400 \text{ m}^2 - 480 \text{ m}^2$$

$$= 1920 \text{ m}^2$$

Answer : B

5. d = the surface area of the cake – the surface area of cake that read “Happy Birthday”

$$= (60 \text{ cm} \times 40 \text{ cm}) - (50 \text{ cm} \times 10 \text{ cm})$$

$$= \{(60 \times 40) - (50 \times 10)\} \text{ cm}^2$$

Answer : B

6. Land's area = $p \times l$

$$432 = 24 \times l$$

$$l = \frac{432}{24}$$

$$l = 18$$

So the width of the land is 18 m.

Answer : A

7. The perimeter of the garden = the perimeter of a rectangle

$$= 2 \times (p + l)$$

$$= 2 \times (12 + 7.5)$$

$$= 39$$

The number of banana trees which are planted = $39 : 0.5$

$$= 78$$

So, the number of the banana trees which are planted in Mr. Andi's garden is 78 trees.

Answer : C

$$\begin{aligned} 8. \text{ Field's area} &= 80 \times 45 \\ &= 3600 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{Total price of the japanese grass} &= \text{field's area} \times \text{the cost of japanese grass every } \text{m}^2 \\ &= 3600 \times 2.500 \\ &= \text{Rp}9.000.000,00 \end{aligned}$$

Answer : C

$$9. \text{ The area of the picture} = 250 \text{ cm}^2$$

Answer : B

$$\begin{aligned} 10. \text{ The park that planted grass} &= \text{total area} - (\text{pool's area} + \text{street's area}) \\ &= (20 \times 18) - (15 \times 11) \\ &= 360 - 165 \\ &= 195 \text{ m}^2 \end{aligned}$$

Answer : B

LEARNING ACTIVITY 4

Challenge 4.1

1.

a.	True
b.	True
c.	True

2. **Remember!** Rhombus has sides that equal in length, so:

$$\begin{aligned}RO &= AD \\(5x - 3) &= (2x + 3) \\5x - 2x &= 3 + 3 \\3x &= 6 \\x &= 2\end{aligned}$$

b. **Remember!** The sum of adjacent angles in rhombus is 180° , so:

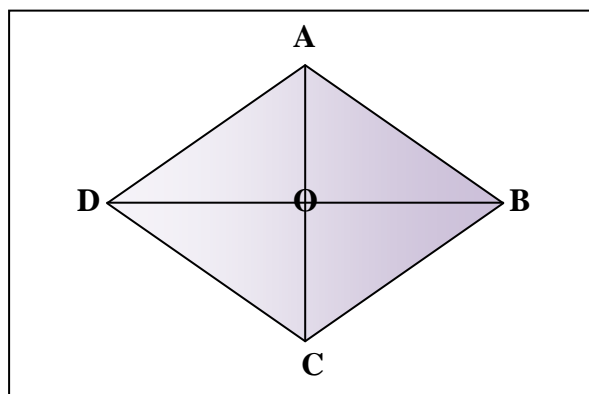
$$\begin{aligned}\angle RAD + \angle ADO &= 180 \\4y + 5y &= 180 \\9y &= 180 \\y &= 20\end{aligned}$$

c. Substitute the value of $x = 2$ into $(5x - 3)$ cm or to $(2x + 3)$ cm to find the length of sides. Then : $RO = OD = DA = AR = 7$ cm

$$\begin{aligned}\text{d. } \angle RAD &= 4y^\circ \\&= (4 \times 20)^\circ = 80^\circ\end{aligned}$$

$$\begin{aligned}\angle ADO &= 5y^\circ \\&= (5 \times 20)^\circ \\&= 100^\circ\end{aligned}$$

3. a.



- b. - Find the length of all sides

$$\begin{aligned}
 AB &= \sqrt{AO^2 + BO^2} \\
 &= \sqrt{12^2 + 9^2} \\
 &= \sqrt{144 + 81} \\
 &= \sqrt{225} \\
 &= 15
 \end{aligned}$$

So, the length of all sides rhombus ABCD are 15cm

- Find the measure of all angles.

Remember! The opposite angles are equal in measurement. So:

$$\angle BAD = \angle BCD = 50^\circ$$

Remember! The sum of adjacent angles is 180° . So :

$$\begin{aligned}
 \angle BAD + \angle ABC &= 180^\circ \\
 50^\circ + \angle ABC &= 180^\circ \\
 \angle ABC &= 130^\circ
 \end{aligned}$$

$$\angle ABC = \angle ADC = 130^\circ$$

4. **Remember!** Rhombus has sides that equal in length, so:

$$\begin{aligned}
 \text{a. the length of side 1} &= \text{the length of side 2} \\
 (4m - 5) &= (2m + 15) \\
 4m - 2m &= 15 + 5 \\
 2m &= 20 \\
 m &= \frac{20}{2} \\
 m &= 10
 \end{aligned}$$

- b. To find the length of ceramics, we can be substituted the value of $m = 10$ into $(4m - 5)$ or to $(2m + 15)$. Let us substitute the value of $m = 10$ to $(2m + 15)$, then:

$$2m + 15 = 35$$

So, the length of ceramics is 35 cm.

Challenge 4.2

1. a. The area of rhombus $= \frac{1}{2} \times d_1 \times d_2$

$$81 = \frac{1}{2} \times 18 \times (2x + 3)$$

$$81 = 9 \times (2x + 3)$$

$$81 = 18x + 27$$

$$54 = 18x$$

$$x = \frac{54}{18}$$

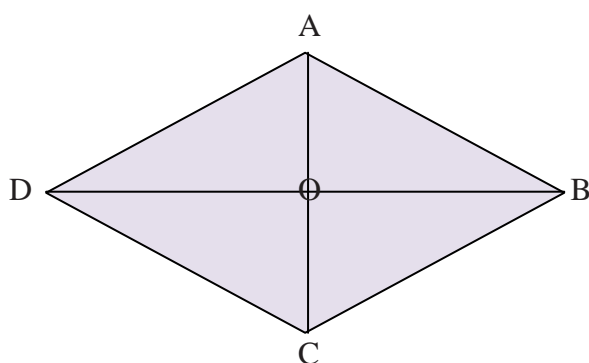
$$x = 3$$

b. The length of the second diagonal $= (2x + 3)$

$$= ((2 \times 3) + 3)$$

$$= 9 \text{ cm}$$

2.



Let the above picture is the illustration of an ornament of a palace's foundation pole is made from a plat of gold. The length of AB = the length of BC = the length of CD = the length of DA = 10 cm. The diagonal's length of BD = 16 cm.

a. $AO = \sqrt{AB^2 - BO^2}$

$$= \sqrt{10^2 - 8^2}$$

$$= \sqrt{100 - 64}$$

$$= \sqrt{36}$$

$$= 6$$

The diagonal's length of AC = 12 cm.

$$\begin{aligned}
 \text{The area of an ornament} &= \frac{1}{2} \times d_1 \times d_2 \\
 &= \frac{1}{2} \times 16 \times 12 \\
 &= 96 \text{ cm}^2
 \end{aligned}$$

If the weight of 1 cm^2 of the gold plat is 2.5 grams, so the total weight of an ornament of the palace's foundation pole is

$$\begin{aligned}
 &= 96 \times 2,5 \text{ gram} \\
 &= 240 \text{ gram.}
 \end{aligned}$$

$$\begin{aligned}
 \text{b. The price of 1 ornament} &= 240 \times \text{Rp}500.000,00 \\
 &= \text{Rp}120.000.000,00
 \end{aligned}$$

$$\begin{aligned}
 \text{The number of ornaments} &= 7 \times 101 \\
 &= 707 \text{ ornaments}
 \end{aligned}$$

$$\begin{aligned}
 \text{The total money needed to make these ornament} &= 707 \times \text{Rp}120.000.000,00 \\
 &= \text{Rp}84.840.000.000,00
 \end{aligned}$$

3. The area of the land which is used to plant banana trees = the total area – the area of pond

$$\begin{aligned}
 &= (p \times l) - \left(\frac{1}{2} \times d_1 \times d_2\right) \\
 &= (32 \times 16) - \left(\frac{1}{2} \times 16 \times 32\right) \\
 &= 512 - 256 \\
 &= 256
 \end{aligned}$$

So, the area of the land which is used to plant banana trees is 256 m^2 .

4. The area of center of the yard = the area of rhombus

$$\begin{aligned}
 &= \frac{1}{2} \times d_1 \times d_2 \\
 &= \frac{1}{2} \times 16 \times 24 \\
 &= 192
 \end{aligned}$$

$$\begin{aligned}
 \text{The total cost to buy the grass} &= 15.000 \times 192 \\
 &= 2.880.000
 \end{aligned}$$

So, the total cost to buy the grass is $\text{Rp}2.880.000,00$.



Formative Test 4

1. The properties of rhombus are :

- (i) The opposite sides are equal in length
- (ii) The opposite angles are equal in measure and bisected by the diagonals.
- (iii) All sides are equal in length

Answer : A

$$\begin{aligned} 2. \text{ The length of rhombus} &= \sqrt{3^2 + 4^2} \\ &= \sqrt{9 + 16} \\ &= \sqrt{25} \\ &= 5 \text{ cm} \end{aligned}$$

Answer : D

$$\begin{aligned} 3. \text{ The area of an ornament} &= \frac{1}{2} \times d_1 \times d_2 \\ &= \frac{1}{2} \times 24 \times 10 \\ &= 120 \end{aligned}$$

If the weight of 1 cm^2 of the gold plat is 1.5 grams, then the weight of an ornament of the palace's foundation pole $= 120 \times 1.5$
 $= 180$

So, the weight of an ornament of the palace's foundation pole is 180 gram.

Answer : D

$$\begin{aligned} 4. \text{ The area of house} &= 30 \text{ m}^2 = 300.000 \text{ cm}^2 \\ \text{The area of ceramics} &= \frac{1}{2} \times d_1 \times d_2 \\ &= \frac{1}{2} \times 120 \times d_2 \\ &= 60 d_2 \end{aligned}$$

The number of ceramics required = the area of house : the area of ceramics
 $1000 = 300.000 : 60 d_2$

$$60 d_2 = \frac{300.000}{1.000}$$

$$60 d_2 = 300$$

$$d_2 = \frac{300}{60}$$

$$d_2 = 5$$

So the length of diagonal II of the ceramic is 5 cm.

Answer : A

5. The area of the land which is = the total area – the area of pond used to plant banana trees

$$= (24 \times 15) - \left(\frac{1}{2} \times 9 \times 12\right)$$

$$= 360 - 54$$

$$= 306$$

So the area of the land which is used to plant banana trees is $306 m^2$

Answer : B

6. The area of the rhombus on Brazil's national flag $= \frac{1}{2} \times d_1 \times d_2$
 $= \frac{1}{2} \times 12 \times 8$
 $= 48$

So the area of the rhombus on Brazil's national flag is $48 dm^2$.

Answer : B

7. **Remember!** Rhombus has sides that equal in length, so:

$$5p - 5 = 3p + 9$$

$$5p - 3p = 9 + 5$$

$$2p = 14$$

$$p = 7$$

The value of $p = 7$, so the value of $3p - 7 = 21 - 7 = 14$ cm

Answer : B

$$\begin{aligned}
 8. \text{ The minimal length of wire} &= \text{the perimeter of rhombus} \\
 &= 4 \times 39 \\
 &= 156 \text{ m}
 \end{aligned}$$

Answer : A

$$\begin{aligned}
 9. \text{ The perimeter of canvas} &= 4 \times s \\
 52 &= 4 \times s \\
 s &= 13 \text{ cm}
 \end{aligned}$$

The length of the other diagonal = 24 cm

$$\begin{aligned}
 \text{The area of canvas} &= \frac{1}{2} \times d_1 \times d_2 \\
 &= \frac{1}{2} \times 24 \times 10 \\
 &= 120 \text{ cm}^2
 \end{aligned}$$

Answer : B

$$\begin{aligned}
 10. \text{ The perimeter of park} &= \text{the perimeter of rhombus} \\
 &= 4 \times 15 \\
 &= 60 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 \text{The number of garden lights} &= 60 : 3 \\
 &= 20
 \end{aligned}$$

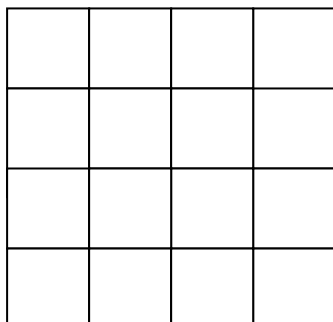
So the number of garden lights is 20 garden lights.

Answer : B

LEARNING ACTIVITY 5

Challenge 5.1

1. a.



b. The length of new bigger square $= 4 \times 3$
 $= 12$

So the length of the new bigger square is
 12 cm

2. a.

$$\begin{aligned} AD &= DC \\ 2x &= 10 \\ x &= \frac{10}{2} \\ x &= 5 \end{aligned}$$

b.

$$\begin{aligned} AC &= BD \\ y + 5 &= 14 \\ y &= 14 - 5 \\ y &= 9 \end{aligned}$$

3. **Remember!** Square has the diagonal that equal in length, so:

$$\begin{aligned} PR &= QS \\ 6x &= 2 \times OS \\ 6x &= 2 \times \frac{(7-x)}{2} \\ 12x &= 14 - 2x \\ 14x &= 14 \end{aligned}$$

- $x = 1$
- the length of diagonal $= PR = 6x = 6 \times 1 = 6$
 so the length of the diagonal is 6 cm.

4. a.

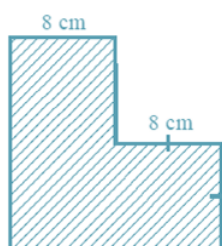
$$\begin{aligned} \frac{2}{3}(p+2) &= \frac{(p+8)}{3} \\ \frac{2}{3}p + \frac{4}{3} &= \frac{p}{3} + \frac{8}{3} \\ \frac{2}{3}p - \frac{p}{3} &= \frac{8}{3} - \frac{4}{3} \\ \frac{p}{3} &= \frac{4}{3} \\ p &= 4 \end{aligned}$$

b. substitute the value of $p = 4$ to $\frac{2}{3}(p+2)$ or
 to $\frac{(p+8)}{3}$ m to find the length of living
 room's side. $\frac{(p+8)}{3} = \frac{(4+8)}{3} = \frac{12}{3} = 4$
 so the length of living room's side is 4 m.

so the value of p is 4.

Challenge 5.2

1.



- The perimeter of shaded plane = $8 + 8 + 8 + 8 + 16 + 16$
 $= 64$

So, the perimeter of shaded plane is 64 cm.

- The area of shaded plane = $3 \times (8 \times 8)$
 $= 192$

So the area of shaded plane is 192 cm^2

2. The length of the fence = the perimeter of a square
 $= 4 \times 50$
 $= 200$

If the cost of making the fence is Rp20.000,00/meter, so the total cost to manufacture the fence is : $20.000 \times 200 = \text{Rp}4.000.000,00$

3.

No	Length	Square's perimeter	Square's area
1.	11 cm	44 cm	121 cm^2
2.	15 cm	60 cm	225 cm^2
3.	21 m	84 m	441 m^2
4.	23 km	92 km	529 km^2

4. The area of the flower garden = garden's area – fish pond's area
 $= (50 \times 30) - (15 \times 15)$
 $= 1500 - 225$
 $= 1275$

So the area of flower garden is 1275 m^2 .

5. The area of the floor = $400 \text{ cm} \times 300 \text{ cm}$
 $= 120.000 \text{ cm}^2$

The area of the marble = $20 \text{ cm} \times 20 \text{ cm}$
 $= 400 \text{ cm}^2$

$$\begin{aligned}
 \text{The number of the marble} &= \text{floor's area} : \text{marble's area} \\
 &= 120.000 : 400 \\
 &= 300
 \end{aligned}$$

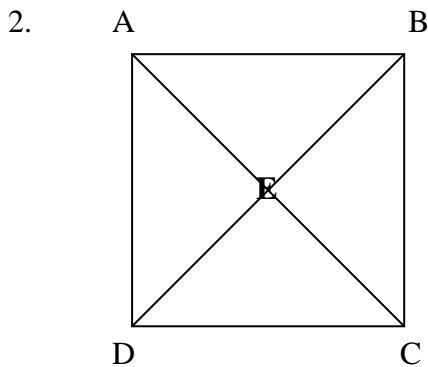
So the number of the marble are required to cover the floor is 300 marbles.



Formative Test 5

1. The correct statements about square are :
 - (i) Square is a quadrilateral with four right-angled
 - (ii) Square is a rectangle with four equal-length of sides

Answer : A



The length of $AB = BC = CD = DA = 20 \text{ cm}$
 The length of $AC = BD = 20\sqrt{2} \text{ cm}$
 The length of $AE = BE = CE = DE = 10\sqrt{2} \text{ cm}$

Answer : C

$$\begin{aligned}
 3. \quad \angle TPQ &= (2x + 3)^0 & \angle TQR &= (y + 17)^0 \\
 45^0 &= (2x + 3)^0 & 45^0 &= (y + 17)^0 \\
 2x &= 42^0 & y &= 28^0 \\
 x &= 21^0 \\
 x + y &= 21^0 + 28^0 = 49^0
 \end{aligned}$$

Answer : A

$$\begin{aligned}
 4. \quad \text{The number of ropes that is needed} &= 3 \times \text{the perimeter of square} \\
 &= 3 \times (4 \times s) \\
 &= 3 \times (4 \times 6)
 \end{aligned}$$

$$= 3 \times 24$$

$$= 72$$

So the number of ropes that is needed to make the safety ropes of the boxing ring is 72 m.

Answer : B

5. The area of the total roof = $2 \times (6.5 \times 6.5) = 84.5 \text{ m}^2$

The number of rooftiles that is needed = 84.5×20

$$= 1690$$

So the amount of roof-tiles for covering the roof of Mr. Burhan's house is 1690 rooftiles

Answer : B

6. Let the length of the pond = $2x$, so the width of the pond = x .

If the length = $(2x - 5)$ and the width = $(x + 1)$ then the shape of the pond will become a square-shaped.

Remember! Square has the sides that equal in length, so:

$$\text{Length} = \text{width}$$

$$(2x - 5) = (x + 1)$$

$$2x - x = 1 + 5$$

$$x = 6$$

The area of the square-shaped pond = $(2x - 5) \times (x + 1)$

$$= (12 - 5) \times (6 + 1)$$

$$= 7 \times 7$$

$$= 49$$

So the area of the square-shaped pond is 49 m^2 .

Answer : D

7. The length of the floor = $2,4 \text{ m} = 240 \text{ cm}$

The width of the floor = $2 \text{ m} = 200 \text{ cm}$

The number of ceramics are required = floor's area : ceramic's area

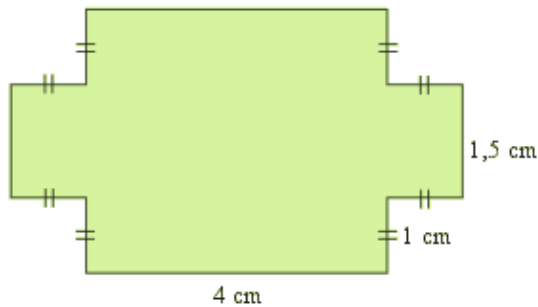
$$= (240 \times 200) : (40 \times 40)$$

$$= 48.000 : 1600$$

= 30 ceramics

Answer : C

8.



The perimeter of the picture

$$= 4 + 1 + 1 + 1,5 + 1 + 1 + 4 + 1 + 1 + 1,5 + 1 + 1 = 19$$

So the perimeter of the picture is 19 cm.

Answer : B

$$\begin{aligned} 9. \text{ The total length of wire} &= 10 \times \text{the perimeter of the rectangle} \\ &= 10 \times (2 \times (15 + 12)) \\ &= 10 \times 54 \\ &= 540 \text{ cm} \end{aligned}$$

The number of square frame are made = the total length of wire : square's perimeter

$$\begin{aligned} &= 540 : (4 \times 45) \\ &= 540 : 180 \\ &= 3 \text{ square frame} \end{aligned}$$

Answer : A

10.

Garden's area	The number of cassava stems that can be planted
1 m ²	4
4 m ²	9
9 m ²	16
16 m ²	25
.	.
.	.
100 m ²	121

So the number of cassava stems that can be planted is 121.

Answer : B

LEARNING ACTIVITY 6

Challenge 6.1

1.

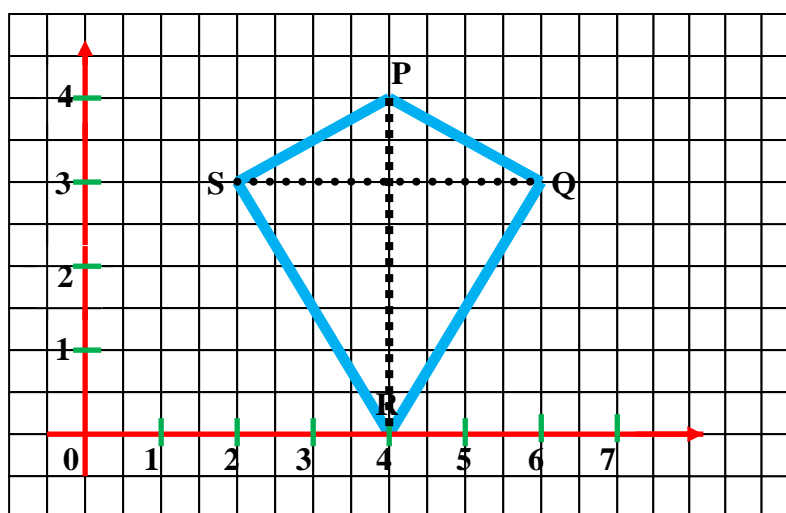
a.	True
b.	True
c.	False

$$\begin{aligned} 2. \text{ a. } DC &= \sqrt{DO^2 + OC^2} \\ &= \sqrt{12^2 + 15^2} \\ &= \sqrt{144 + 225} \\ &= \sqrt{369} \\ &= 3\sqrt{41} \end{aligned}$$

$$\begin{aligned} \text{b. } AB &= \sqrt{AO^2 + OB^2} \\ &= \sqrt{15^2 + 20^2} \\ &= \sqrt{225 + 400} \\ &= \sqrt{625} \\ &= 25 \end{aligned}$$

So the length of $DC = 3\sqrt{41}$ cm and the length $AB = 25$ cm.

3.



- a. The coordinate of point S = (2,3)
- b. The coordinate of the diagonal intersection is (4,3).

4.

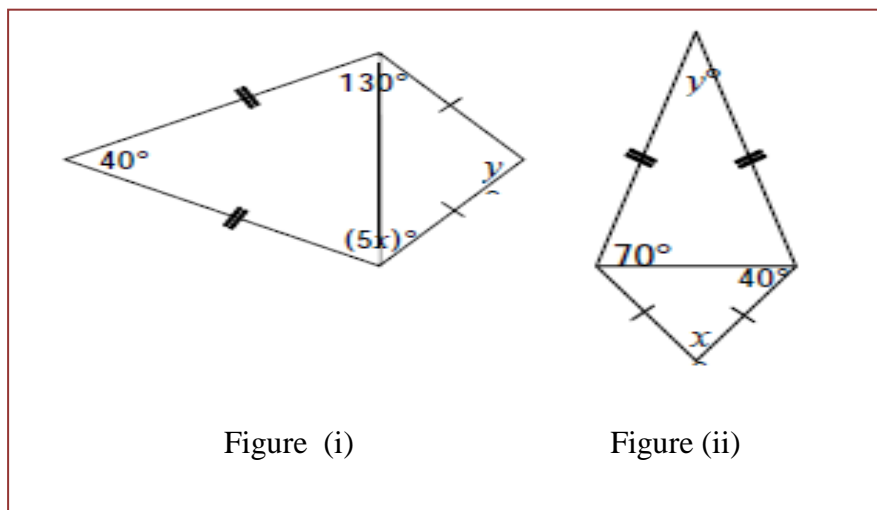


Figure (i)

Figure (ii)

Find the value of x

- **Figure (i)**

$$5x^\circ = 130^\circ \text{ (The opposite angles)}$$

$$x = \frac{130^\circ}{5}$$

$$x = 26$$

- **Figure (ii)**

$$x = 180 - 40 - 40$$

$$= 100$$

To find the value of y

- **Figure (i)**

$$y = 360 - 130 - 130 - 40$$

$$= 60$$

- **Figure (ii)**

$$y = 360 - 110 - 110 - 100$$

$$= 40$$

Challenge 6.2

1. The area of kite $= \frac{1}{2} \times d_1 \times d_2$

$$492 = \frac{1}{2} \times 24 \times d_2$$

$$492 = 12 \times d_2$$

$$d_2 = \frac{492}{12}$$

$$d_2 = 41$$

So the length of another diagonal is 41 cm.

2. The minimum area of the paper = the area of kite

$$= \frac{1}{2} \times d_1 \times d_2$$

$$= \frac{1}{2} \times 40 \times 24$$

$$= 480$$

So the minimum area of the paper required to make a kite is 480 cm^2 .

3. a. The length of bamboo = the length of AC + the length of BD

$$= 21 + 24$$

$$= 45$$

The length of yarn = the perimeter of kite

$$= AB + BC + CD + AD$$

$$= (\sqrt{AE^2 + BE^2}) + (\sqrt{CE^2 + BE^2}) + (\sqrt{CE^2 + DE^2}) + (\sqrt{AE^2 + DE^2})$$

$$= (\sqrt{5^2 + 12^2}) + (\sqrt{12^2 + 16^2}) + (\sqrt{12^2 + 16^2}) + (\sqrt{12^2 + 5^2})$$

$$= (\sqrt{169}) + (\sqrt{400}) + (\sqrt{400}) + (\sqrt{169})$$

$$= 13 + 20 + 20 + 13$$

$$= 66$$

The area of paper required = the area of kite

$$= \frac{1}{2} \times 24 \times 21$$

$$= 252$$

So : the length of bamboo to make a kite = 45 cm

the length of yarn to make a kite = 66 cm

the area of the paper to make a kite = 252 cm^2 .

b. 100 cm of bamboo costs = Rp1.000,00

100 cm of yarn costs = Rp100,00

100 cm \times 100 cm of paper cost = Rp5.000,00

The total cost to make the kite = bamboo costs + yarn costs + paper costs

$$\begin{aligned} &= \left(\frac{1000}{100} \times 45\right) + \left(\frac{100}{100} \times 66\right) + \left(\frac{5000}{10000} \times 252\right) \\ &= 450 + 66 + 126 \\ &= 642 \text{ (is rounded to 650)} \end{aligned}$$

So the total cost to make the kite is Rp650,00

$$\begin{aligned} 4. \text{ The area of a kite} &= \frac{1}{2} \times d_1 \times d_2 \\ &= \frac{1}{2} \times 35 \times 20 \\ &= 350 \text{ cm}^2 = 0.035 \text{ m}^2 \end{aligned}$$

$$\begin{aligned} \text{The price of paper every } 1\text{m}^2 &= 33.750 : (1.5 \times 1.5) \\ &= 33.750 : 2.25 \\ &= 15.000 \end{aligned}$$

$$\begin{aligned} \text{The price of a kite} &= 15.000 \times 0.035 \\ &= 525 \end{aligned}$$

$$\begin{aligned} \text{The price of 300 kites} &= 300 \times 525 \\ &= 157.500 \end{aligned}$$

$$\begin{aligned} \text{The profit has gotten by Ludye} &= (300 \times 750) - 157.500 \\ &= 225.000 - 157.500 \\ &= 67.500 \end{aligned}$$

So the profit has gotten by Ludye is Rp67.500,00



Formative Test 6

1. Those are the properties of kite, *except* (iii) the diagonals are equal in length and perpendicular and (iv) the diagonals bisect each other but not perpendicular.

Answer : D

2. $x = 110^\circ$ (the opposite sides)

$$y = 360^\circ - 110^\circ - 110^\circ - 36^\circ = 104^\circ$$

The value of $x - y = 6^\circ$

Jawaban : A

3. The area of papers for making 1 kites = the area of kite

$$= \frac{1}{2} \times d_1 \times d_2$$

$$= \frac{1}{2} \times 30 \times 20$$

$$= 300$$

The area of papers for making 50 kites = 50×300

$$= 15.000$$

So the area of papers for making 50 kites is 15.000 cm^2 or 1.5 m^2 .

Answer : A

4. The area of kite = $\frac{1}{2} \times d_1 \times d_2$

$$336 = \frac{1}{2} \times 16 \times d_2$$

$$336 = 8 \times d_2$$

$$d_2 = \frac{336}{8}$$

$$d_2 = 42$$

So the length of another diagonal is 42 cm.

Answer : D

$$\begin{aligned}
 5. \text{ The area of a kite} &= \frac{1}{2} \times d_1 \times d_2 \\
 &= \frac{1}{2} \times 30 \times 20 \\
 &= 300 \text{ cm}^2 = 0.03 \text{ m}^2
 \end{aligned}$$

$$\begin{aligned}
 \text{The price of paper every } 1\text{m}^2 &= 22.500 : (1.5 \times 1.5) \\
 &= 22.500 : 2.25 \\
 &= 10.000
 \end{aligned}$$

$$\begin{aligned}
 \text{The price of paper for making 1 kite} &= 10.000 \times 0.03 \\
 &= 300
 \end{aligned}$$

$$\begin{aligned}
 \text{The price of paper for making 200 kites} &= 200 \times 300 \\
 &= 60.000
 \end{aligned}$$

So the total cost to buy the paper is Rp60.000,00

Answer : C

6. The correct statements are

- (i) {rectangle} \subset {parallelogram}
- (ii) {parallelogram} \subset {trapezoid}
- (iii) {rhombus} \subset {kite}

Answer : A

$$\begin{aligned}
 7. \text{ The length of bamboo} &= \text{the length of AC} + \text{the length of BD} \\
 &= 32 + 10 \\
 &= 42
 \end{aligned}$$

$$\begin{aligned}
 \text{The length of yarn} &= \text{the perimeter of kite} \\
 &= AB + BC + CD + AD \\
 &= (\sqrt{AE^2 + BE^2}) + (\sqrt{CE^2 + BE^2}) + (\sqrt{CE^2 + DE^2}) + (\sqrt{AE^2 + DE^2}) \\
 &= (\sqrt{12^2 + 5^2}) + (\sqrt{20^2 + 5^2}) + (\sqrt{20^2 + 5^2}) + (\sqrt{12^2 + 5^2}) \\
 &= (\sqrt{169}) + (\sqrt{425}) + (\sqrt{425}) + (\sqrt{169}) \\
 &= 13 + 5\sqrt{17} + 5\sqrt{17} + 13 \\
 &= 26 + 10\sqrt{17} \\
 &= 67.23
 \end{aligned}$$

$$\begin{aligned}
 \text{The area of paper required} &= \text{the area of kite} \\
 &= \frac{1}{2} \times 10 \times 32 = 160
 \end{aligned}$$

100 cm of bamboo costs = Rp1.000,00

100 cm of yarn costs = Rp500,00

100 cm × 100 cm of paper cost = Rp5.000,00

The total cost to make the kite = bamboo costs + yarn costs + paper costs

$$\begin{aligned} &= \left(\frac{1000}{100} \times 42\right) + \left(\frac{500}{100} \times 67.23\right) + \left(\frac{5000}{10000} \times 160\right) \\ &= 420 + 336.15 + 80 \\ &= 836.15 \text{ (is rounded to 836)} \end{aligned}$$

So the total cost to make the kite is Rp836,00

Answer : C

$$\begin{aligned} 8. \text{ The paper required to make a kite} &= 8 \times \left(\frac{1}{2} \times 45 \times 30\right) \\ &= 8 \times 675 \\ &= 5400 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{The paper getted} &= 120 \times 80 \\ &= 9600 \text{ cm}^2 \end{aligned}$$

$$\text{The number of unused paper} = 9600 - 5400 = 4200 \text{ cm}^2$$

Answer : A

$$\begin{aligned} 9. \text{ The paper required} &= 120 \times \left(\frac{1}{2} \times 30 \times 50\right) \\ &= 90.000 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{The size a paper} &= 100 \times 150 \\ &= 15.000 \text{ cm}^2 \end{aligned}$$

$$\begin{aligned} \text{The number of paper for making 120 kites} &= 90.000 : 15.000 \\ &= 6 \text{ sheets of paper} \end{aligned}$$

Answer : B

$$10. \text{ The perimeter of kite PQRS} = 20 + 13 + 13 + 20 = 66 \text{ cm}$$

$$\text{The area of kite PQRS} = \frac{1}{2} \times 24 \times 21 = 252 \text{ cm}^2$$

Answer : A