**LEARNING ACTIVITY 1**

**Challenge 1.1**

1. **a.**

![Diagram](image)

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

\[110^\circ + \angle B = 180^\circ\]

\[\angle B = 180^\circ - 110^\circ\]

\[\angle B = 70^\circ\]

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

\[45^\circ + \angle D = 180^\circ\]

\[\angle D = 180^\circ - 45^\circ\]

\[\angle D = 135^\circ\]

**b.**

![Diagram](image)

\[\angle K = 90^\circ\]

\[\angle L = 90^\circ\]

\[\angle K + \angle L + \angle M + \angle N = 360^\circ - \angle K - \angle L - \angle M\]

\[\angle N = 360^\circ - \angle K - \angle L - \angle M\]

\[\angle N = 360^\circ - 90^\circ - 90^\circ - 30^\circ\]

\[\angle N = 150^\circ\]
2. **Remember!** The sum of its adjacent interior angles between two parallel sides is $180^0$

\[
60^0 + 3a = 180^0 \\
3a = 180^0 - 60^0 \\
3a = 120^0 \\
a = \frac{120^0}{3} \\
a = 40^0
\]

**Remember!!** The base angle are equal in measurement

\[
6c = 60^0 \\
c = \frac{60^0}{6} \\
c = 10^0
\]

**Remember!** The sum of its adjacent interior angles between two parallel sides is $180^0$

\[
60^0 + 5b = 180^0 \\
5b = 180^0 - 60^0 \\
5b = 120^0 \\
b = \frac{120^0}{5} \\
b = 24^0
\]

**So the value of** $a = 40^0$, **the value of** $b = 24^0$ **and the value of** $c = 10^0$
4. \( \angle K + \angle M = 180^0 \)
\( (3x - 12)^0 + \angle M = 180^0 \)
\( \angle M = 180^0 - (3x - 12)^0 \)
\( \angle M = 192^0 - 3x \)

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

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

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

\( \angle N + \angle L = 180^0 \)
\( (2x + 7)^0 + \angle L = 180^0 \)
\( \angle L = 180^0 - ((2 \times 37) + 7)^0 \)
\( \angle L = 99^0 \)

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
   
   \[
   \frac{1}{2} \times \text{the sum of parallel sides} \times t
   \]

   \[
   = \frac{1}{2} \times (2.5 + 4.5) \times 2
   \]

   \[
   = 7 \, \text{m}^2
   \]

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

   \[
   = 2 + 2.5 + 2.8 + 4.5
   \]

   \[
   = 11.8 \, \text{m}
   \]

2. 

   \[
   \begin{align*}
   \text{a. The length of hypotenuse} &= \sqrt{10^2 + 24^2} \\
   &= \sqrt{100 + 576} \\
   &= \sqrt{676} \\
   &= 26 \, \text{m}
   \end{align*}
   \]

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

3. Total area of the roof = \(2 \times \left\{ \left(\frac{jumlah \, sisi \, sejajar \times t}{2}\right) + \frac{a \times t}{2}\right\}\)

   \[
   = 2 \times \left\{\left(\frac{15 \times 6.5}{2}\right) + \frac{8 \times 4.5}{2}\right\}
   \]

   \[
   = 133.5 \, \text{m}^2
   \]

   Number of roof-tiles required = area of the roof \times number of roof-tiles per \(\text{m}^2\)

   \[
   = 133.5 \times 30
   \]

   \[
   = 4005 \, \text{roof-tiles}
   \]
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 \( x_1 = 6 \)

\[ x_2 = -\frac{15}{2} \] (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.

```
10 m

12 m

5m 10 m 5m
```

The length of hypotenuse

\[ = \sqrt{12^2 + 5^2} \]

\[ = \sqrt{144 + 25} \]

\[ = \sqrt{169} \]

\[ = 13 \text{ m} \]

So, the perimeter of park \( = 10 + 13 + 20 + 13 = 56 \text{ m} \).

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 \text{ km}^2.
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

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

   Number of roof-tiles required = area of the roof \times number of roof-tiles per \text{m}^2
   \[= 133.5 \times 40\]
   \[= 5340 \text{ roof-tiles}\]

   Answer: C

3. The length of fence required = the perimeter of isosceles trapezoid
   \[= 50 + 30 + 50 + 40 + 30 + 40\]
   \[= 240\]

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

   Answer: A

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

   So the area of a wall that will be painted is 6 \text{ m}^2

   Answer: A

5. The area of whole sold land = Total area of land – area of square land
   \[= \{ \frac{1}{2} \times (100 + 40) \times 40 \} – \{ 40 \times 40 \}\]
= 2800 – 1600
= 1200

The price of the land is Rp75,000.00/m²

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**

6. Area of the region \( = \frac{1}{2} \times \text{the sum of parallel sides} \times \text{altitude} \)
\[ = \frac{1}{2} \times (80 + 120) \times 200 \]
\[ = 20,000 \]

So the area of the region which is shown by the trapezoid figure is \(20,000 \text{ km}^2\).

**Answer : B**

7. Area of park \( = \frac{1}{2} \times \text{the sum of parallel sides} \times \text{altitude} \)
\[ = \frac{1}{2} \times (x + 4 + 3x + 2) \times 2x \]
\[ = \frac{1}{2} \times (4x + 6) \times 2x \]
\[ = 4x^2 + 6x \]

\[ 4x^2 + 6x - 180 = 0 \]
\[ x = 6 \text{ (satisfied)} \]
\[ x = -7.5 \text{ (not satisfied)} \]

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

![Diagram](image)

The perimeter of park = 13 + 10 + 13 + 20
= 56

So the perimeter of park is 56 m
Answer: B

8. C 6 cm D

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 = \( \sqrt{8^2 + 15^2} = 17 \text{ cm} \)

The perimeter of trapezoid ABCD = AB + BC + CD + AD
\[ = 21 + 8 + 6 + 17 \]
\[ = 52 \text{ cm} \]

Answer: D

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

If 1 \( \text{ cm}^2 \) of the table’s surface which is made from granite costs Rp250,00, then the price of all table’s surfaces costs = 3750 \( \times \) Rp250,00
\[ = \text{Rp937,500,00} \]

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 \( \times \) Rp1,500,00 = Rp135,000,00

Answer: B
LEARNING ACTIVITY 2

Challenge 2.1

1. a.  
\[ \angle P + \angle Q = 180 \]
\[ (x + 10) + (2x + 20) = 180 \]
\[ 3x + 30 = 180 \]
\[ 3x = 150 \]
\[ x = \frac{150}{3} \]
\[ x = 50 \]

b.  
\[ \angle R = \angle P = 60 \]
\[ \angle S = 120^0 \]

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.
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 × t
      = 16 × 18
      = 288
      So the area of parallelogram KLMN is 288 cm²

   c. The area of parallelogram KLMN = KL × NP
      288  = 28 × NP
      NP  = 10.28
      So the length of NP is 10.28 cm.

2. The area of floor = a × t
   = 1200 cm × 1000 cm
   = 1.200.000 cm²
   The area of tiles = a × t
   = 25 cm × 20 cm
   = 500 cm²
   The number of tiles are required = the area of floor : 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 × t
   = 10 × 8
   = 80 cm²
   The price of every 10 cm² 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

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

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 = $2x$

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

So:
   a. The base length of parallelogram = $3x$
      $= 3 \times 3$
      $= 9$ meter
   b. The altitude of parallelogram = $2x$
      $= 2 \times 3$
      $= 6$ meter
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 $180^0$.

   Answer: C

2. \( \angle K + \angle L = 180^0 \)
   \[ 4x + 5x = 180^0 \]
   \[ 9x = 180^0 \]
   \[ x = 20^0 \]

   \( \angle L = \angle N \)
   \[ 100^0 = 2y \]
   \[ y = 50^0 \]

   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
4. The area of parallelogram \( = a \times t \)
\[ = 10 \times 8 \]
\[ = 80 \]
So, the area of parallelogram is \(80 \text{ m}^2\).
**Answer : C**

5. The area of the emblem \( = a \times t \)
\[ = 16 \times 12 \]
\[ = 192 \]
The price of every \(10 \text{ cm}^2\) of the emblem \( = 1.000 : 100 \)
\[ = 10 \]
The price of the emblem \( = 192 \times 10 \)
\[ = 1.920 \]
The price of the emblem that Kiki made is Rp1.920.00.
**Answer : A**

6. The number of ceramics are required = the area of the floor : the area of the ceramics
\[ = (1500 \times 1200) : (20 \times 18) \]
\[ = 1.800.000 : 360 \]
\[ = 5.000 \]
**Answer : C**

7. The area of parallelogram PQRS \( = PS \times QU \)
\[ 144 = PS \times 9 \]
\[ PS = 16 \text{ cm} \]
The perimeter of parallelogram PQRS \( = PQ + QR + RS + SP \)
\[ = 18 + 16 + 18 + 16 \]
\[ = 68 \text{ cm} \]
**Answer : B**
8. The area of parallelogram = base × 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 × 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. \[
\frac{\text{The base length of flower garden}}{\text{the base length of swimming pool}} = \frac{\text{the width of flower garden}}{\text{the width of swimming pool}}
\]
\[ \frac{10}{15} = \frac{\text{the width of flower garden}}{12} \]

The width of the flower garden = \[ \frac{12 \times 10}{15} \]

The width of the flower garden = 8

So, the perimeter of the flower garden = \[ 10 + 8 + 10 + 8 \]
\[ = 36 \text{ m} \]

Answer: D
Learning Activity 3

Challenge 3.1

1.  
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>False</td>
</tr>
<tr>
<td>c.</td>
<td>True</td>
</tr>
</tbody>
</table>

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.  \textbf{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.  \(AC = BD\)
   \[\frac{3x - 5}{2} = (x + 10)\]
   \[3x - 5 = 2x + 20\]
   \[x = 25\]
   So, the length of diagonal \(AC = BD = 35\) cm

   b.  \(AB = DC\)
   \[(2y + 5) = (3y - 3)\]
   \[y = 8\]
   The length of \(AB = DC = 21\) cm
   The length of \(BC = AD = 8\) cm
1. The perimeter of garden = the perimeter of rectangle
   = $2 \times (p + l)$
   = $2 \times (20 + 12)$
   = 64

   The number of trees are planted = $64 : 2$
   = 32 trees

2. 

   $L_1 = 18 \times 5 = 90$
   $L_2 = 8 \times 6 = 48$
   $L_3 = 18 \times 5 = 90$

   $L_{TOT} = L_1 + L_2 + L_3$
   = 90 + 48 + 90
   = 228

   So, the area of that figure is $228 \text{ cm}^2$.

3. a. The width of field = area : length
   = $432 : 24$
   = 18

   So, the width of field is 18 m.

   b. The total cost = $150.000 \times 432$
   = 64.800.000

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

4. 

   Stadion

   110 m
   90 m
a. The street’s area  
\[ = 2 \times (3 \times 116) + 2 \times (3 \times 90) \]
\[ = 1236 \text{ m}^2. \]

b. The total cost  
\[ = 75.000 \times 1164 \]
\[ = 92.700.000 \]

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. 

   ![Diagram of a rectangle with dimensions](image)

   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 = \( (x - 5) \)
   
   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

   \[ x = 14 \] (satisfy)
   \[ x = -9 \] (not satisfy)

   The perimeter of the flower park  
   \[ = 2 \times (p + l) \]
   \[ = 2 \times (14 + (14 - 5)) \]
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
8. Field’s area = 80 × 45  
    = 3600 m²  
Total price of the Japanese grass = field’s area × the cost of Japanese grass every m²  
    = 3600 × 2.500  
    = Rp9,000,000.00  

Answer : C

9. The area of the picture = 250 cm²  

Answer : B

10. The park that planted grass = total area – (pool’s area + street’s area)  
    = (20 × 18) – (15 × 11)  
    = 360 – 165  
    = 195 m²  

Answer : B
LEARNING ACTIVITY 4

Challenge 4.1

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

\[ \begin{align*}
RO &= AD \\
(5x - 3) &= (2x + 3) \\
5x - 2x &= 3 + 3 \\
3x &= 6 \\
x &= 2
\end{align*} \]

b. Remember! The sum of adjacent angles in rhombus is \(180^\circ\), so:

\[ \begin{align*}
\angle RAD + \angle ADO &= 180 \\
4y + 5y &= 180 \\
9y &= 180 \\
y &= 20
\end{align*} \]

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

d. \[ \begin{align*}
\angle RAD &= 4y^\circ \\
&= (4 \times 20)^\circ = 80^\circ \\
\angle ADO &= 5y^\circ \\
&= (5 \times 20)^\circ = 100^\circ
\end{align*} \]
b.  - Find the length of all sides
\[ AB = \sqrt{AO^2 + BO^2} \]
\[ = \sqrt{12^2 + 9^2} \]
\[ = \sqrt{144 + 81} \]
\[ = \sqrt{225} \]
\[ = 15 \]
So, the length of all sides rhombus ABCD are 15 cm

- Find the measure of all angles.
Remember! The opposite angles are equal in measurement. So:
\[ \angle BAD = \angle BCD = 50^0 \]
Remember! The sum of adjacent angles is 180\(^0\). So:
\[ \angle BAD + \angle ABC = 180^0 \]
\[ 50^0 + \angle ABC = 180^0 \]
\[ \angle ABC = 130^0 \]
\[ \angle ABC = \angle ADC = 130^0 \]

4. Remember! Rhombus has sides that equal in length, so:
   a. the length of side 1 = the length of side 2
      \[ (4m - 5) = (2m + 15) \]
      \[ 4m - 2m = 15 + 5 \]
      \[ 2m = 20 \]
      \[ m = \frac{20}{2} \]
      \[ m = 10 \]

   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. [Diagram]

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.
The area of an ornament \[= \frac{1}{2} \times d_1 \times d_2 \]
\[= \frac{1}{2} \times 16 \times 12 \]
\[= 96 \text{ cm}^2\]

If the weight of 1 cm² of the gold plate is 2.5 grams, so the total weight of an ornament of the palace’s foundation pole is
\[= 96 \times 2.5 \text{ gram} \]
\[= 240 \text{ gram}.\]

b. The price of 1 ornament
\[= 240 \times \text{Rp500.000,00}\]
\[= \text{Rp120.000.000,00}\]

The number of ornaments
\[= 7 \times 101 \]
\[= 707 \text{ ornaments}\]

The total money needed to make these ornament
\[= 707 \times \text{Rp120.000.000,00}\]
\[= \text{Rp84.840.000.000,00}\]

3. The area of the land which is used to plant banana trees
\[= \text{the total area} – \text{the area of pond}\]
\[= (p \times l) - \left(\frac{1}{2} \times d_1 \times d_2\right)\]
\[= (32 \times 16) - \left(\frac{1}{2} \times 16 \times 32\right)\]
\[= 512 - 256 \]
\[= 256 \]

So, the area of the land which is used to plant banana trees is 256 m².

4. The area of center of the yard
\[= \text{the area of rhombus}\]
\[= \frac{1}{2} \times d_1 \times d_2 \]
\[= \frac{1}{2} \times 16 \times 24 \]
\[= 192 \]

The total cost to buy the grass
\[= 15.000 \times 192 \]
\[= 2.880.000 \]

So, the total cost to buy the grass is Rp2.880.000,00.
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

2. The length of rhombus
   \[ a = \sqrt{3^2 + 4^2} \]
   \[ = \sqrt{9 + 16} \]
   \[ = \sqrt{25} \]
   \[ = 5 \text{ cm} \]
   Answer: D

3. The area of an ornament
   \[ A = \frac{1}{2} \times d_1 \times d_2 \]
   \[ = \frac{1}{2} \times 24 \times 10 \]
   \[ = 120 \]
   If the weight of 1 cm² of the gold plate 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

4. The area of house
   \[ = 30 \text{ m}^2 = 300.000 \text{ cm}^2 \]
   The area of ceramics
   \[ = \frac{1}{2} \times d_1 \times d_2 \]
   \[ = \frac{1}{2} \times 120 \times d_2 \]
   \[ = 60 d_2 \]
   The number of ceramics required
   \[ = \text{the area of house : the area of ceramics} \]
   \[ 1000 = 300.000 : 60 d_2 \]
$60 \cdot d_2 = \frac{300,000}{1,000}$
$60 \cdot d_2 = 300$
$d_2 = \frac{300}{60}$
$d_2 = 5$

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

**Answer : A**

5. The area of the land which is used to plant banana trees

\[
= (24 \times 15) - (\frac{1}{2} \times 9 \times 12)
= 360 - 54
= 306
\]

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**
8. The minimal length of wire = the perimeter of rhombus
   = 4 × 39
   = 156 m

   Answer : A

9. The perimeter of canvas = 4 × s
   52 = 4 × s
   s = 13 cm

   The length of the other diagonal = 24 cm

   The area of canvas = \( \frac{1}{2} \times d_1 \times d_2 \)
   = \( \frac{1}{2} \times 24 \times 10 \)
   = 120 cm²

   Answer : B

10. The perimeter of park = the perimeter of rhombus
    = 4 × 15
    = 60 m

    The number of garden lights = 60 : 3
    = 20

    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.  
   \[
   AD = DC  
   \]
   \[
   2x = 10  
   \]
   \[
   x = \frac{10}{2}  
   \]
   \[
   x = 5  
   \]
   b.  
   \[
   AC = BD  
   \]
   \[
   y + 5 = 14  
   \]
   \[
   y = 14 - 5  
   \]
   \[
   y = 9  
   \]

3. **Remember!** Square has the diagonal that equal in length, so:  
   \[
   PR = QS  
   \]
   \[
   6x = 2 \times OS  
   \]
   \[
   6x = 2 \times \left(\frac{7-x}{2}\right)  
   \]
   \[
   12x = 14 - 2x  
   \]
   \[
   14x = 14  
   \]
   \[
   x = 1  
   \]
   • the length of diagonal = \(PR = 6x = 6 \times 1 = 6\)  
   so the length of the diagonal is 6 cm.

4. a.  
   \[
   \frac{2}{3} (p + 2) = \frac{p+8}{3}  
   \]
   b. substitute the value of \(p = 4\) to \(\frac{2}{3} (p + 2)\) or  
   \[
   \frac{2}{3} p + \frac{4}{3} = \frac{p}{3} + \frac{8}{3}  
   \]
   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.
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 × (8 × 8) = 192
     So the area of shaded plane is 192 cm²

2. The length of the fence = the perimeter of a square
   = 4 × 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 × 200 = Rp4.000.000.00

3. | No | Length | Square’s perimeter | Square’s area |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>11 cm</td>
<td>44 cm</td>
<td>121 cm²</td>
</tr>
<tr>
<td>2.</td>
<td>15 cm</td>
<td>60 cm</td>
<td>225 cm²</td>
</tr>
<tr>
<td>3.</td>
<td>21 m</td>
<td>84 m</td>
<td>441 m²</td>
</tr>
<tr>
<td>4.</td>
<td>23 km</td>
<td>92 km</td>
<td>529 km²</td>
</tr>
</tbody>
</table>

4. The area of the flower garden = garden’s area – fish pond’s area
   = (50 × 30) – (15 × 15)
   = 1500 – 225
   = 1275
   So the area of flower garden is 1275 m².

5. The area of the floor = 400 cm × 300 cm
   = 120.000 cm²
   The area of the marble = 20 cm × 20 cm
   = 400 cm²
The number of the marble = floor’s area : marble’s area
= 120,000 : 400
= 300

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

2. A B
   D C

   The length of AB = BC = CD = DA = 20 cm
   The length of AC = BD = 20√2 cm
   The length of AE = BE = CE = DE = 10√2 cm

   **Answer**: C

3. ∠TPQ = (2x + 3)°
   45° = (2x + 3)°
   2x = 42°
   x = 21°

   ∠TQR = (y + 17)°
   45° = (y + 17)°
   y = 28°

   x + y = 21° + 28° = 49°

   **Answer**: A

4. The number of ropes that is needed = 3 × the perimeter of square
   = 3 × (4 × s)
   = 3 × (4 × 6)

   **Answer Key** learning Activities 1, 2, 3, 4, 5 and 6
252

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

The number of rooftiles that is needed = 84.5 \(\times 20\)

= 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 = 2\(x\), so the width of the pond = \(x\). If the length = (2\(x\) − 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:

Length = width

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

2\(x - x\) = 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 \(m\) = 240 cm

The width of the floor = 2 \(m\) = 200 cm

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

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

= 48,000 : 1600
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

9. The total length of wire = \( 10 \times \) the perimeter of the rectangle
   \[ = 10 \times (2 \times (15 + 12)) \]
   \[ = 10 \times 54 \]
   \[ = 540 \text{ cm} \]

   The number of square frame are made = the total length of wire : square’s perimeter
   \[ = 540 : (4 \times 45) \]
   \[ = 540 : 180 \]
   \[ = 3 \text{ square frame} \]

Answer: A

10.

<table>
<thead>
<tr>
<th>Garden’s area</th>
<th>The number of cassava stems that can be planted</th>
</tr>
</thead>
<tbody>
<tr>
<td>( 1 m^2 )</td>
<td>4</td>
</tr>
<tr>
<td>( 4 m^2 )</td>
<td>9</td>
</tr>
<tr>
<td>( 9 m^2 )</td>
<td>16</td>
</tr>
<tr>
<td>( 16 m^2 )</td>
<td>25</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>( 100 m^2 )</td>
<td>121</td>
</tr>
</tbody>
</table>

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

Answer: B
LEARNING ACTIVITY 6

Challenge 6.1

1. 

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>True</td>
</tr>
<tr>
<td>b.</td>
<td>True</td>
</tr>
<tr>
<td>c.</td>
<td>False</td>
</tr>
</tbody>
</table>

2. a. \[ DC = \sqrt{DO^2 + OC^2} \]
   \[ = \sqrt{12^2 + 15^2} \]
   \[ = \sqrt{144 + 225} \]
   \[ = \sqrt{369} \]
   \[ = 3\sqrt{41} \]

b. \[ AB = \sqrt{AO^2 + OB^2} \]
   \[ = \sqrt{15^2 + 20^2} \]
   \[ = \sqrt{225 + 400} \]
   \[ = \sqrt{625} \]
   \[ = 25 \]

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

3. 

a. The coordinate of point S = (2,3)

b. The coordinate of the diagonal intersection is (4,3).
Find the value of x

- **Figure (i)**

\[5x^0 = 130^0 \text{ (The opposite angles)}\]

\[x = \frac{130^0}{5^0}\]

\[x = 26\]

- **Figure (ii)**

\[x = 180 - 40 - 40\]

\[= 100\]

To find the value of y

- **Figure (i)**

\[y = 360 - 130 - 130 - 40\]

\[= 60\]

- **Figure (ii)**

\[y = 360 - 110 - 110 - 100\]

\[= 40\]
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

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
\[
= AB + BC + CD + AD \\
= (\sqrt{AE^2 + BE^2}) + (\sqrt{CE^2 + BE^2}) + (\sqrt{DE^2 + DE^2}) \\
= (\sqrt{5^2 + 12^2}) + (\sqrt{12^2 + 16^2}) + (\sqrt{12^2 + 5^2}) \\
= (\sqrt{169}) + (\sqrt{400}) + (\sqrt{169}) \\
= 13 + 20 + 20 + 13 \\
= 66
\]
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

Learning Activities 1, 2, 3, 4, 5 and 6
the area of the paper to make a kite = 252 cm².

b. 100 cm of bamboo costs = Rp1,000,00
100 cm of yarn costs = Rp100,00
100 cm × 100 cm of paper cost = Rp5,000,00
The total cost to make the kite = bamboo costs + yarn costs + paper costs

\[
= \left(\frac{1000}{100} \times 45\right) + \left(\frac{100}{100} \times 66\right) + \left(\frac{5000}{10000} \times 252\right)
\]

= 450 + 66 + 126
= 642 (is rounded to 650)

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

4. The area of a kite

\[
= \frac{1}{2} \times d_1 \times d_2
\]

\[
= \frac{1}{2} \times 35 \times 20
\]

= 350 cm² = 0.035 m²

The price of paper every 1m² = 33,750 : (1.5 × 1.5)

\[
= 33,750 : 2.25
\]

= 15,000

The price of a kite

\[
= 15,000 \times 0.035
\]

= 525

The price of 300 kites = 300 × 525

= 157,500

The profit has getted by Ludye

\[
= (300 \times 750) - 157,500
\]

= 225,000 – 157,500

= 67,500

So the profit has getted by Ludye is Rp67,500,00
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. \( x = 110^0 \) *(the opposite sides)*
\[ y = 360^0 - 110^0 - 110^0 - 36^0 = 104^0 \]
The value of \( x - y = 6^0 \)

**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 \times 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**
5. The area of a kite  
   \[ = \frac{1}{2} \times d_1 \times d_2 \]
   
   \[ = \frac{1}{2} \times 30 \times 20 \]
   
   \[ = 300 \text{ cm}^2 = 0.03 \text{ m}^2 \]

   The price of paper every \(1 \text{ m}^2 = 22.500 : (1.5 \times 1.5)\)
   
   \[ = 22.500 : 2.25 \]
   
   \[ = 10.000 \]

   The price of paper for making 1 kite \[ = 10.000 \times 0.03 \]
   
   \[ = 300 \]

   The price of paper for making 200 kites \[ = 200 \times 300 \]
   
   \[ = 60.000 \]

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

   **Answer : C**

6. The correct statements are

   (i) \{rectangle\} \subseteq \{parallelogram\}

   (ii) \{parallelogram\} \subseteq \{trapezoid\}

   (iii) \{rhombus\} \subseteq \{kite\}

   **Answer : A**

7. The length of bamboo \[ = \text{the length of } AC + \text{the length of } BD \]
   
   \[ = 32 + 10 \]
   
   \[ = 42 \]

   The length of yarn \[ = \text{the perimeter of kite} \]

   \[ = \text{AB + BC + CD + AD} \]
   
   \[ = (\sqrt{AE^2 + BE^2}) + (\sqrt{CE^2 + DE^2}) + (\sqrt{AE^2 + DE^2}) \]
   
   \[ = (\sqrt{12^2 + 5^2}) + (\sqrt{20^2 + 5^2}) + (\sqrt{20^2 + 5^2}) + (\sqrt{12^2 + 5^2}) \]
   
   \[ = (\sqrt{169}) + (\sqrt{425}) + (\sqrt{425}) + (\sqrt{169}) \]
   
   \[ = 13 + 5\sqrt{17} + 5\sqrt{17} + 13 \]
   
   \[ = 26 + 10\sqrt{17} \]
   
   \[ = 67.23 \]

   The area of paper required \[ = \text{the area of kite} \]

   \[ = \frac{1}{2} \times 10 \times 32 = 160 \]
100 cm of bamboo costs = Rp1,000.00
100 cm of yarn costs = Rp500.00
100 cm x 100 cm of paper cost = Rp5,000.00

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

\[
= \left(\frac{1000}{100} \times 42\right) + \left(\frac{500}{100} \times 67.23\right) + \left(\frac{5000}{10000} \times 160\right)
\]

\[
= 420 + 336.15 + 80
\]

\[
= 836.15 \text{ (is rounded to 836)}
\]

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

**Answer : C**

8. The paper required to make a kite = \(8 \times \left(\frac{1}{2} \times 45 \times 30\right)\)

\[
= 8 \times 675
\]

\[
= 5400 \text{ cm}^2
\]

The paper gotted = \(120 \times 80\)

\[
= 9600 \text{ cm}^2
\]

The number of unused paper = 9600 – 5400 = 4200 \(\text{cm}^2\)

**Answer : A**

9. The paper required = \(120 \times \left(\frac{1}{2} \times 30 \times 50\)\)

\[
= 90,000 \text{ cm}^2
\]

The size a paper = \(100 \times 150\)

\[
= 15,000 \text{ cm}^2
\]

The number of paper for making 120 kites = \(90,000 : 15,000\)

\[
= 6 \text{ sheets of paper}
\]

**Answer : B**

10. The perimeter of kite PQRS = 20 + 13 + 13 + 20 = 66 cm

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

**Answer : A**