The KEC PREMIER MATHEMATICS BOOK
PRIMARY SIX (TERM III) VOLUME II

LENGTH, MASS AND CAPACITY

PERIMETER OF A PARALLELOGRAM

⇒ Perimeter is the distance around a given figure.

OR

⇒ Perimeter is the length of the outline of a shape.

Therefore, perimeter of a parallelogram is the distance around it.

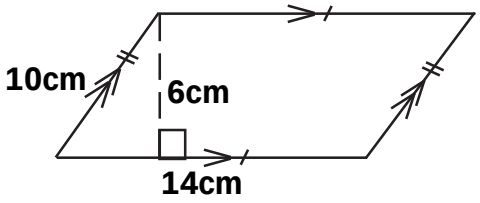
⇒ Perimeter of a parallelogram is got by adding all its sides.

procedure (steps taken)

- State the formula for finding the perimeter of a parallelogram
  i.e **P = l + b + l + b** OR **P = 2l + 2b** OR **P = 2(l + b)** where **"P" is perimeter, "l" is the length, "b" is the base.**
- Substitute in correctly.
- Compute accurately and the product is the perimeter.

EXAMPLE 1

Find the perimeter of the parallelogram below.



Approach I

p = l + b + l + b

p = 14cm + 10cm + 14cm + 10cm

p = 24cm + 24cm

$$\begin{array}{r} 24 \\ +\ 24 \\ \hline 48 \end{array}$$

p = 48cm

Approach II

p = 2l + 2b

p = (2 x 14cm) + (2 x 10cm)

p = 28cm + 20cm

$$\begin{array}{r} 28 \\ +\ 20 \\ \hline 48 \end{array}$$

p = 48cm

Approach III

p = 2 (l + b)

p = 2 (14cm + 10cm)

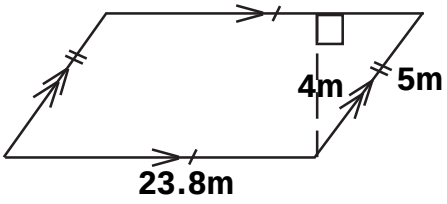
p = 2 (24cm)

$$\begin{array}{r} 24\text{cm} \\ \times\ 2 \\ \hline 48\text{cm} \end{array}$$

p = 48cm

EXAMPLE 2

Find the perimeter of the parallelogram below.



Approach I

p = l + b + l + b

p = 23.8m + 5m + 23.8m + 5m

p = 23.8m
5.0m
23.8m
+ 5.0m
57.6m

p = 57.6m

Approach II

p = 2l + 2b

p = (2 x 23.8m) + (2 x 5m)

23.8 x 2 = 47.6

p = 47.6m + 10m

p = 47.6m
+10.0m
57.6m

p = 57.6m

Approach III

p = 2 (l + b)

p = 2 (23.8m + 5m)

p = 2 (28.8m)

P = 28.8m
x 2
57.6m

p = 57.6m

Approach IV

p = 2 (l + b)

p = 2 (23.8m + 5m)

p = 2 (28.8m)

P = 2 x 28.8m

P = $\frac{\cancel{2}^{1}}{\cancel{10}_{5}}$ x $\frac{288m}{}$

p = $\frac{288m}{5}$

p = 57.6
5 | 288
5 x 5 = - 25
38
7 x 5 = - 35
30
6 x 5 = - 30
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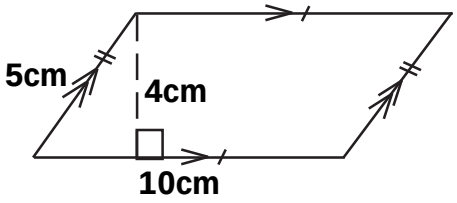
∴ p = 57.6m

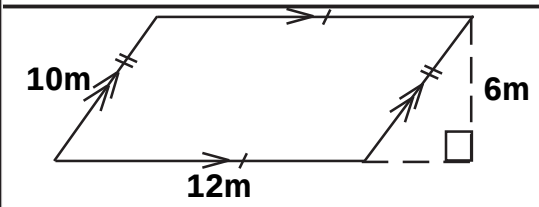
TASK 30

Find the perimeter (distance around the following shapes)

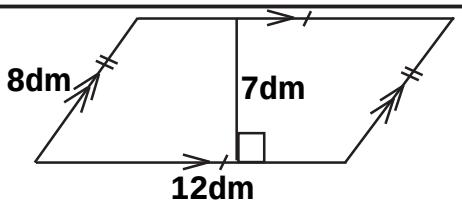
1.



2.



3.



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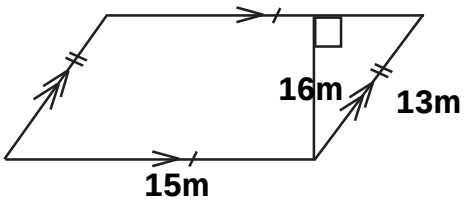
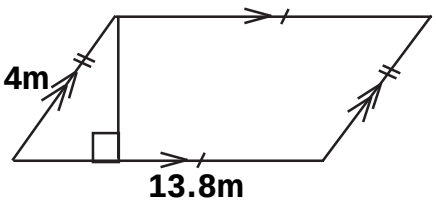


5.



THE TRIANGLE

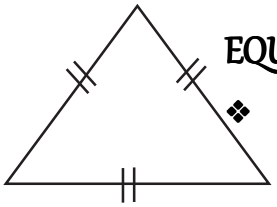
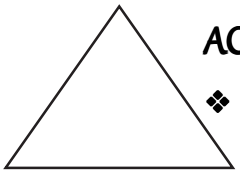
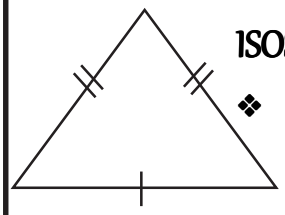
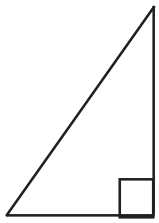
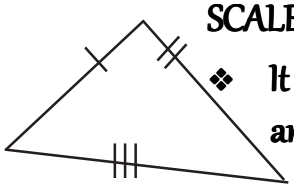
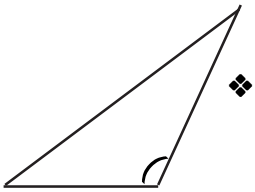
- A triangle is a three sided polygon with three (3) angles and an interior angle sum of 180^0.

Properties of a triangle.

- A triangle has three sides.
- A triangle has 3 interior angles.
- A triangle has 3 exterior angles.
- A triangle has 3 centre angles.
- The interior angle sum of a triangle is always 180^0 .
- The sum of the length of any two sides of a triangle is greater than the length of the third side.
- In the same way,the difference between the two sides of a triangle is less than the length of the third side.

Categories of triangles.

❖ Triangles are categorised either by sides or by angles.

By sides	By angles
 EQUILATERAL TRIANGLE ❖ It has three equal sides and angles	 ACUTE ANGLED TRIANGLE ❖ Has three angles less than 90^0.
 ISOSCELES TRIANGLE ❖ It has two equal sides and angles	 RIGHT ANGLED TRIANGLE ❖ Has one of the three angles a right angle (90^0)
 SCALEN TRIANGLE ❖ It has no equal sides and angles	 OBTUSE ANGLED TRIANGLE ❖ Has one of the angles obtuse (greater than 90^0 but less than 180^0 .

AREA OF A TRIANGLE

Finding the area of a triangle.

Procedure / steps taken

➔ State the formula for finding area of a triangle i.e Area = $\frac{1}{2}$bh.

➔ Substitute in the base and the height correctly.

➔ Compute accurately and the product obtained is the area.

OR

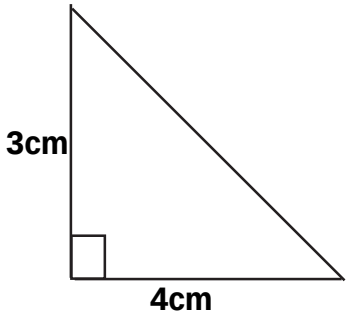
➔ Complete the triangle to form a rectangle or a parallelogram.

➔ State the formula for finding either the area of a rectangle or the area of a parallelogram when applicable and divide it by 2 .

➔ Substitute in correctly and the result obtained is the answer.

EXAMPLE 1

Find the area of the triangle below.



Approach I

$$\text{Area} = \frac{1}{2}bh$$

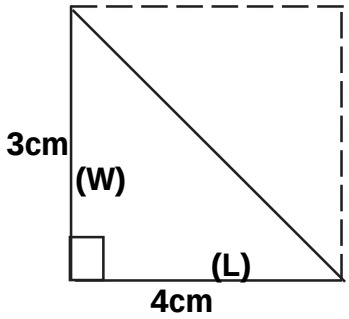
$$\text{Area} = \frac{1}{\cancel{2}_1} \times \cancel{4}^{2}\text{cm} \times 3\text{cm}$$

$$\text{Area} = 6\text{cm}^2$$

Complete the triangle to form either a rectangle or a parallelogram.

Approach II

RECTANGLE



This is now a rectangle with two equal triangles , we therefore get the area of a rectangle and divide that area by 2 to get the area of one triangle

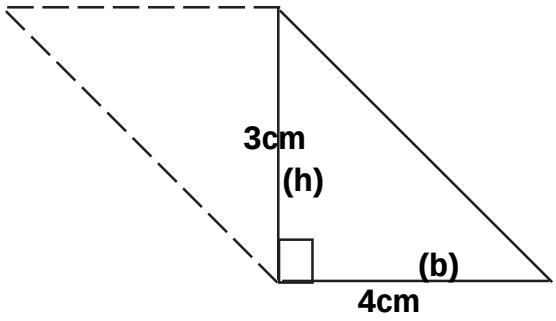
$$\text{Area} = \frac{L \times W}{2}$$

$$\text{Area} = \frac{\cancel{4}^{2}\text{cm} \times 3\text{cm}}{\cancel{2}_1}$$

$$\text{Area} = 6\text{cm}^2$$

Approach III

PARALLELOGRAM



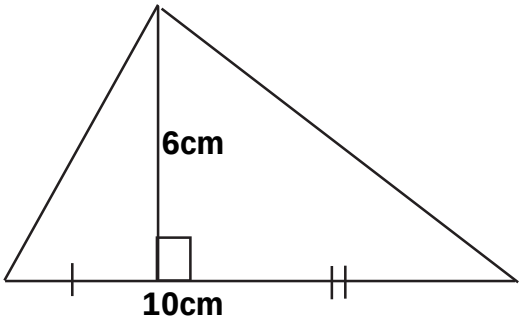
This is now a parallelogram with two equal triangles , we therefore get the area of a parallelogram and divide that area by 2 to get the area of one triangle

$$\text{Area} = \frac{b \times h}{2}$$

$$\text{Area} = \frac{\cancel{4}^{2}\text{cm} \times 3\text{cm}}{\cancel{2}_1}$$

$$\text{Area} = 6\text{cm}^2$$

EXAMPLE 2



Approach I

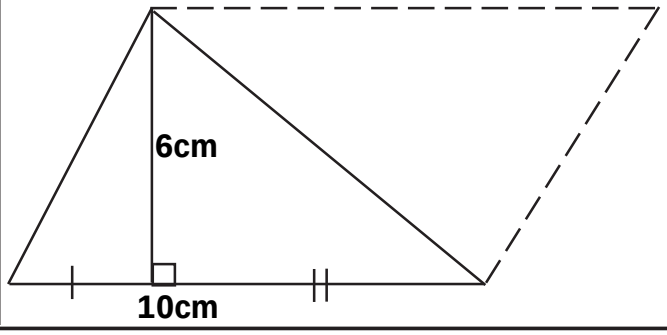
$$\text{Area} = \frac{1}{2}bh$$

$$\text{Area} = \frac{1}{\cancel{2}_1} \times \cancel{10}^{5}\text{cm} \times 6\text{cm}$$

$$\text{Area} = 30\text{cm}^2$$

Complete the triangle to form a parallelogram.

Approach II

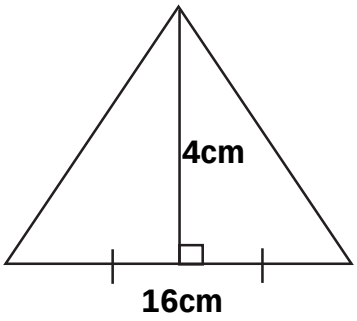


$$\text{Area} = \frac{b \times h}{2}$$

$$\text{Area} = \frac{\overset{5}{\cancel{10}}\text{cm} \times 6\text{cm}}{\cancel{2}_{1}}$$

$$\text{Area} = 30\text{cm}^2$$

EXAMPLE 3



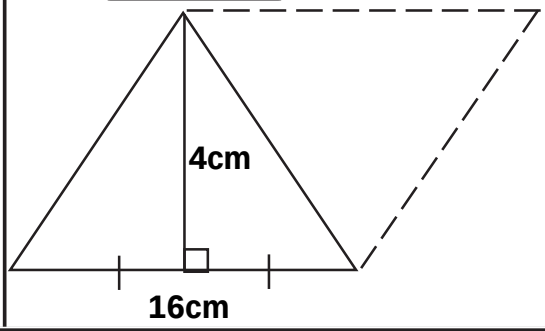
Approach I

$$\text{Area} = \frac{1}{2}bh$$

$$\text{Area} = \frac{1}{\cancel{2}_{1}} \times \overset{8}{\cancel{16}}\text{cm} \times 4\text{cm}$$

$$\text{Area} = 32\text{cm}^2$$

Approach II

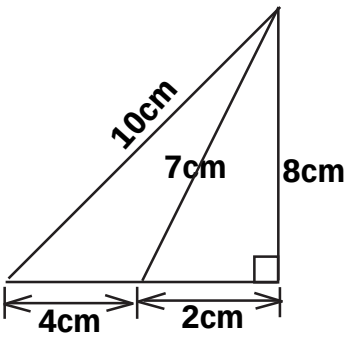


$$\text{Area} = \frac{b \times h}{2}$$

$$\text{Area} = \frac{\overset{8}{\cancel{16}}\text{cm} \times 4\text{cm}}{\cancel{2}_{1}}$$

$$\text{Area} = 32\text{cm}^2$$

EXAMPLE 4



$b = 4\text{cm} + 2\text{cm}$

$b = 6\text{cm}$

NB: The height is always perpendicular to the base.

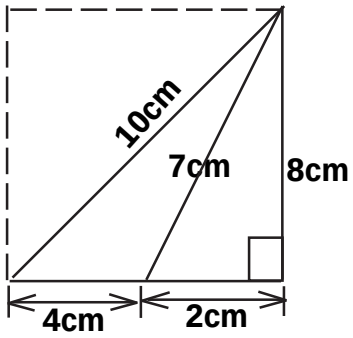
Approach I

$$\text{Area} = \frac{1}{2}bh$$

$$\text{Area} = \frac{1}{\cancel{2}_{1}} \times \overset{3}{\cancel{6}}\text{cm} \times 8\text{cm}$$

$$\text{Area} = 24\text{cm}^2$$

Approach II



$$\text{Area} = \frac{L \times W}{2}$$

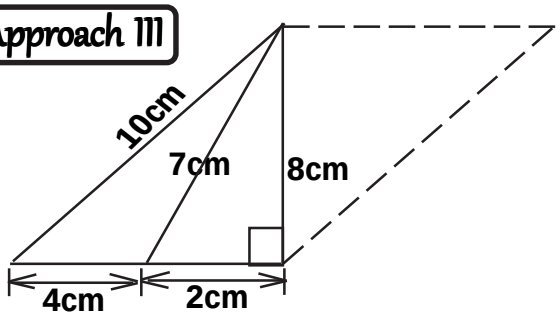
$$\text{Area} = \frac{\overset{3}{\cancel{6}}\text{cm} \times 8\text{cm}}{\underset{1}{\cancel{2}}}$$

$$\text{Area} = 3\text{cm} \times 8\text{cm}$$

$$\text{Area} = 24\text{cm}^2$$

b = 4cm + 2cm
b = 6cm

Approach III



$$\text{Area} = \frac{b \times h}{2}$$

$$\text{Area} = \frac{6\text{cm} \times \overset{4}{\cancel{8}}\text{cm}}{\underset{1}{\cancel{2}}}$$

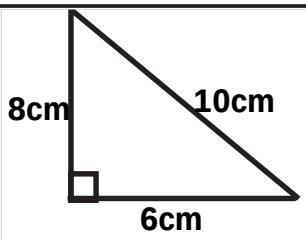
$$\text{Area} = 24\text{cm}^2$$

b = 4cm + 2cm
b = 6cm

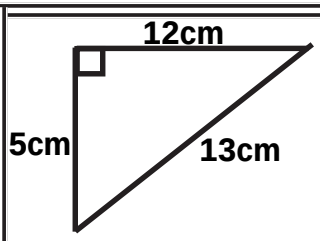
TASK 31

Find the area of the triangles below.

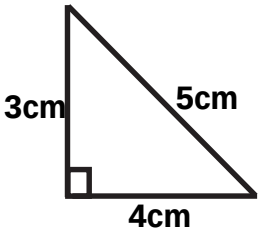
1.



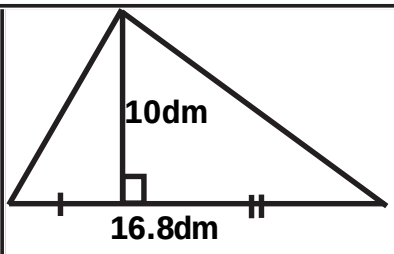
2.



3.



4.



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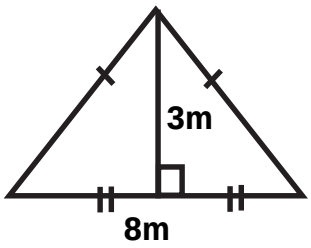

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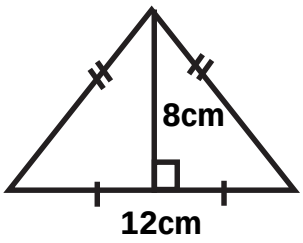

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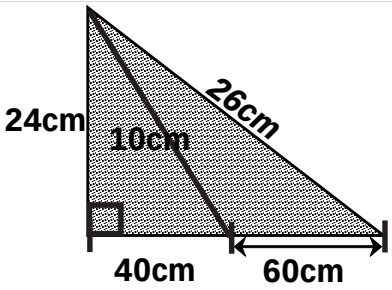
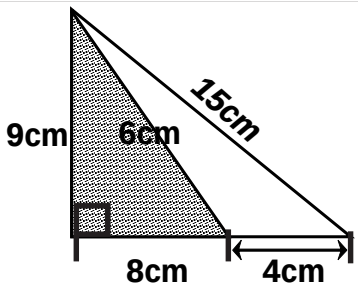
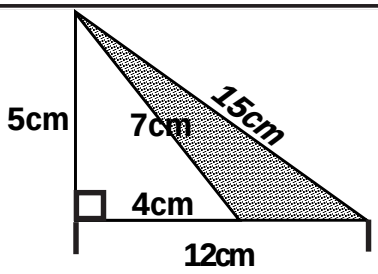
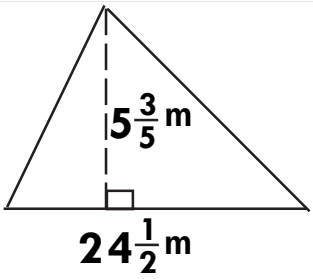


8.



9.





Finding the unknown side of a triangle given the area

Procedure / steps taken

- Let the unknown side of the base be "b" and the height be "h".
- State the formula for finding the area of a triangle i.e Area $= \frac{1}{2} \times b \times h$.
- Inter change the formula above i.e from Area $= \frac{1}{2} \times b \times h$

  to $\frac{1}{2} \times b \times h = \text{Area}$.

➔ Substitute in correctly.

➔ Compute accurately and the value of the unknown is the answer.

OR

➔ Let the base be "b" and the height be "h".

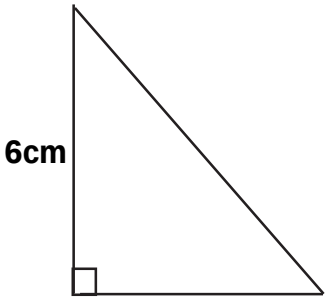
➔ State the formula for finding the base i.e $b = \frac{\text{Area} \times 2}{h}$ OR $b = \frac{2\,\text{Area}}{h}$ and the height is $h = \frac{\text{Area} \times 2}{b}$ OR $h = \frac{2\,\text{Area}}{b}$.

➔ Substitute in correctly.

➔ Compute accurately and the value of the unknown is the answer.

EXAMPLE 1

The area of the triangle below is $24cm^2$. Find its base.



Approach I

$\text{Area} = \frac{1}{2} \times b \times h$

$\frac{1}{2} \times b \times h = \text{Area}$

$\frac{1}{2} \times b \times 6cm = 24cm^2$

$\frac{3bcm}{3cm} = \frac{24cm \times cm}{3cm}$

$b = 8cm$

Approach II

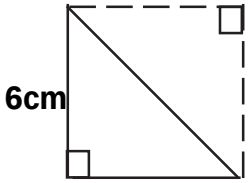
$b = \frac{\text{Area} \times 2}{h}$

$b = \frac{24cm^2 \times 2}{6cm}$

$b = \frac{24cm \times cm}{3cm}$

$b = 8cm$

Approach III



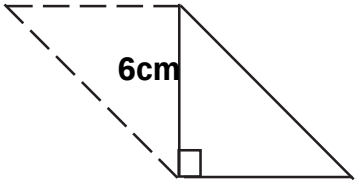
$\frac{l \times w}{2} = \text{Area}$

$\frac{l \times 6cm}{2} = 24cm^2$

$\frac{b \times 3cm}{3cm} = \frac{24 \times cm}{3cm}$

$b = 8cm$

Approach IV



$\frac{b \times h}{2} = \text{Area}$

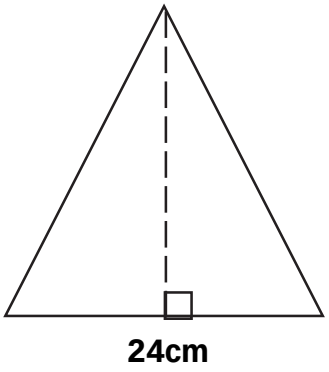
$\frac{b \times 6cm}{2} = 24cm^2$

$\frac{b \times 3cm}{3cm} = \frac{24 \times cm}{3cm}$

$b = 8$

EXAMPLE 2

Find the height of the triangle below if its area is 144cm².



Approach I

$\frac{1}{2} \times b \times h = \text{Area}$

$\frac{1}{\cancel{2}} \times \cancel{24}^{12}\text{cm} \times h = 144\text{cm}^2$

$\frac{\cancel{12}^{1}\text{cm}}{\cancel{12}\text{cm}} \times h = \frac{\cancel{144}^{12}\text{cm} \times \cancel{\text{cm}}^{1}}{\cancel{12}\text{cm}}$

$h = 12\text{cm}$

Approach II

$h = \frac{\text{Area} \times 2}{b}$

$h = \frac{144\text{cm}^2 \times \cancel{2}^{1}}{\cancel{24}^{12}\text{cm}}$

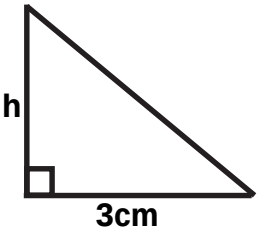
$h = \frac{\cancel{144}^{12}\text{cm} \times \cancel{\text{cm}}^{1}}{\cancel{12}\text{cm}}$

$h = 12\text{cm}$

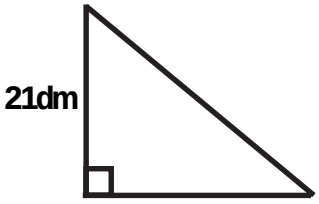
TASK 32

Work out the following.

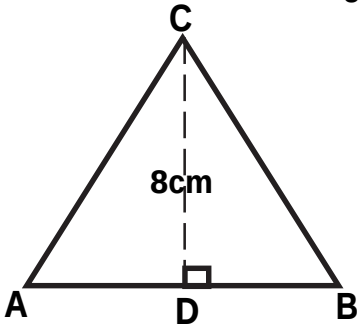
1. The area of the triangle below is **6cm²**. Find the value of **h**.



2. The area of the triangle below is **210dm²**. Find its base length.



3. If the area of the figure below is **96cm²**, find the length **AB**.



Comparing the area of the triangles.

➔ In this case, we shall look at two triangles occupying the same area though they have different dimensions.

Finding the unknown side (base or height of one of the two triangles occupying the same area.

procedure (steps taken)

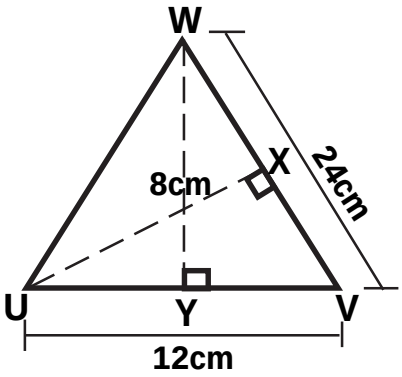
➔ Equate the area of the two (2) triangles i.e $\frac{1}{2}$ b h = $\frac{1}{2}$ b h.

➔ Substitute in correctly.

➔ Compute accurately and the value of the unknown is the answer.

EXAMPLE 1

Below is a triangle UVW in which UV = 12cm , WY = 8cm ,WV = 24cm. Find the length UX.



Approach I

Area = Area

$\frac{1}{2}$ bh = $\frac{1}{2}$ bh

$\frac{1}{\cancel{2}_1} \times \cancel{24}^{12}\text{cm} \times UX = \frac{1}{\cancel{2}_1} \times \cancel{12}^{6}\text{cm} \times 8\text{cm}$

$12\text{cm} \times UX = 48\text{cm} \times \text{cm}$

$\frac{\cancel{12}^{1}\text{cm} \times UX}{\cancel{12}_{1}\text{cm}} = \frac{\cancel{48}^{4}\text{cm} \times \cancel{\text{cm}}^{1}}{\cancel{12}_{1}\text{cm}}$

$UX = 4\text{cm}$

Approach II

Area of triangle UVW = $\frac{1}{2}$ bh

$= \frac{1}{\cancel{2}_1} \times \cancel{12}^{6}\text{cm} \times 8\text{cm}$

$= 48\text{cm}^2$

Area of another triangle in the same area. = $\frac{1}{2} \times 24\text{cm} \times UX$

Comparing the area of the two triangles

Area = Area

$\frac{1}{\cancel{2}_1} \times \cancel{24}^{12}\text{cm} \times UX = 48\text{cm}$

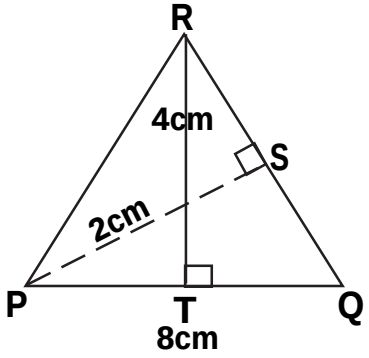
$\frac{\cancel{12}^{1}\text{cm} \times UX}{\cancel{12}_{1}\text{cm}} = \frac{\cancel{48}^{4}\text{cm} \times \cancel{\text{cm}}^{1}}{\cancel{12}_{1}\text{cm}}$

$UX = 4\text{cm}$

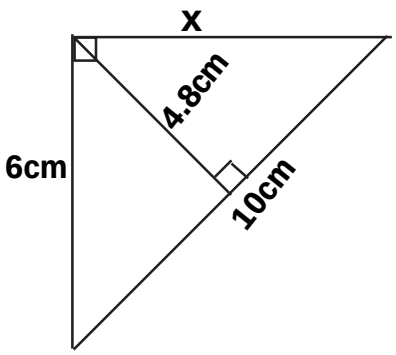
TASK 33

Work out the following if each figure has two triangles occupying the same area.

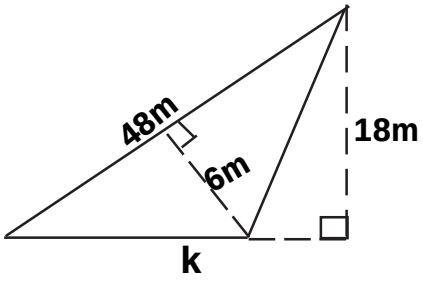
1. Given that in the figure below $\overline{PQ}$ **= 8cm, RT = 4cm and PS = 2cm**, find the length **QR.**



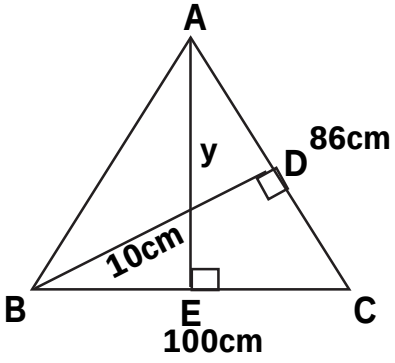
2. Find the value of x.



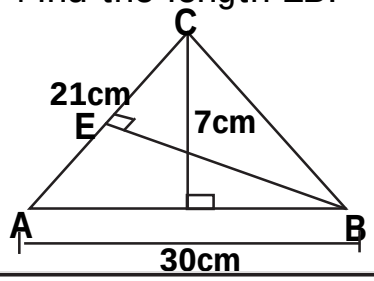
3. Find the value of **k**.



4. Find the value of **"y"** if **BC = 100cm** , **AC = 86cm** , **BD = 10cm** and **AE = y**.



5. Find the length **EB**.



PERIMETER OF A TRIANGLE

⇒ Perimeter of a triangle is the distance around a triangle.

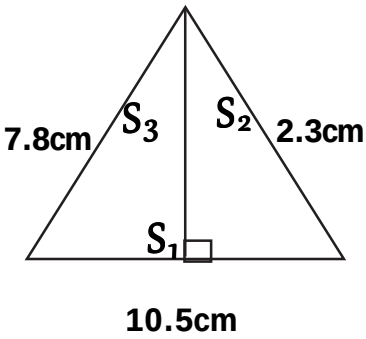
Finding the perimeter of a triangle

Procedure / steps taken

➔ State the formular for finding perimeter of a triangle i.e P = S + S + S.
➔ Substitute in the formular correctly.
➔ Compute accurately and the sum is the perimeter.
➔ find the sum of all the 3 sides and it is the required perimeter.

EXAMPLE 1

Find the perimeter of the figure below;



Approach 1

$P = S_1 + S_2 + S_3$

$P = 10.5cm + 2.3cm + 7.8cm$

$P = 10.5cm$
$2.3cm$
$+ 7.8cm$
$20.6cm$

Approach 11

P = sum of all sides (add all sides)

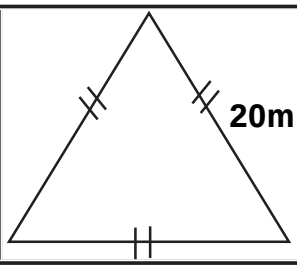
P = 10.5cm + 2.3cm + 7.8cm

10.5
2.3
+7.8
20.6cm

P = 20.6cm

EXAMPLE 2

Calculate the perimeter of the triangle below;



Approach 1

P = S + S + S

P = 20m + 20m + 20m

P = 60m

Approach 11

P = sum of all sides.

P = 20m + 20m + 20m

P = 60m

20
20
+20
60

Approach 111

For an equilateral triangle, we can also say P = 3S

P = 3S

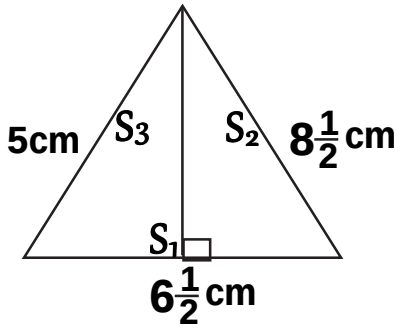
P = 3 x 20m

20
x 3
60

P = 60m

EXAMPLE 3

Find the perimeter of the triangle given below;



Approach I

$P = S_1 + S_2 + S_3$

$P = 6\frac{1}{2}\text{cm} + 8\frac{1}{2}\text{cm} + 5\text{cm}$

$P = \left(6 + 8 + 5 + \frac{1}{2} + \frac{1}{2}\right)\text{cm}$

$P = 20\text{cm}$

Approach II

P = sum of all sides.

$P = 6\frac{1}{2}\text{cm} + 8\frac{1}{2}\text{cm} + 5\text{cm}$

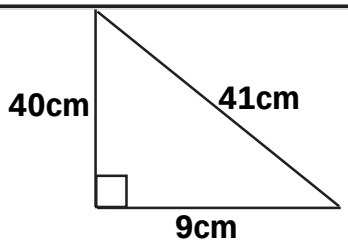
$P = 6 + 8 + 5 + \frac{1}{2} + \frac{1}{2}\text{ cm}$

P = 20cm

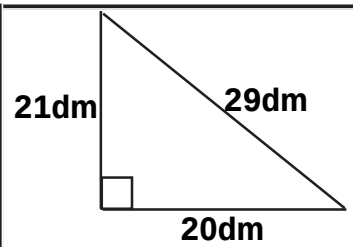
TASK 34

Find the perimeter of the triangles below;

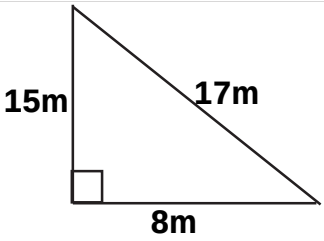
1.



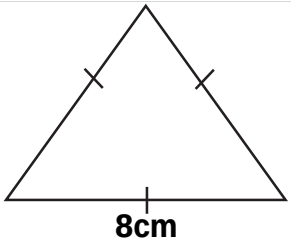
2.

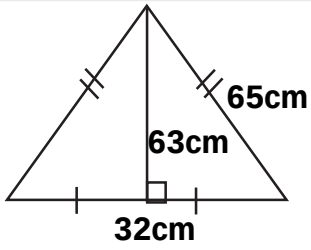


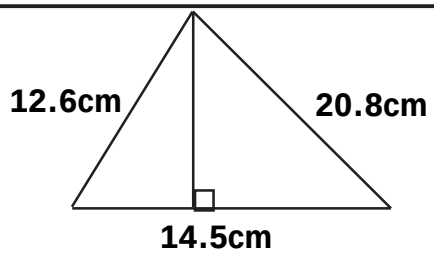
3.

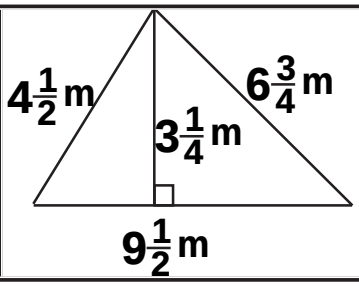


4.



5. 

6. 

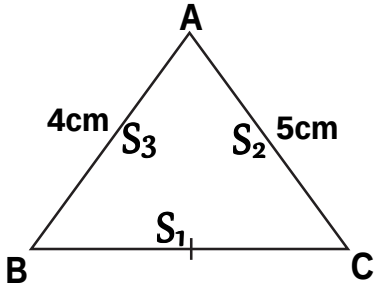
7. 

8. Find the perimeter of an equilateral triangle whose side is **10cm**.

Finding the unknown side of a triangle given the perimeter.

EXAMPLE 1

The perimeter of the triangle ABC below is 15cm. Find the length.



Approach I

$S_1 + S_2 + S_3 = P$

$BC + 5cm + 4cm = 15cm$

$BC + 9cm = 15cm$

$BC + 9cm - 9cm = 15cm - 9cm$

$BC = 6cm$

Approach II

$\overline{BC} = P - (AB + AC)$

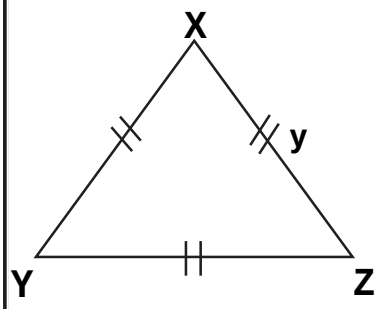
$\overline{BC} = 15cm - (4cm + 5cm)$

$\overline{BC} = 15cm - 9cm$

$\overline{BC} = 6cm$

EXAMPLE 2

The distance around the equilateral triangle below is 27cm. Find the value of y.



Approach II

$P = S + S + S$

$S + S + S = P$

$y + y + y = 27cm$

$3y = 27cm$

$\frac{\cancel{3}^{1}y}{\cancel{3}_{1}} = \frac{\cancel{27}^{9}cm}{\cancel{3}_{1}}$

$y = 9cm$

Approach I

$3s = P$

$3s = 27cm$

$\frac{\cancel{3}^{1}s}{\cancel{3}_{1}} = \frac{\cancel{27}^{9}cm}{\cancel{3}_{1}}$

$s = 9cm$

EXAMPLE 3

The perimeter of an equilateral triangle is $7\frac{1}{2}$ m. Find the length of its side.

$P = S + S + S$

$S + S + S = P$

$3S = 7\frac{1}{2}\ m$

$\frac{\cancel{3}^{1}S}{\cancel{3}_{1}} = \frac{7\frac{1}{2}\ m}{3}$

$S = 7\frac{1}{2} \div 3\ m$

$S = \frac{15}{2} \div \frac{3}{1}\ m$

$S = \frac{\cancel{15}^{5}}{2} \times \frac{1}{\cancel{3}_{1}}\ m$

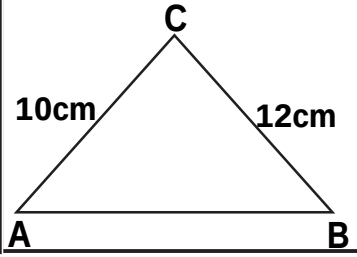
$S = \frac{5}{2}\ m$ (2 r 1)

$S = 2\frac{1}{2}\ m$

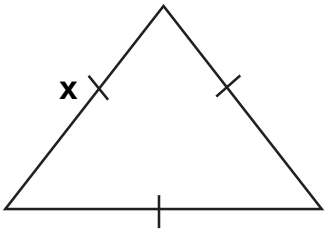
TASK 35

Work out the following.

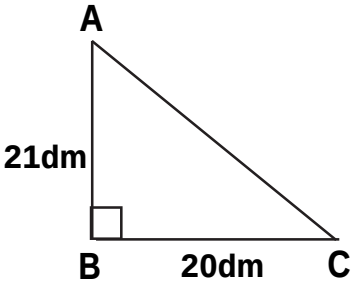
1. Find the length AB in the figure below whose perimeter is **42cm**.



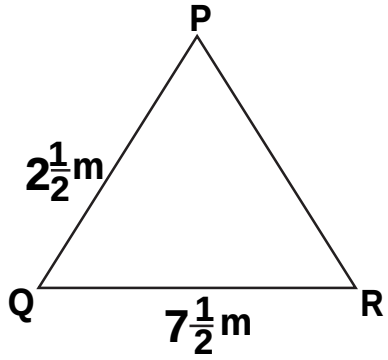
2. The perimeter of the figure below is **45m**. Find the value of **x**.



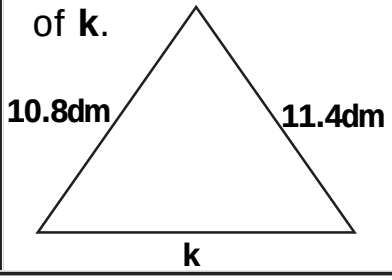
3. The distance around the figure below is **82dm**, find the length **AC**.



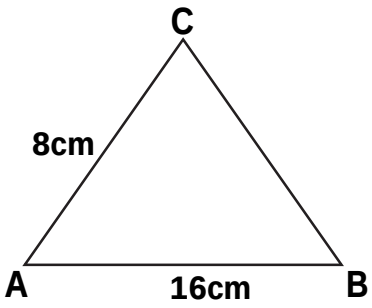
4. The distance around triangle **PQR below** is $16\frac{1}{4}$**cm** , find the length **PR**.



5. Given that the perimeter of the figure below is **46.8dm**, find the value of **k**.



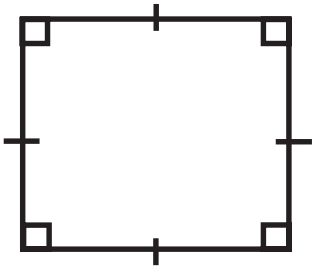
6. Given that the ratio of **BC** to **AC** is **2 : 3** , respectively. Find the length **AC** if the perimeter of a triangle below is **36cm**.



THE SQUARE

⇒ A square is a regular quadrilateral that has four equal sides and four equal angles that are right angles (90^0) each.

Illustration of a square



Properties of a square

- ❖ A square has all the four sides are congruent or equal to each other.
- ❖ A square has all its four interior angles equal and are right angles (90^0) each.
- ❖ The opposite sides of a square are parallel to each other.
- ❖ The two diagonals of a square are equal.
- ❖ The two diagonals of the square bisect each other at a right angle (90^0).
- ❖ The diagonals of the square divide each interior angles into two equal right angles Isosceles triangles.
- ❖ The two diagonals of the square divide it into 4 congruent or equal right angled Isosceles triangles.
- ❖ The two interior angles on each side of a square are co - interior angles.
- ❖ The square has 4 lines of folding symmetry.
- ❖ The square has an interior angle sum of 360^0 like any other quadrilateral.
- ❖ The opposite interior angles of a square are equal.

AREA OF A SQUARE

Finding the area of a square

Procedure / steps taken

- ➢ State the formular for finding the area of a square i.e Area = Side x Side (Area = S x S).
- ➢ Substitute in the given side length.

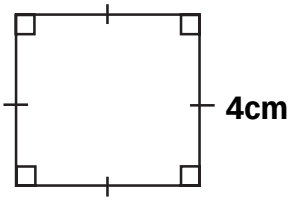
- Cumpute accurately to get the product which is the area .
- Indicate the correct square units.

OR

- Divide the square into two right angled triangles.
- Find the area of one of the triangles obtained above.
- Multiply the area of one of the triangles by 2 .
- The product obtained is the required area for the square.

EXAMPLE 1

Find the area of a square whose side is 4cm;



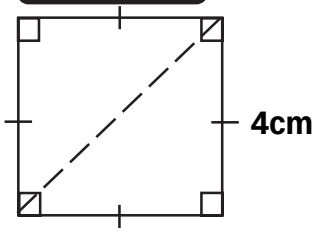
Approach 1

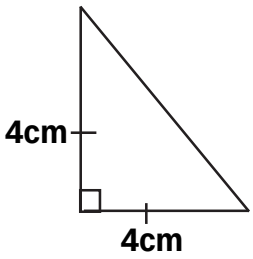
Area = S x S

Area = 4cm x 4cm

Area = 16cm²

Approach 11





Area = $\frac{1}{2}$ bh

Area = $\frac{1}{\cancel{2}_{1}}$ x $\cancel{4}^{2}$cm x 4cm

Area = 8cm²

Area of the square.

8cm² x 2

16cm²

Approach 111

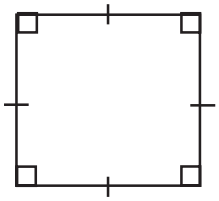
Area = $\frac{1}{2}$ bh

Area = $\frac{1}{\cancel{2}_{1}}$ x 4cm x 4cm x $\cancel{2}^{1}$

Area = 16cm²

EXAMPLE 2

Find the area of a square below.



Approach I

Area = S x S

Area = 0.6m x 0.6m

Area = $\frac{6}{10}$ m x $\frac{6}{10}$ m

Area = $\frac{6 \times 6}{10 \times 10}$ m²

Area = $\frac{36}{100}$ m²

Area = 0.36m²

Approach II

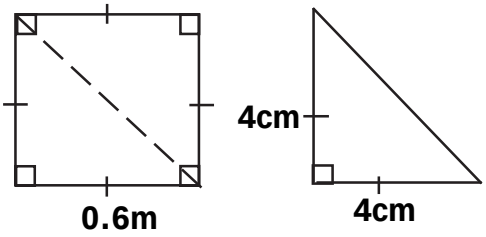
Area = S x S

Area = 0.6m x 0.6m

$$\begin{array}{r} 0.6 \\ \times\ 0.6 \\ \hline 3\ 6 \\ +\ 0\ 0 \\ \hline 0.3\ 6 \end{array}$$

Area = 0.36m

Approach III



Area = $\frac{1}{2}$ bh

Area = $\frac{1}{2}$ x 0.6m x 0.6m

Area = $\frac{1}{\cancel{2}_{1}}$ x $\frac{\cancel{6}^{3}}{10}$ m x $\frac{6}{10}$ m

Area = $\frac{18}{100}$ m²

Area = 0.18 m²

Total area of the square.

= 0.18 m²

x 2

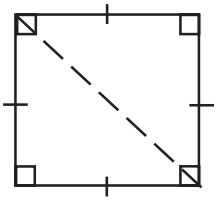
0.36m²

$\frac{18}{100}$ x 2 m²

= $\frac{36}{100}$ m²

= 0.36m²

Approach IV



Area = $\frac{1}{2}$ bh

Area = $\frac{1}{2}$ x 0.6m x 0.6m x 2

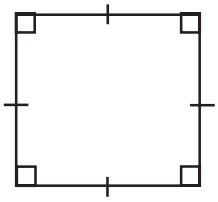
Area = $\frac{1}{\cancel{2}_{1}}$ x $\frac{6}{10}$ m x $\frac{6}{10}$ m x $\frac{\cancel{2}^{1}}{1}$

Area = $\frac{36}{100}$ m²

Area = 0.36 m²

EXAMPLE 3

Mr. Kasumba Jackson, the principal Gombe Junior School has a plot of land shown below.



Approach I

Area = S x S

Area = $2\frac{2}{5}$m x $2\frac{2}{5}$m

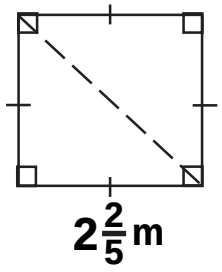
Area = $\frac{12}{5}$m x $\frac{12}{5}$m

Area = $\frac{144}{25}$ m²

Area = $\frac{\overset{5 \text{ rem. } 19}{\cancel{144}}}{\underset{1}{\cancel{25}}}$ m²

Area = $5\frac{19}{25}$ m²

Approach II



Area = $\frac{1}{2}$ x b x h x 2

Area = $\frac{1}{\cancel{2}_{1}}$ x $2\frac{2}{5}$m x $2\frac{2}{5}$m x $\frac{1}{\cancel{2}}$

Area = $\frac{12}{5}$m x $\frac{12}{5}$m

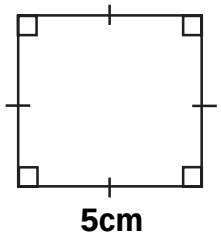
Area = $\frac{\overset{5 \text{ rem. } 19}{\cancel{144}}}{\underset{1}{\cancel{25}}}$m²

Area = $5\frac{19}{25}$ m²

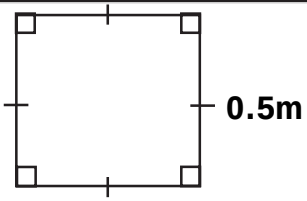
TASK 36

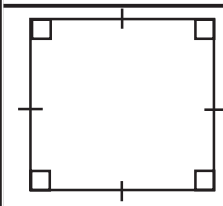
Find the area of the following squares.

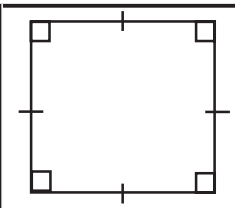
1.

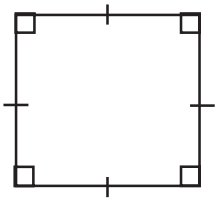


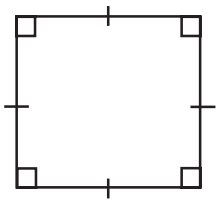
2.

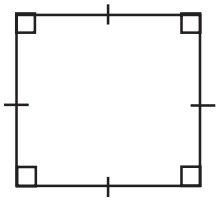


3. 

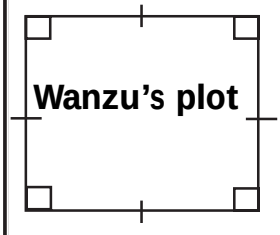
4. 

5. 

6. 

7. 

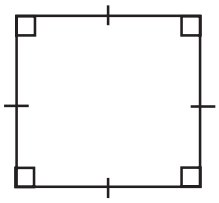
8. The figure below shows Wanzu's square plot of land. If Kagere's plot of land is four times the land of Wanzu, find the area of Kagere's plot of land.



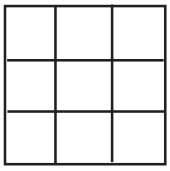
9. Find the area of a square whose side is **2.5 metres**.

10. Each side of a square **30cm**. Find the area of the square.

11. Find the area of the figure below.



12. If each small square of size of the shaded part is **9 square centimetre (9 sq.cm or 9cm²)**,

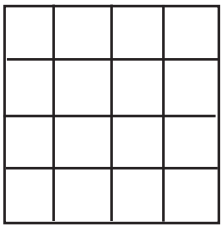


(a) find the area of the square below.

b) Find the length of each side of the square.

c) Find the perimeter of the square.

13. The figure below shows a square floor covered by square tiles of equal length. If the length of the side of each tile is **15cm**.



(a) Find the length of each side of the square floor.

b) Calculate the perimeter of the floor.

c) Find the area of the floor.

Finding the unknown side of a square given the area

Procedure / steps taken

➔ State the formula for finding area of a square i.e **Area = S x S OR**

Area = S^2, where "S" is the side.

➔ Inter change the formula i.e from "**Area = S x S**" to "**S x S = Area**"

➔ Substitute in the given area correctly.

➔ Find the square root of both sides.

➔ Compute accurately and the value of **S** is the answer.

OR

➔ State the formula for finding the unknown side of a square i.e

S = $\sqrt{\text{Area}}$.

➔ Substitute in the given area correctly.

➔ Compute accurately and the value of "S" is the required answer.

OR

➔ State the formular for finding the area of two equal right angled triangles

i.e Area = $\frac{1}{2}$ bh x 2 .

➔ Substitute in the given area correctly, Substitute in "S" for "b" and "S" for "h" This is because the base and the area of the triangle take up the sides of the square.

➔ Compute accurately and the value of "S" is the required answer.

EXAMPLE 1

The area of a square is 81cm². Find the length of its side.

Approach I

Area = S x S

S x S = Area

$S^2 = 81cm^2$

$\sqrt{S^2} = \sqrt{81cm^2}$

S =

3	81
3	27
3	9
3	3
	1

$S = \sqrt{(3 \times 3) \times (3 \times 3)}cm$

S = (3 x 3)cm

S = 9cm

Approach II

$S = \sqrt{Area}$

$S = \sqrt{81cm}$

3	81
3	27
3	9
3	3
	1

$S = \sqrt{(3 \times 3) \times (3 \times 3)}cm$

S = (3 x 3)cm

S = 9cm

Approach III

Area = $\frac{1}{2}$ bh x 2

$\frac{1}{2}$ x b x h = Area

$\frac{1}{2}$ x S x S x $\frac{1}{2}$ = $81cm^2$

$S^2 = 81cm^2$

$\sqrt{S^2} = \sqrt{81cm^2}$

3	81
3	27
3	9
3	3
	1

$S = \sqrt{(3x3)x(3x3)cm}$

S = (3 x 3)cm

S = 9cm

EXAMPLE 2

The area of a square garden is $2\frac{7}{9}$ m². Find the length of each side of the garden.

Approach I

$\text{Area} = S \times S$

$S \times S = \text{Area}$

$S^2 = 2\frac{7}{9}\text{ m}^2$

$S^2 = \frac{25}{9}\text{ m}^2$

$\sqrt{S^2} = \sqrt{\frac{25}{9}\text{m}^2}$

$S^2 = \frac{\sqrt{25}}{\sqrt{9}}\text{ m}^2$

$S = \frac{5}{3}\text{m}$

$S = \frac{5}{3}\text{m}$ (1 rem. 2)

$S = 1\frac{2}{3}\text{m}$

Approach II

$r = \sqrt{\text{Area}}$

$r = \sqrt{2\frac{7}{9}\text{ m}^2}$

$r = \sqrt{\frac{25}{9}\text{m}^2}$

$r = \frac{\sqrt{25}}{\sqrt{9}}\text{ m}^2$

$r = \frac{5}{3}\text{m}$

$r = \frac{5}{3}\text{m}$ (1 rem. 2)

$r = 1\frac{2}{3}\text{m}$

Approach III

$\text{Area} = \frac{1}{2}bh \times 2$

$\frac{1}{2}bh \times 2 = \text{Area}$

$\frac{1}{2} \times S \times S \times 2 = 2\frac{7}{9}\text{ m}^2$

$S^2 = \frac{25}{9}\text{m}^2$

$\sqrt{S^2} = \sqrt{\frac{25}{9}\text{m}^2}$

$S^2 = \frac{\sqrt{25}}{\sqrt{9}}\text{ m}^2$

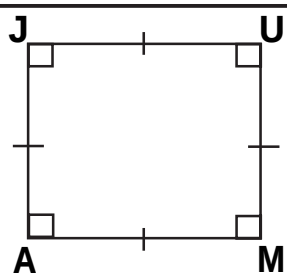
$S = \frac{5}{3}\text{m}$

$S = \frac{5}{3}\text{m}$ (1 rem. 2)

$S = 1\frac{2}{3}\text{m}$

EXAMPLE 3

The area of the square carpet JUMA below is 20.25m². (a) Find the length of $\overline{JA}$



Approach I

$S \times S = Area$

$\sqrt{S^2} = \sqrt{20.25m^2}$

5	2025
5	405
3	81
3	27
3	9
3	3
	1

$S = \sqrt{\frac{2025}{100}\ m^2}$

2	100
2	50
5	25
5	5
	1

$S = \frac{\sqrt{2025}}{\sqrt{100}}\ m$

$S = \frac{\sqrt{(5 \times 5) \times (3 \times 3) \times (3 \times 3)}}{\sqrt{(2 \times 2) \times (5 \times 5)}}\ m$

$S = \frac{5 \times 3 \times 3}{2 \times 5}\ m$

$S = \frac{45}{10}\ m$

$\underline{S = 4.5m}$

Approach II

$S = \sqrt{Area}$

$S = \sqrt{20.25m^2}$

5	2025
5	405
3	81
3	27
3	9
3	3
	1

$S = \sqrt{\frac{2025}{100}\ m^2}$

$S = \frac{\sqrt{2025}}{\sqrt{100}}\ m$

2	100
2	50
5	25
5	5
	1

$S = \frac{\sqrt{(5 \times 5) \times (3 \times 3) \times (3 \times 3)}}{\sqrt{(2 \times 2) \times (5 \times 5)}}\ m$

$S = \frac{5 \times 3 \times 3}{2 \times 5}$

$S = \frac{45}{10}\ m$

$\underline{S = 4.5m}$

Approach III

$Area = \frac{1}{2}\ bh \times 2$

$\frac{1}{2}\ bh \times 2 = Area$

$\frac{1}{\cancel{2}_1} \times S \times S \times \cancel{2}^1 = 20.25m^2$

$S^2 = 20.25m^2$

$\sqrt{S^2} = \sqrt{\frac{2025}{100}\ m^2}$

$S = \frac{\sqrt{2025}}{\sqrt{100}}\ m^2$

5	2025
5	405
3	81
3	27
3	9
3	3
	1

2	100
2	50
5	25
5	5
	1

$S = \frac{\sqrt{(5 \times 5) \times (3 \times 3) \times (3 \times 3)}}{\sqrt{(2 \times 2) \times (5 \times 5)}}\ m$

$S = \frac{5 \times 3 \times 3}{2 \times 5}$

$S = \frac{45}{10}\ m$

$\underline{S = 4.5m}$

EXAMPLE 4

Find the length of the side of a square whose area is y^2 cm^2 OR $(ycm)^2$

Approach I

Area = S x S

S x S = Area

$S^2 = y^2$ cm^2

$\sqrt{S^2} = \sqrt{y^2 \text{ cm}^2}$

S = y cm.

Approach II

$S = \sqrt{\text{Area}}$

$S = \sqrt{y^2 \text{ cm}^2}$

$S = \sqrt{y \times y \text{ cm} \times \text{cm}}$

S = y cm

Approach III

$\text{Area} = \frac{1}{2}$ bh x 2

$\frac{1}{2}$ bh x 2 = Area

$\frac{1}{2} \times S \times S \times \cancel{2}^{1} = y^2$ cm^2

$\cancel{2}_{1}$

$S^2 = y^2$ cm^2

$\sqrt{S^2} = \sqrt{y^2 \text{ cm}^2}$

$S = \sqrt{(y \times y)(\text{cm} \times \text{cm})}$

S = y cm

TASK 37

Find the length of the side of a square whose area is;

1. 25cm^2

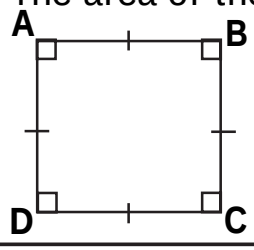
2. 36m^2

3. $10\frac{9}{16}\text{m}^2$

4. 64dm^2

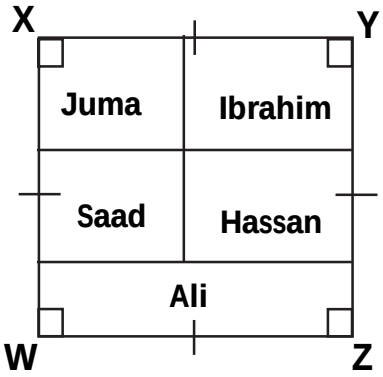
5.	$6.25cm^2$	6.	$1.44m^2$

7. The area of the square below is $6\frac{1}{4}cm^2$. Find the length $\overline{AB}$.



8. Given that **twice** the area of a square garden is **5,000m²**. Find the side length of this garden.

9. The figure below shows a family square plot of land which Wanzu Awali gave to his **5 sons** in rectangular plots as follow;
Juma got **2,401m²**, Ibrahim got **2,499m²**, Saad got **1,470m²**, Hassan got **1,530m²** and finally Ali got **2,100m²** . Find the length **WX**.

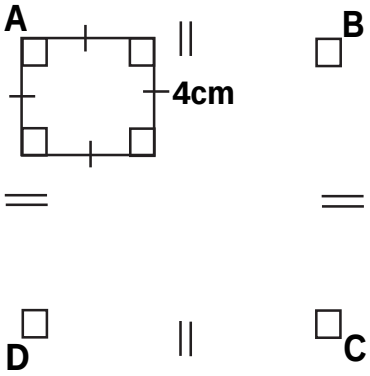


b) If by the time Wanzu gave the above land to his sons, the cost of each square metre was shs. 1,000, how much money;

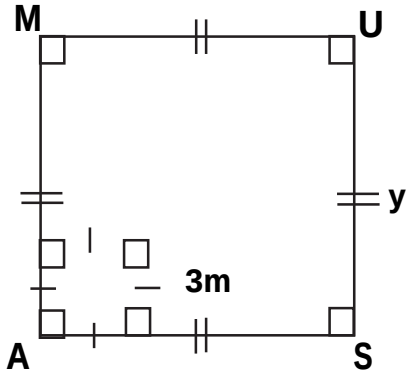
i) Would Wanzu have got had he just sold the above plot of land?

ii) Would Ibrahim and Ali have paid for their pieces of land altogether had their father sold the land to them?

10. The figure **ABCD** below is a square. If the area of the shaded part is **3 times** the unshaded area, find the the length $\overline{\mathbf{BC}}$.



11. The figure **MUSA** below is a square. Given that **four times** the area of the shaded part is equal to aquater the area of the whole figure, find the value of **y**.



PERIMETER OF A SQUARE

What is perimeter?

⇒ Perimeter is the distance around a given figure. Therefore, perimeter of a square is the distance around a square.

☞ **Finding the perimeter of the square**

Procedure / steps taken

➔ State the formular for finding the perimeter of a square

i.e S + S + S + S OR 4S, where "S" is the side

➔ Substitute the side length correctly.

➔ Compute accurately and the sum for (S + S + S + S) OR the product for (4S) is the perimeter.

OR

➔ When given the area, we state the formular for finding the perimeter of a square as "P = $\sqrt{\text{Area}}$ x 4" where "P" is perimeter and "S" is side.

➔ Substitute the side length correctly.

➔ Compute accurately and the sum for (S + S + S + S) OR the product for (4S) is the perimeter.

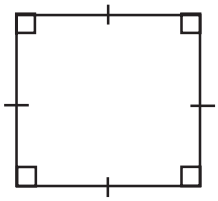
OR

➔ When given the area, we use the formular for finding the area of a square to obtain the length of each side.

➔ Then we use the length of each side to find the perimeter.

EXAMPLE 1

Find the perimeter of the square below.



Approach 1

P = S + S + S + S

P = 4cm + 4cm + 4cm + 4cm

P = 8cm + 8cm

P = 16cm

Approach 11

P = 4 S

P = 4 x 4cm

P = 16cm

EXAMPLE 2

Find the perimeter of a square whose area is $36cm^2$.

Approach 1

P = $\sqrt{Area}$ x 4

P = $\sqrt{36cm^2}$ x 4

2	36
2	18
3	9
3	3
	1

$\sqrt{(2 \times 2) \times (3 \times 3)}$

= 2 x 3

= 6

P = 6cm x 4

P = 24cm

Approach 11

S x S = Area

$S^2 = 36cm^2$

$\sqrt{S^2} = \sqrt{36cm^2}$

S = 6cm

P = 4 S

P = 4 x 6cm

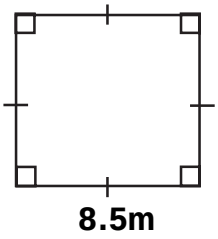
P = 24cm

EXAMPLE 3

A square garden has a side of 8.5m. Find the distance around this garden.

Approach I

Sketch



$P = S + S + S + S$

$P = 8.5m + 8.5m + 8.5m + 8.5m$

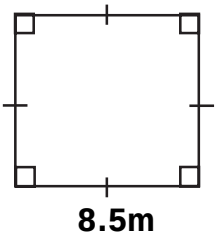
$P = 17.0m + 17.0m$

$$\begin{array}{r} 17.0m \\ +17.0m \\ \hline 34.0m \end{array}$$

$\therefore$ $P = 34.0m$ OR $34m$

Approach II

Sketch



$P = 4\,S$

$P = 4 \times 8.5m$

$P = 4 \times \frac{85}{10}\,m$

$$\begin{array}{r} 85 \\ \times\ 4 \\ \hline 340 \end{array}$$

$P = \frac{340}{10}\,m$

$P = 34m$

EXAMPLE 4

Find the perimeter of a square whose area is $\frac{4}{25}\,m^2$.

Approach I

$P = \sqrt{Area} \times 4$

$P = \sqrt{\frac{4}{25}\,m^2} \times 4$

$P = \frac{\sqrt{4}}{\sqrt{25}}\,m \times 4$

$P = \frac{2}{5}m \times 4$

$P = \frac{\overset{1}{\cancel{8}}}{\underset{1}{\cancel{5}}}\,m$ (1 rem. 3)

$P = 1\frac{3}{5}m$

Approach II

$S \times S = Area$

$S^2 = \frac{4}{25}\,m^2$

$\sqrt{S^2} = \sqrt{\frac{4}{25}\,m^2}$

$S = \frac{\sqrt{4}}{\sqrt{25}}\,m$

$S = \frac{2}{5}m$

$P = 4\,S$

$P = 4 \times \frac{2}{5}m$

$P = \frac{\overset{1}{\cancel{8}}}{\underset{1}{\cancel{5}}}\,m$ (1 rem. 3)

$P = 1\frac{3}{5}m$

Approach III

$S \times S = \text{Area}$

$S^2 = \frac{4}{25} m^2$

$\sqrt{S^2} = \sqrt{\frac{4}{25} m^2}$

$S = \frac{\sqrt{4}}{\sqrt{25}} m$

$S = \frac{2}{5} m$

$P = S + S + S + S$

$P = \frac{2}{5} + \frac{2}{5} + \frac{2}{5} + \frac{2}{5} m$

$P = \frac{2 + 2 + 2 + 2}{5} m$

1 rem. 3

$P = \frac{8}{5} m$

$P = 1\frac{3}{5} m$

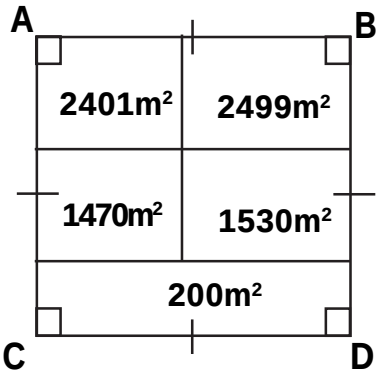
TASK 38

Find the perimeter of a square whose side is;

1.	7cm	2.	10m
3.	3cm	4.	0.5m
5.	6.3cm	6.	$\frac{4}{7}$ m

7.	$3\frac{1}{2}$cm		
	Find the perimeter of a square whose area is;		
8.	$9cm^2$	9.	$25cm^2$
10.	$64cm^2$	11.	$\frac{4}{9}$ m^2
12.	$2\frac{46}{49}$ dm^2		

13. A square plot of land was divided into rectangular portions as shown below.



Find the distance around the plot.

Finding the area of a square given the perimeter

Procedure / steps taken

➔ State the formula for finding the area of a square using perimeter as "Area = $\left(\frac{P}{4}\right)^2$ Or Area = $\frac{1}{16}P^2$ Or Area = $\frac{P^2}{16}$, where "P" is the perimeter, and "S" is the side.

➔ Substitute in the perimeter correctly.

➔ Compute accurately and the result obtained is the answer (area).

OR

➔ Use the perimeter to find the length of each side.
Then use the side length to find the area.

EXAMPLE 1

Find the area of a square whose perimeter is 28cm.

Approach I

Area = $\left(\frac{P}{4}\right)^2$

Area = $\left(\frac{\overset{7}{\cancel{28}}cm}{\underset{1}{\cancel{4}}}\right)^2$

Area = 7cm x 7cm

Area = $49cm^2$

Approach II

4 S = P (where "S" stands for sides and "P" perimeter)

4 S = 28cm

$\frac{\overset{1}{\cancel{4}}S}{\underset{1}{\cancel{4}}} = \frac{\overset{7}{\cancel{28}}cm}{\underset{1}{\cancel{4}}}$

S = 7cm

Area = S x S

Area = 7cm x 7cm

Area = $49cm^2$

Approach III

Area = $\frac{1}{16}P^2$

Area = $\frac{1}{16}$ x 28cm x 28cm

Area = $\frac{1}{\cancel{16}_{\cancel{4}_{1}}}$ x $\cancel{28}^{7}$cm x $\cancel{28}^{7}$cm

Area = 7cm² x 7cm²

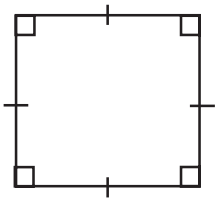
Area = 49cm²

TASK 39

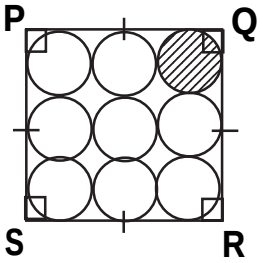
Find the area of a square whose perimeter is;

1.	8cm	2.	12cm
3.	20cm	4.	120dm
5.	40dm	6.	48m

7. Madrine ran around the figure below **four times** and covered a distance of **96m**. Find the area of the figure below.



8. **Use the figure below to answer the questions that follow**.



If the circumference of the shaded part is **44cm**.

(a) Find the length **QR**.

b) Find the perimeter of the square **PQRS**.

Finding the value of the unknown side of the square given unknown values.

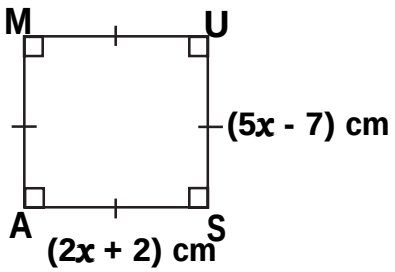
Procedure / steps taken

- Equate the two given side of the given square NB it is advisable to begin with the side of the larger unknown.
- Open the brackets if any.
- Collect like terms correctly.
- Compute accurately and the value of the unknown is the answer.

EXAMPLE 1

Below is a square MUSA, use it to answer the questions that follow it.

Find the value of x.



Approach I

Since a square has all the sides equal, we equate the two sides.

Side = Side

$(5x - 7)cm = (2x + 2)cm$

$\frac{(5x - 7)\cancel{cm}^{1}}{\cancel{cm}_{1}} = \frac{(2x + 2)\cancel{cm}^{1}}{\cancel{cm}_{1}}$

$-\quad +$

$5x - 7 = 2x + 2$

$5x - 2x - 7 + 7 = 2 + 7$

$\frac{\cancel{3}^{1}x}{\cancel{3}_{1}} = \frac{\cancel{9}^{3}}{\cancel{3}_{1}}$

$x = 3$

Approach II

Side = Side

$(5x - 7)cm = (2x + 2)cm$

$5xcm - 7cm = 2xcm + 2cm$

$5xcm - 2xcm - 7cm + 7cm = 2cm + 7cm$

$\frac{\cancel{3}^{1}xcm}{\cancel{3}_{1}} = \frac{\cancel{9}^{3}cm}{\cancel{3}_{1}}$

$\frac{x\cancel{cm}^{1}}{\cancel{cm}_{1}} = \frac{\cancel{3cm}^{1}}{\cancel{cm}_{1}}$

$x = 3$

Approach III

Side = Side

$(2x + 2)cm = (5x - 7)cm$

$\frac{(2x + 2)\cancel{cm}^{1}}{\cancel{cm}_{1}} = \frac{(5x - 7)\cancel{cm}^{1}}{\cancel{cm}_{1}}$

$2x + 2 = 5x - 7$

$2x - 5x + 2 - 2 = -7 - 2$

$-3x = -9$

$\frac{\cancel{-3}^{1}x}{\cancel{-3}_{1}} = \frac{\cancel{-9}^{3}}{\cancel{-3}_{1}}$

$x = 3$

Approach IV

Side = Side

$(2x + 2)\text{cm} = (5x - 7)\text{cm}$

$\frac{(2x + 2)\text{cm}}{\text{cm}} = \frac{(5x - 7)\text{cm}}{\text{cm}}$

$2x + 2 = 5x - 7$

$2x - 2x + 2 + 7 = 5x - 2x$

$9 = 3x$

$\frac{9}{3} = \frac{3x}{3}$

$\therefore \quad x = 3$

b) Find the length of each side.

Approach I

Length of each side $= (2x + 2)\text{cm}$

$= (2 \times 3 + 2)\text{cm}$

$= (6 + 2)\text{cm}$

$= 8\text{cm}$

Approach II

Length of each side $= (5x - 7)\text{cm}$

$= (5 \times 3 - 7)\text{cm}$

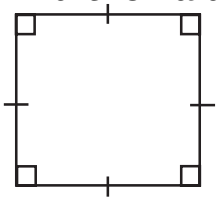
$= (15 - 7)\text{cm}$

$= 8\text{cm}$

EXAMPLE 2

Below is a square, use it to answer questions that follow.

Find the value of x.



Approach I

Side = Side

$(3.5x - 26)\text{dm} = (0.4x + 5)\text{dm}$

$\frac{(3.5x - 26)\text{dm}}{\text{dm}} = \frac{(0.4x + 5)\text{dm}}{\text{dm}}$

$3.5x - 26 = 0.4x + 5$

$3.5x - 0.4x - 26 + 26 = 5 + 26$

$\begin{array}{r} 3.5 \\ -\ 0.4 \\ \hline 3.1 \end{array}$

$3.1x = 31$

$\frac{3.1x}{3.1} = \frac{31}{3.1}$

$x = \frac{31}{3.1} \times 10$

3.1×10

$x = \frac{310}{31}$

$x = 10$

Approach II

Side = Side

$(3.5x - 26)dm = (0.4x + 5)dm$

$\frac{(3.5x - 26)\cancel{dm}^{1}}{\cancel{dm}_{1}} = \frac{(0.4x + 5)\cancel{dm}^{1}}{\cancel{dm}_{1}}$

$3.5x - 26 = 0.4x + 5$

$3.5x - 0.4x - 26 + 26 = 5 + 26$

3.5
- 0.4
3.1

$3.5x - 0.4x - 26 + 26 = 5 + 26$

$\frac{\cancel{3.1}^{1}x}{\cancel{3.1}_{1}} = \frac{31}{3.1}$

$x = 31 \div 3.1$

$x = 31 \div \frac{31}{10}$

$x = \cancel{31}^{1} \times \frac{10}{\cancel{31}_{1}}$

$x = 10$

Approach III

Side = Side

$(3.5x - 26)dm = (0.4x + 5)dm$

$\frac{(3.5x - 26)\cancel{dm}^{1}}{\cancel{dm}_{1}} = \frac{(0.4x + 5)\cancel{dm}^{1}}{\cancel{dm}_{1}}$

$3.5x - 26 = 0.4x + 5$

$\frac{35}{10}x - 26 = \frac{4}{10}x + 5$

$\frac{35}{10}x - \frac{4}{10}x - 26 + 26 = 5 + 26$

$\frac{35x - 4x}{10} = 31$

$\cancel{10}^{1} \times \frac{31x}{\cancel{10}_{1}} = 31 \times 10$

$\frac{\cancel{31}^{1}x}{\cancel{31}_{1}} = \frac{\cancel{310}^{10}}{\cancel{31}_{1}}$

$x = 10$

Approach IV

Side = Side

$(3.5x - 26)dm = (0.4x + 5)dm$

$\frac{(3.5x - 26)\cancel{dm}^{1}}{\cancel{dm}_{1}} = \frac{(0.4x + 5)\cancel{dm}^{1}}{\cancel{dm}_{1}}$

$3.5x - 26 = 0.4x + 5$

$\frac{35}{10}x - 26 = \frac{4}{10}x + 5$

$\cancel{10}^{1} \times \frac{35x}{\cancel{10}_{1}} - 26 \times 10 = \cancel{10}^{1} \times \frac{4x}{\cancel{10}_{1}} + 5 \times 10$

$35x - 260 = 4x + 50$

$35x - 4x - 260 + 260 = 50 + 260$

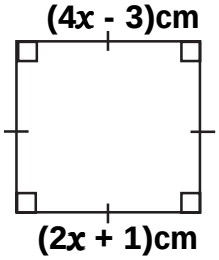
$31x = 310$

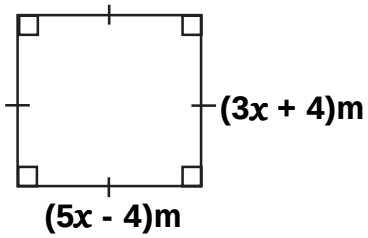
$\frac{\cancel{31}^{1}x}{\cancel{31}_{1}} = \frac{\cancel{310}^{10}}{\cancel{31}_{1}}$

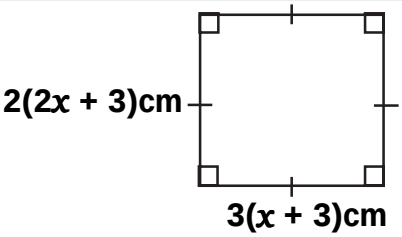
$x = 10$

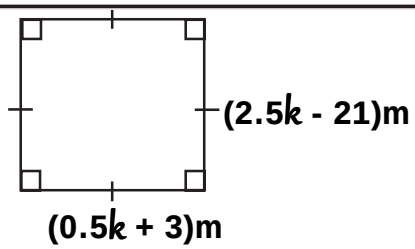
TASK 40

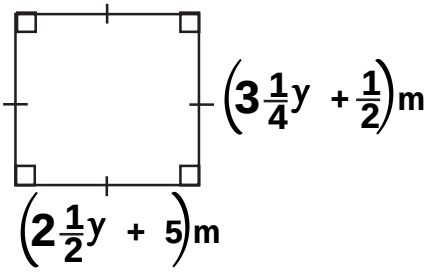
Find the value of the unknown letters and the actual length of each side in the following squares.

1. 

2. 

3. 

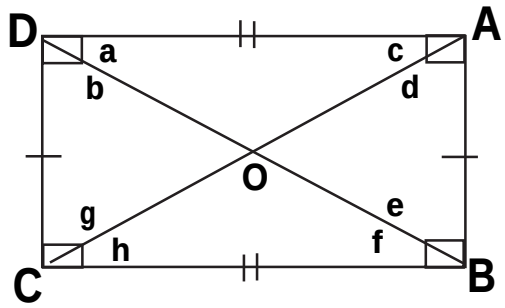
4. 

5. 

THE RECTANGLE

⇒ A rectangle is a parallelogram with two pairs of equal and parallel opposite (facing) sides and four right angles.

Illustration of a rectangle



Properties of a rectangle in relation to the above figure

- ❖ It has two pairs of parallel sides i.e AB ||DC and AD || BC.
- ❖ The opposite (facing) sides are equal i.e $\overline{AB} = \overline{DC}$ and $\overline{AD} = \overline{BC}$.
- ❖ It has 4 interior angles which are right angles (90^0) each i.e ∠A or , ∠DAB = 90^0, ∠B or ∠ABC = 90^0, ∠C or ∠BCD = 90^0 and ∠D or ∠ADC = 90^0 hence ∠A = ∠B = ∠C = ∠D = 90^0.
- ❖ Its diagonals are equal i.e diagonal AC = diagonal BD.
- ❖ The diagonal bisect each other i.e AO = OC and DO = OB.
- ❖ Its two interior angles on the same side (its two consecutive angles) are co-interior angles and therefore, supplementary (add up to 180^0) or The two same-side interior angles supplement each other i.e ∠A + ∠D = 180^0, ∠A + ∠B = 180^0, ∠B + ∠C = 180^0 and ∠C + ∠D = 180^0.
- ❖ The opposite angles are equal i.e ∠A = ∠C and ∠D = ∠B.
- ❖ Its diagonals divide each interior angle into different (unequal) angle unlike the square and the rhombus where the diagonal bisect the interior angles.
- ❖ Its diagonals bisect each other at oblique angles (not at right angles) like for a square and a rhombus.
- ❖ Its centre angles (angles formed at the intersecting point of the two diagonals) add up to 360^0.
- ❖ It has two lines of folding symmetry.

Area of a rectangle.

Area of a rectangle is the area occupied by a rectangle in square units.

Procedure / steps taken

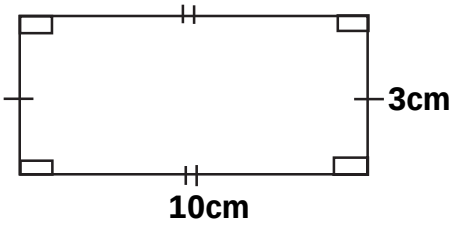
- State the formula for finding the area of a rectangle given the length and the width i.e **Area = L x W.**
- Substitute in correctly.
- Compute accurately and the final value obtained is the answer (area).

OR

- Divide the rectangle into two right angled triangles by drawing one of its diagonals.
- State the formula for finding the area a rectangle using the two right angled triangles. i.e **Area = $\frac{1}{}$ bh x 2.**
- Substitute in correctly. ^{2}
- Compute accurately and the final value obtained is the answer (area).

EXAMPLE 1

Find the area of the figure below.



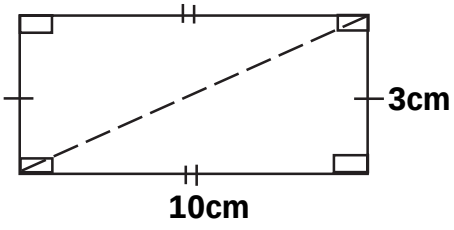
Approach I

Area = L x W

Area = 10cm x 3cm

Area = $30cm^2$

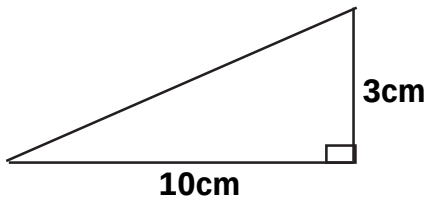
Approach II



Area = $\frac{1}{2}$ bh x 2

Area = $\frac{1}{\cancel{2}_{1}}$ x 10cm x 3cm x $\cancel{2}^{1}$

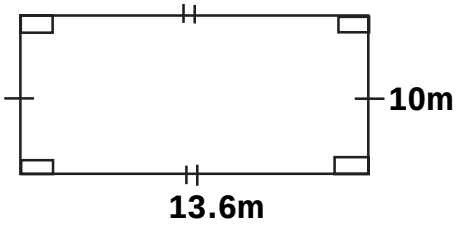
Area = 10cm x 3cm



Area = $30cm^2$

EXAMPLE 2

Find the area of the rectangle below.



Approach I

Area = L x W

Area = 13.6m x 10m

Area = 13.6m x 10m

Area = 136m²

Approach II

Area = L x W

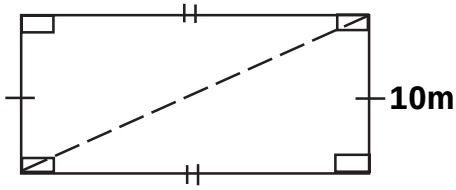
Area = 13.6m x 10m

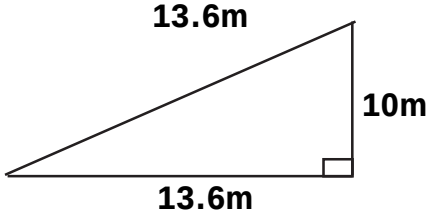
Area = 13.6m x 10m

Area = $\frac{136}{10}$m x $\frac{10}{1}$m

Area = 136m²

Approach III





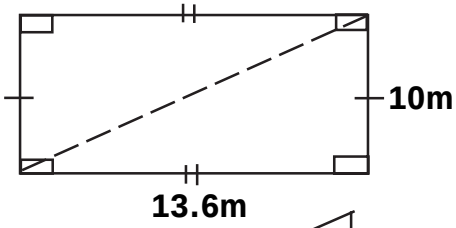
Area = $\frac{1}{2}$ bh x 2

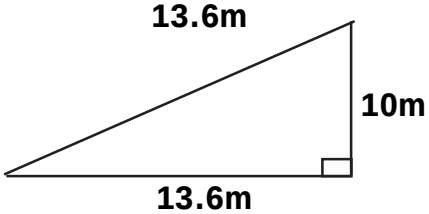
Area = $\frac{1}{\cancel{2}}$ x 13.6m x 10m x $\frac{1}{\cancel{2}}$

Area = 13.6m x 10m

Area = 136m²

Approach IV





Area = $\frac{1}{2}$ x b x h x 2

Area = $\frac{1}{\cancel{2}}$ x 13.6m x 10m x $\frac{1}{\cancel{2}}$

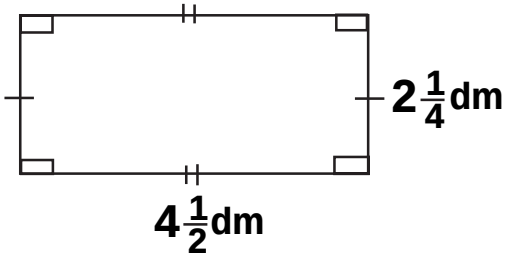
Area = 13.6m x 10m

Area = $\frac{136}{\cancel{10}}$m x $\frac{1}{\cancel{10}}$m

Area = 136m²

EXAMPLE 3

Find the area of the given figure below.



Approach I

Area = L x W

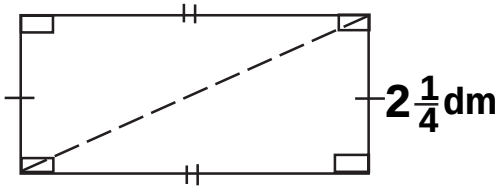
Area = $4\frac{1}{2}$dm x $2\frac{1}{4}$dm

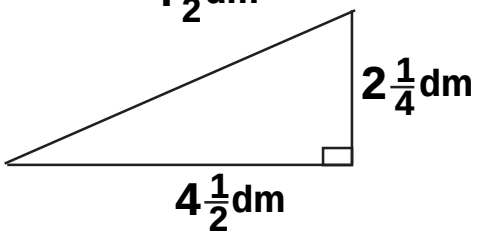
Area = $\frac{9}{2}$dm x $\frac{9}{4}$dm

Area = $\frac{\overset{10 \text{ rem. } 1}{\cancel{81}}}{8}$dm²

Area = $10\frac{1}{8}$dm²

Approach II





Area = $\frac{1}{2}$ x b x h x 2

Area = $\frac{1}{2}$ x $4\frac{1}{2}$dm x $2\frac{1}{4}$dm x 2

Area = $\frac{1}{\cancel{2}_{1}}$ x $\frac{9}{2}$dm x $\frac{9}{4}$dm x $\frac{\cancel{2}^{1}}{1}$

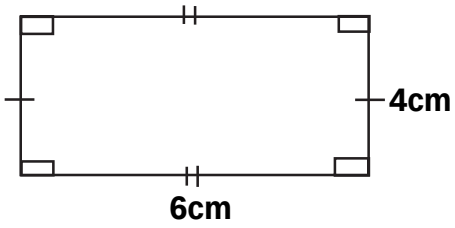
Area = $\frac{\overset{10 \text{ rem. } 1}{\cancel{81}}}{\underset{1}{\cancel{8}}}$dm²

Area = $10\frac{1}{8}$dm²

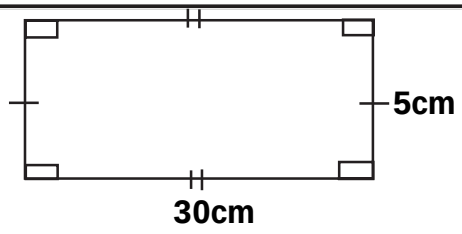
TASK 41

Find the area of the given figures;

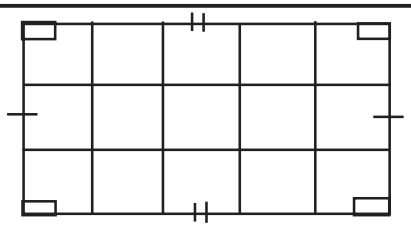
1.



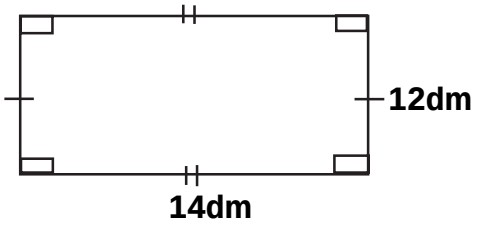
2.



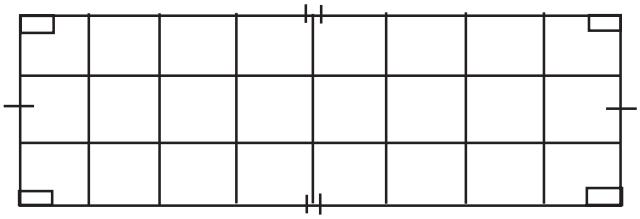
3.



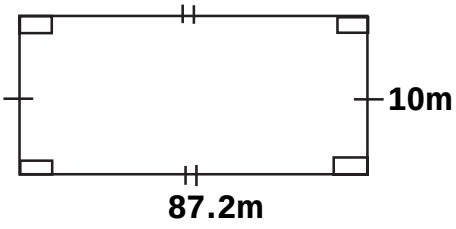
4.



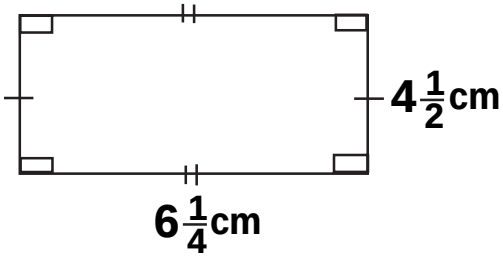
5. Find the area of the figure below if the length of each small square is **3cm**.

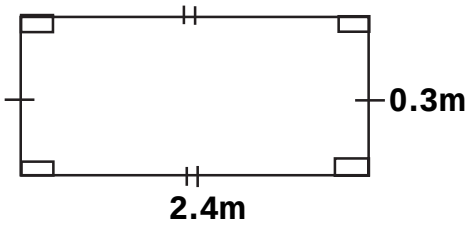


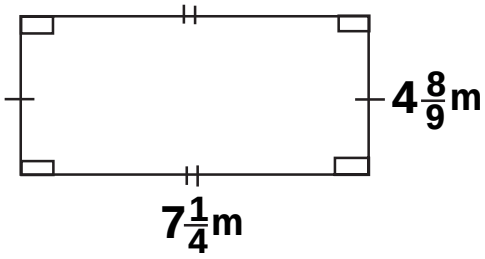
6.



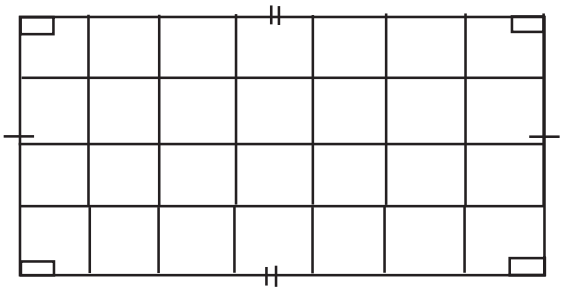
7.



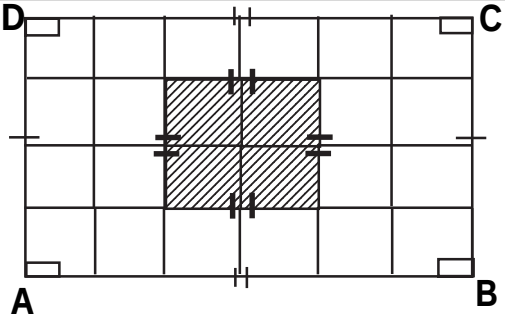
8. 

9. 

10. Find the area of the figure below if the area of each small square is **4cm²**.



11. The area of the shaded part is **100cm²**.



(a) Given that all squares are equal, find the sum of the length **AB** and length **BC**.

b) Find the area of the rectangle **ABCD** above.

Finding the unknown side of a rectangle given the area.

Procedure / steps taken

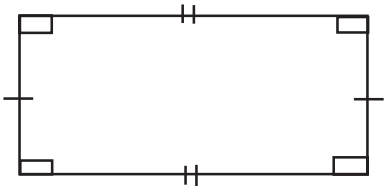
- State the formular for finding area of a rectangle i.e Area = L x W.
- You may interchange the formular from Area = L x W to L x W = Area.
- Substitute in correctly.
- Compute accurately and the value of the unknown is the answer.

OR

- State the formular for finding the unknown i.e if it is the length, you state Length (L) = $\frac{A}{W}$ and if it is the width, you state Width (W) = $\frac{A}{L}$.

EXAMPLE 1

Find the length of the rectangle below if its area is 120cm².



Approach I

Area = L x W

L x W = Area

L x 10cm = 120cm²

$$\frac{L \times \cancel{10cm}^{1}}{\cancel{10cm}_{1}} = \frac{\cancel{120} \times \cancel{cm}^{1}}{\cancel{10}\cancel{cm}_{1}}$$

L = 12cm

Approach II

$$\text{Length} = \frac{\text{Area}}{W}$$

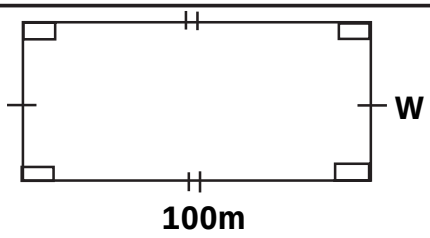
$$\text{Length} = \frac{120cm^2}{10cm}$$

$$\text{Length} = \frac{\cancel{120}cm \times \cancel{cm}^{1}}{\cancel{10}\cancel{cm}_{1}}$$

Length = 12cm

EXAMPLE 2

The area of the rectangular garden below is $756m^2$. Find its width if its length is 100m.



Approach I

L x W = Area

$100m \times w = 756m^2$

$$\frac{\cancel{100m} \times w}{\cancel{100m}} = \frac{756m \times \cancel{m}}{100\cancel{m}}$$

$w = 7.56m$

Approach II

$$\text{Width} = \frac{\text{Area}}{\text{L}}$$

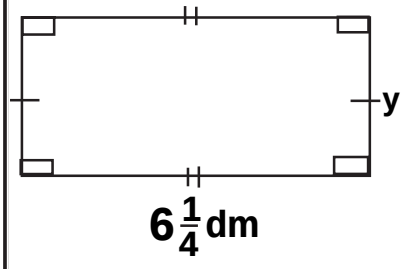
$$\text{Width} = \frac{756m^2}{100m}$$

$$\text{Width} = \frac{756m \times \cancel{m}}{100\cancel{m}}$$

$\text{Width} = 7.56m$

EXAMPLE 3

The area of the figure below is $28\frac{1}{8}dm^2$. Find the value of y.



Approach I

Area = L x W

L x W = Area

$6\frac{1}{4}dm \times y = 28\frac{1}{8}dm^2$

$$\frac{25dm}{4} \times y = \frac{225dm^2}{8}$$

$$\cancel{8}^{2} \times \frac{25dm}{\cancel{4}_{1}} \times y = \frac{225dm^2}{\cancel{8}_{1}} \times \frac{1}{\cancel{8}}$$

$50dm \times y = 225dm^2$

$$\frac{\cancel{50dm} \times y}{\cancel{50dm}} = \frac{\overset{45}{\cancel{225dm}} \times \overset{1}{dm}}{\cancel{50dm}_{10}}$$

$$y = \frac{\cancel{45}^{\cancel{9}\ 4\text{ rem. }1}dm}{\cancel{10}_{2}}$$

$y = 4\frac{1}{2}dm$

Approach II

L x W = Area

$6\frac{1}{4}dm \times y = 28\frac{1}{8}dm^2$

$\frac{25dm}{4} \times y = \frac{225dm^2}{8}$

$25dm \times y \times 8 = 225dm^2 \times 4$

$\frac{\overset{1}{\cancel{25dm}} \times y \times \overset{1}{\cancel{8}}}{\underset{1}{\cancel{25dm}} \times \underset{1}{\cancel{8}}} = \frac{\overset{9}{\cancel{225}}dm \times \overset{1}{\cancel{4}}}{\underset{1}{\cancel{25dm}} \times \underset{2}{\cancel{8}}}$

$y = \frac{9dm^2}{2dm}$

$y = \frac{\overset{4 \text{ rem. } 1}{\cancel{9}}dm \times \overset{1}{\cancel{dm}}}{\underset{1}{\cancel{2}}\underset{1}{\cancel{dm}}}$

$y = 4\frac{1}{2}dm$

Approach III

L x W = Area

$6\frac{1}{4}dm \times y = 28\frac{1}{8}dm^2$

$\frac{\overset{1}{\cancel{6\frac{1}{4}dm}} \times y}{\underset{1}{\cancel{6\frac{1}{4}dm}}} = \frac{28\frac{1}{8}dm \times \overset{1}{\cancel{dm}}}{6\frac{1}{4}\underset{1}{\cancel{dm}}}$

$y = 28\frac{1}{8}dm \div 6\frac{1}{4}$

$y = \frac{225}{8}dm \div \frac{25}{4}$

$y = \frac{\overset{9}{\cancel{225}}}{\underset{2}{\cancel{8}}}dm \times \frac{\overset{1}{\cancel{4}}}{\underset{1}{\cancel{25}}}$

$y = \frac{\overset{4 \text{ rem. } 1}{\cancel{9}}}{\underset{1}{\cancel{2}}}dm$

$y = 4\frac{1}{2}dm$

Approach IV

$\text{Width} = \frac{\text{Area}}{\text{Length}}$

$y = \frac{28\frac{1}{8}dm^2}{6\frac{1}{4}dm}$

$y = \frac{28\frac{1}{8}dm \times \overset{1}{\cancel{dm}}}{6\frac{1}{4}\underset{1}{\cancel{dm}}}$

$y = 28\frac{1}{8}dm \div 6\frac{1}{4}dm$

$y = \frac{225}{8}dm \div \frac{25}{4}$

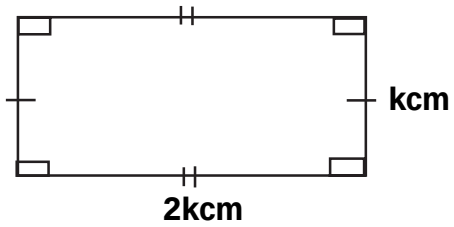
$y = \frac{\overset{9}{\cancel{225}}}{\underset{2}{\cancel{8}}}dm \times \frac{\overset{1}{\cancel{4}}}{\underset{1}{25}}$

$y = \frac{\overset{4 \text{ rem. } 1}{\cancel{9}}}{\underset{1}{\cancel{2}}}dm$

$y = 4\frac{1}{2}dm$

EXAMPLE 4

The area of the figure below is $98cm^2$.



a) Find the value of y.

Area = L x W

2kcm x kcm = $98cm^2$

$$\frac{\overset{1}{\cancel{2}}kcm \times kcm}{\underset{1}{\cancel{2}}} = \frac{\overset{49}{\cancel{98}}cm \times cm}{\underset{1}{\cancel{2}}}$$

$$\frac{k^2\overset{1}{\cancel{cm^2}}}{\underset{1}{\cancel{cm^2}}} = \frac{49\overset{1}{\cancel{cm^2}}}{\underset{1}{\cancel{cm^2}}}$$

$$k^2 = 49$$

$$\sqrt{k^2} = \sqrt{49}$$

$$k = 7$$

b) Find the actual;

i) Length

Actual length

= 2k cm
= (2 x k)cm
= (2 x 7)cm
= 14cm

ii) Width

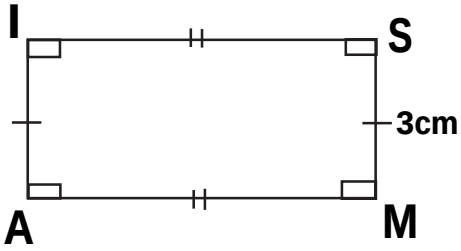
Actual Width

= k cm
= 7cm

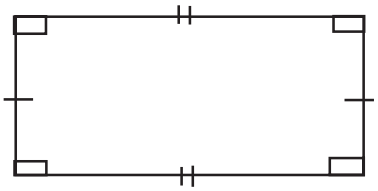
TASK 42

Work out the following;

1. The area of the rectangle **ISMA** below is **$24cm^2$**. Find its **length**.

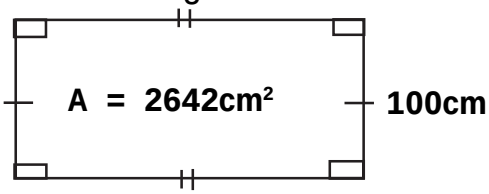


2. Find the **width** of the rectangle below if its **area is 150cm²** and **length 15cm**.

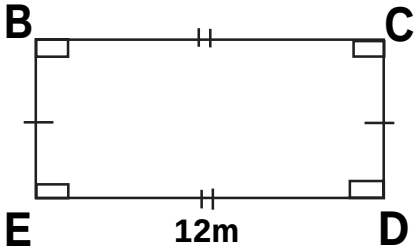


3. The **area** of a rectangle is **12cm²**. If its **width is 3cm**, find its length.

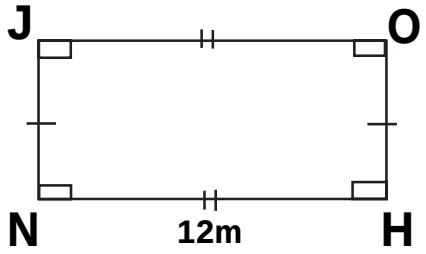
4. Given that the **area** of the rectangle below is **2542cm²**.Find the **length** of the rectangle.



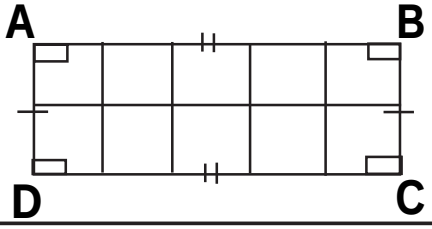
5. Madrine measured the area of the rectangular plot of land below **three times** and got the same results each time. If he recorded a total area of **216m²** for the **three times**, find the length **CD**.



6. If $\frac{1}{4}$ of the area of the rectangle **JOHN** below is **15cm²**. Find the length **NH**.



7. The diagram below shows a rectangular plot of land divided into **10 square** plots of **16m²** each.



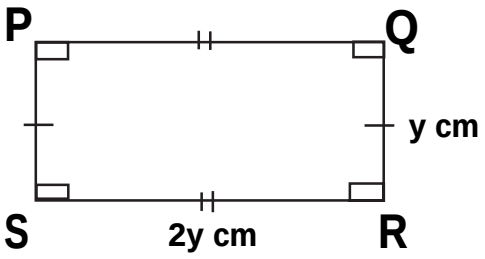
a) Find the length;

(i) **DC**

(ii) **BC**

b) Find the area of the rectangular plot above.

8. The area of the figure below is **32cm²**.



a) find the value of **y**.

b) Express the length **QR** as a fraction of the length **RS**.

9. A rectangle has a length of **5n metre** and a width of **n metres**. If it has an area of **45m²**. Find the value of **n**.

Perimeter of the rectangle.

⇒ Perimeter of a rectangle is the distance around a given rectangle.

Finding the perimeter of a rectangle given the length and the width.

Procedure / steps taken

➔ State the formular for finding the perimeter of a rectangle given the length and the width i.e **P = L + W + L + W OR P = 2(L + W) OR**

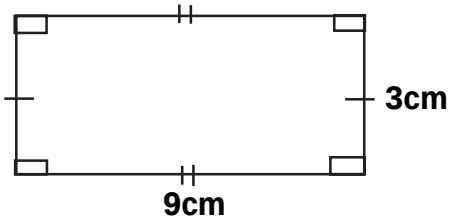
P = Sum of all sides.

➔ Substitute in correctly.

➔ Compute accurately and the final value is the answer (perimeter).

EXAMPLE

Find the perimeter of the rectangle below.



Approach I

P = L + W + L + W

P = 9cm + 3cm + 9cm + 3cm

P = 12cm + 12cm

P = 24cm

Approach II

P = 2 L + 2W

P = (2 x L) + (2 x W)

P = (2 x 9cm) + (2 x 3cm)

P = 18cm + 6cm

P = 24cm

Approach III

P = 2 (L + W)

P = 2 (9cm + 3cm)

P = 2 (12cm)

P = 2 x 12cm

P = 24cm

Approach IV

P = Sum of all sides

P = 9cm + 3cm + 9cm + 3cm

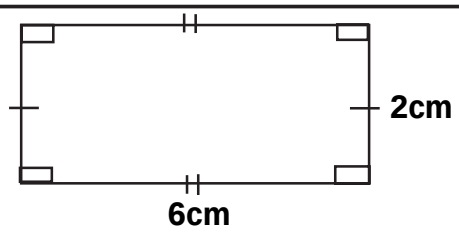
P = 12cm + 12cm

P = 24cm

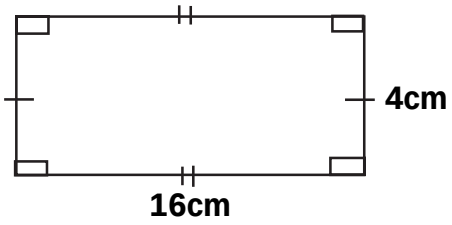
TASK 43

Find the perimeter of the following rectangles.

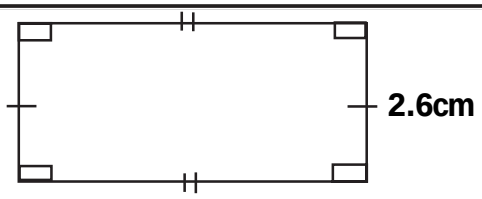
1.



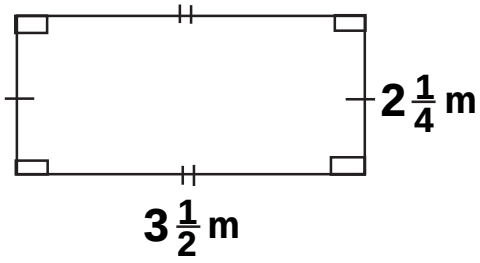
2.



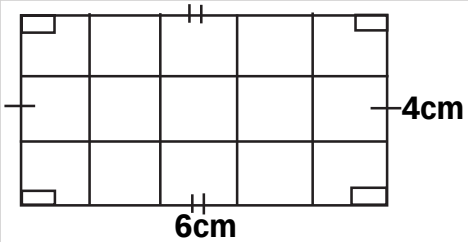
3.



4.



5.



Finding the unknown letters and sides of a rectangle given the perimeter.

Procedure / steps taken

➔ State the formular for finding the perimeter of a rectangle i.e

P = L + W + L + W OR P = 2L + 2W OR P = 2(L + W)

OR P = Sum of all sides. You may interchange the formular

i.e from P = L + W + L + W to L + W + L + W = P, etc.

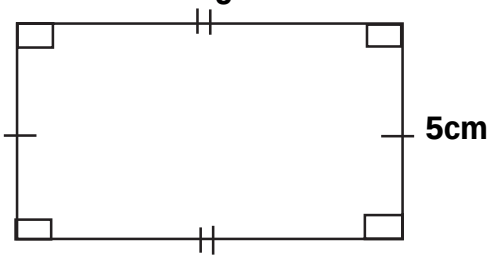
➔ Substitute in correctly.

➔ Compute accurately to obtain the final value or answer.

EXAMPLE 1

The perimeter of the rectangle below is 34cm. If its width is 5cm.

Find its length.



Approach I

P = L + W + L + W

L + W + L + W = Area

L + L + 5cm + 5cm = 34cm

2L + 10cm = 34cm

2L + 10cm - 10cm = 34cm - 10cm

2L = 24cm

$\frac{\cancel{2}^{1}L}{\cancel{2}_{1}} = \frac{\cancel{24}^{12}cm}{\cancel{2}_{1}}$

L = 12cm

Approach II

P = 2 L + 2W

2L + 2W = P

2L + (2 x 5cm) = 34cm

2L + 10cm = 34cm

2L + 10cm - 10cm = 34cm - 10cm

2L = 24cm

$\frac{\cancel{2}^{1}L}{\cancel{2}_{1}} = \frac{\cancel{24}^{12}cm}{\cancel{2}_{1}}$

L = 12cm

Approach III

$2\ (L + W) = P$

x
x

$2\ (L + 5cm) = 34cm$

$(2 \times L) + (2 \times 5cm) = 34cm$

$2L + 10cm = 34cm$

$2L + 10cm - 10cm = 34cm - 10cm$

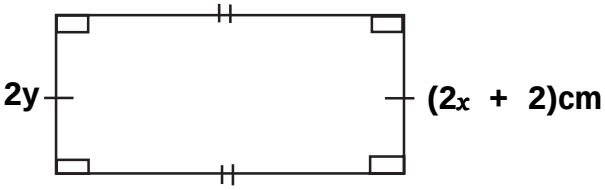
$2L = 24cm$

$\frac{\overset{1}{\cancel{2}}L}{\underset{1}{\cancel{2}}} = \frac{\overset{12}{\cancel{24}}cm}{\underset{1}{\cancel{2}}}$

$L = 12cm$

EXAMPLE 2

Given that the perimeter of the rectangle below is 46cm, use it to answer the questions about it. (a) Find the value of x.



Approach 1

$L + W + L + W = P$

$(3x + 6)cm + (2x + 2)cm + (3x + 6)cm + (2x + 2)cm = 46cm$

$\frac{(3x + 6 + 2x + 2 + 3x + 6 + 2x + 2)\overset{1}{\cancel{cm}}}{\underset{1}{\cancel{cm}}} = \frac{\overset{1}{46}\cancel{cm}}{\underset{1}{\cancel{cm}}}$

$3x + 6 + 2x + 2 + 3x + 6 + 2x + 2 = 46$

$3x + 2x + 3x + 2x + 6 + 2 + 6 + 2 = 46$

$10x + 16 = 46$

$10x + 16 - 16 = 46 - 16$

$\frac{\overset{1}{\cancel{10}}x}{\underset{1}{\cancel{10}}} = \frac{30}{10}$

$x = 3$

Approach II

$2L + 2W = P$

$2(3x + 6)cm + 2(2x + 2)cm = 46cm$

$2(3x + 6)cm + 2(2x+2)cm = 46cm$

$\frac{(6x + 12 + 4x + 4)cm}{cm} = \frac{46cm}{cm}$

$6x + 4x + 12 + 4 = 46$

$10x + 16 = 46$

$10x + 16 - 16 = 46 - 16$

$10x = 30$

$\frac{10x}{10} = \frac{30}{10}$

$x = 3$

Approach III

$2(L + W) = P$

$2(3x + 6 + 2x + 2)cm = 46cm$

$\frac{2(3x + 6 + 2x + 2)cm}{cm} = \frac{46cm}{cm}$

$2(3x + 2x + 6 + 2) = 46$

$2(5x + 8) = 46$

$10x + 16 = 46$

$10x + 16 - 16 = 46 - 16$

$10x = 30$

$\frac{10x}{10} = \frac{30}{10}$

$x = 3$

b) Find the value of **y.**

Width = Width

$2y = (2x + 2)cm$

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

$2y = (6 + 2)cm$

$2y = 8cm$

$\frac{2y}{2} = \frac{8cm}{2}$

$y = 4cm$

c) Find the actual length.

Actual length $= (3x + 6)cm$

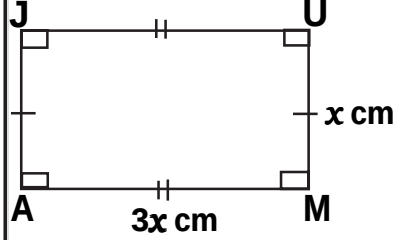
$= (3 \times 3 + 6)cm$

$= (9 + 6)cm$

$= 15cm$

TASK 44

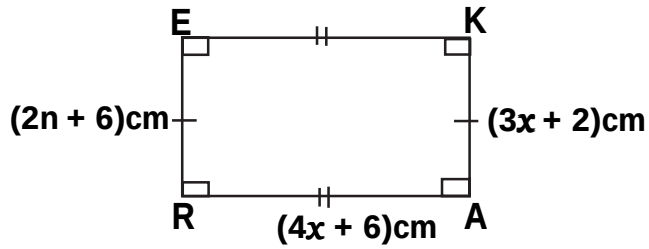
1. JUMA below is a rectangle whose perimeter is **16m**. Work out the following.



(a) Find the value of x.

b)	Find the actual length.	c)	Find the actual width.

2. Use the rectangle **RAKE** below whose perimeter is **100cm** to answer the questions about it.



a) Find the value of x.

b)	Find the length **RA**.	c)	Find the actual width.

d) Find the value of **n**.

e) Express **($\overline{RA}$ + $\overline{KA}$)** as a;

(i) fraction of the perimeter of the figure **RAKE**.

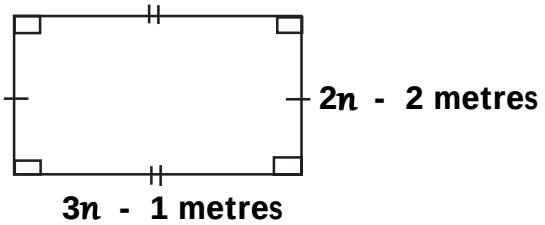
(ii) as a percentage of the perimeter of the **RAKE**.

(iii) as a ratio of the perimeter of **RAKE**.

f) Express the value of x as a fraction of the value of **n**.

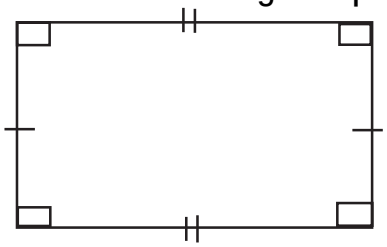
3. The perimeter of the rectangular garden below is **14m**.

a) Find the value of n.



b) Find the **area** of the above figure in **square centimetres**.

4. Use the rectangular plot of land below to answer question below.



a) If the perimeter of the figure above is **60m**, find the value of **k** and the length of the rectangular garden respectively.

5. The length and the width of a rectangle are $4x + 6$**cm** and $3x + 2$**cm** respectively. If the sum of the length and the width is **50cm**. Find the;

(i) Length of the rectangle

ii)	width of the rectangle	iii)	perimeter of a rectangle
iv)	twice the area of the rectangle.		

Finding the perimeter of a rectangle given the area and one of the sides.

Procedure / steps taken

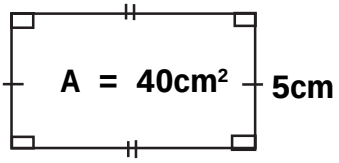
- ➔ Find the unknown dimension using the area.
- ➔ Since the length and the width are now known, state the formular for finding the perimeter of a rectangle using the length and the width

  i.e **P = L + W + L + W OR P = 2L + 2W OR P = 2(L + W)**

  OR **P = Sum of all sides.**
- ➔ Substitute in correctly.
- ➔ Compute accurately and the final result is the answer (perimeter).

EXAMPLE 1

Find the perimeter of the rectangle below whose area is 40cm and width 5cm.



Approach 1

L x W = Area

L x 5cm = 40cm²

$$\frac{L \times \cancel{5cm}^{1}}{\cancel{5cm}_{1}} = \frac{\cancel{40cm}^{8} \times \cancel{cm}^{1}}{\cancel{5cm}_{1}}$$

L = 8cm

P = L + W + L + W

P = 8cm + 5cm + 8cm + 5cm

P = 13cm + 13cm

P = 26cm

Other correct approachs are invited

Approach II

$P = 2W + \frac{2\ Area}{W}$

$P = (2 \times 5cm) + \frac{(2 \times 40cm^2)}{5cm}$

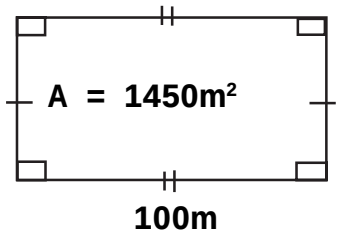
$P = 10cm + \frac{\overset{16}{\cancel{80}}cm \times \overset{1}{\cancel{5}}cm}{\underset{1}{\cancel{5}}cm}$

$P = 10cm + 16cm$

$P = 26cm$

EXAMPLE 2

The area of the figure below is $1450m^2$. Find its perimeter if its length is 100m.



Approach I

$l \times w = Area$

$100m \times w = 1450m^2$

$\frac{\overset{1}{\cancel{100m}} \times w}{\underset{1}{\cancel{100m}}} = \frac{1450m \times \overset{1}{\cancel{m}}}{100\cancel{m}}$

$w = \frac{145m}{10}$

$w = 14.5m$

$P = l + w + l + w$

$P = 100m + 14.5m + 100m + 14.5m$

$P = 100.0m$
$14.5m$
$+ 100.0m$
$14.5m$
$229.0m$

$\therefore$ Perimeter = 229.0m

Approach II

$P = 2l + \frac{2\ Area}{l}$

$P = (2 \times 100m) + \frac{(2 \times 1450m^2)}{100m}$

$P = 200m + \frac{2900m \times m}{100m}$

$P = 200m$
$+29m$
$229m$

$P = 229m$

TASK 45

1. **Find the perimeter of a rectangle whose area and length are**;

a) **10cm²** and **2cm** respectively.

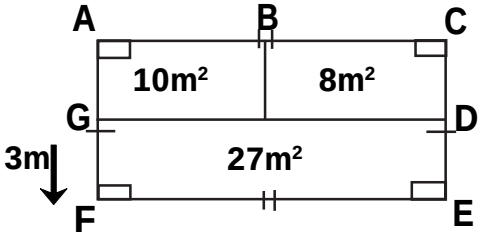
b) **24m²** and **2.4m** respectively

2. Find the perimeter of a rectangle whose area and width are;

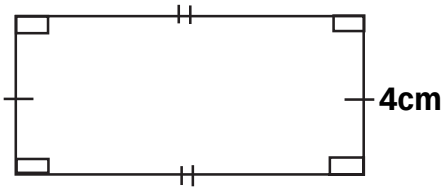
a) 1**8dm²** and **3dm** respectively.

b) $28\frac{1}{8}$ **m²** and $4\frac{1}{2}$**m** respectively.

3. Below is a rectangular plot of land divided into 3 **different rectangular portions whose areas are indicated**. If the length **AG** is **1 metre less than the length GF**, find the perimeter of the rectangular plot **ACEF**.



4. Find the perimeter of the rectangle **RUTH** below whose area is **52cm²** .



Finding the area of a rectangle given the perimeter and one of the sides.

Procedure / steps taken

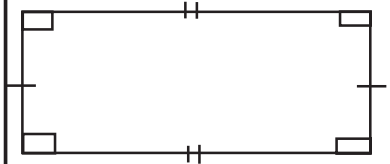
- State the formula for finding the perimeter to find the unknown side i.e **P = l + w + l + w** OR **P = 2l + 2w** OR **P = 2(l + w)** OR **P = Sum of all sides.**
- After getting the unknown side (length or width), we apply the formular for finding the area of a rectangle i.e **Area = l x w** OR **Area = $\frac{1}{2}$ bh x 2**
- Substitute in correctly.
- Compute accurately and obtain the answer.

OR

- State the formula for finding the area of a rectangle using the area directly i.e **Area = $\frac{l\,(p - 2l)}{2}$** given the length OR **Area = $\frac{w\,(P - 2W)}{2}$** given the width.
- Substitute in correctly.
- Compute accurately and obtain the answer.

EXAMPLE 1

Find the area of the rectangle below if its perimeter is 32cm.



Approach 1

l + w + l + w = P	**2l + 8cm - 8cm = 32cm - 8cm**	**l = 12cm**
l + w + l + w = 32cm	**2l = 24cm**	**But Area = l x w**
l + l + 4cm + 4cm = 32cm	$\frac{\cancel{2}^{1}l}{\cancel{2}_{1}} = \frac{\cancel{24}^{12}cm}{\cancel{2}_{1}}$	**Area = 12cm x 4cm**
2l + 8cm = 32cm		**Area = 48cm²**

Approach II

$$\text{Area} = \frac{w(P - 2w)}{2}$$

$$= \frac{4\text{cm}\ (32\text{cm} - 2 \times 4\text{cm})}{2}$$

$$= \frac{4\text{cm}\ (32\text{cm} - 8\text{cm})}{2}$$

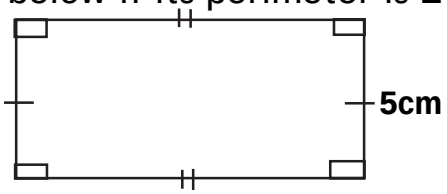
$$= \frac{4\text{cm}\ (\overset{12}{\cancel{24}}\text{cm})}{\underset{1}{\cancel{2}}}$$

$$= 4\text{cm} \times 12\text{cm}$$

$$= 48\text{cm}^2$$

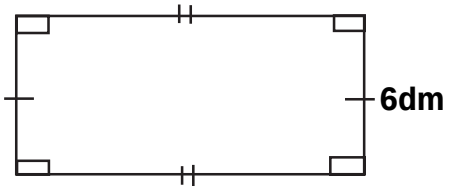
TASK 46

1. Find the area of the rectangle below if its perimeter is **24cm².**



2. Find the area of a rectangle whose perimeter is **3.2m²** and length is **1.2m**.

3. Calculate the area of the rectangle below if its **perimeter** is **52dm²** and **width 6dm**.



Finding the value of the unknown.

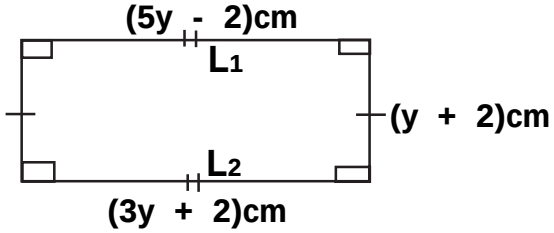
Procedure / steps taken

- Equate two opposite equal sides whose value are given i.e Length 1 = Length 2.
- Substitute in correctly.
- Compute accurately and the value of the unknown is the answer.

NB: When the units are outside the brackets, then they belong to all the terms inside the brackets and the unknown should have no units. But if the units are inside the brackets on the known value, then the unknown should have the units.

EXAMPLE 1

Use the rectangle below to answer the questions that follow.



a) **Find the value of m.**

Approach I

Length 1 = Length 2.

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

$\frac{(5y - 2)\cancel{cm}^{1}}{\cancel{cm}_{1}} = \frac{(3y + 2)\cancel{cm}^{1}}{\cancel{cm}_{1}}$

5y - 2 = 3y + 2

5y - 3y - 2 + 2 = 2 + 2

2y = 4

$\frac{\cancel{2}^{1}y}{\cancel{2}_{1}} = \frac{\cancel{4}^{2}}{\cancel{2}_{1}}$

y = 2

Approach I

Length 1 = Length 2.

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

5y cm - 2cm = 3y cm + 2cm

5y cm - 3y cm - 2cm + 2cm = 2cm + 2cm

2y cm = 4cm

$\frac{\cancel{2}^{1}y\ cm}{\cancel{2}_{1}} = \frac{\cancel{4}^{2}cm}{\cancel{2}_{1}}$

$\frac{y\cancel{cm}^{1}}{\cancel{cm}_{1}} = \frac{2\cancel{cm}^{1}}{\cancel{cm}_{1}}$

y = 2

Approach III

Length 1 = Length 2.

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

$\frac{(3y + 2)\cancel{cm}^{1}}{\cancel{cm}_{1}} = \frac{(5y - 2)\cancel{cm}^{1}}{\cancel{cm}_{1}}$

3y + 2 = 5y - 2

3y - 5y + 2 - 2 = -2 -2

-2y = -4

$\frac{\cancel{-2}^{1}y}{\cancel{-2}_{1}} = \frac{\cancel{-4}^{2}}{\cancel{-2}_{1}}$

y = 2

Approach IV

Length 1 = Length 2.

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

$\frac{(3y + 2)\cancel{cm}^{1}}{\cancel{cm}_{1}} = \frac{(5y - 2)\cancel{cm}^{1}}{\cancel{cm}_{1}}$

3y + 2 = 5y - 2 (- and + over the terms)

3y - 3y + 2 + 2 = 5y - 3y

4 = 2y

$\frac{\cancel{4}^{2}}{\cancel{2}_{1}} = \frac{\cancel{2}^{1}y}{\cancel{2}_{1}}$

2 = y

∴ y = 2

b) **Find the actual length.**

Approach 1

Actual length = (5y - 2)cm

= (5 x y - 2)cm

= (5 x 2 - 2)cm

= (10 - 2)cm

= 8cm

Approach 11

Actual length = (3y + 2)cm

= (3 x y + 2)cm

= (3 x 2 + 2)cm

= (6 + 2)cm

= 8cm

c) **Find the actual width.**

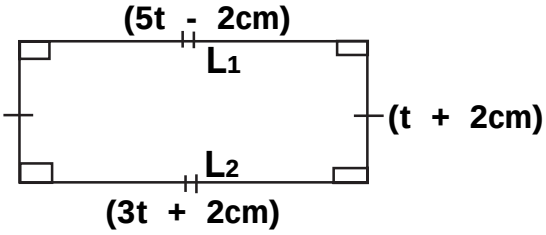
Actual width = (y + 2)cm

= (2 + 2)cm

= 4cm

EXAMPLE 2

Use the rectangle below to find the value of t.



Approach 1

Length 1 = Length 2.

(5t - 2cm) = (3t + 2cm)

5t - 2cm = 3t + 2cm

5t - 3t - 2cm + 2cm = 2cm + 2cm

$\frac{\overset{1}{\cancel{2}t}}{\underset{1}{\cancel{2}}} = \frac{\overset{2}{\cancel{4}cm}}{\underset{1}{\cancel{2}}}$

t = 2cm

Approach 11

Length 1 = Length 2.

(3t + 2cm) = (5t - 2cm)

3t + 2cm = 5t - 2cm

3t - 5t + 2cm - 2cm = -2cm - 2cm

-2t = -4cm

$\frac{\overset{1}{\cancel{-2}t}}{\underset{1}{\cancel{-2}}} = \frac{\overset{2}{\cancel{-4}cm}}{\underset{1}{\cancel{-2}}}$

t = 2cm

Approach 111

Length 1 = Length 2.

(3t + 2cm) = (5t - 2cm)

3t + 2cm = 5t - 2cm

3t - 3t + 2cm + 2cm = 5t - 3t

$\frac{\overset{2}{\cancel{4}cm}}{\underset{1}{\cancel{2}}} = \frac{\overset{1}{\cancel{2}t}}{\underset{1}{\cancel{2}}}$

2cm = t

∴ t = 2cm