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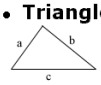
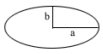
Concepts of Perimeter and Area
Ex 21A

Perimeter

• **Square:** Perimeter = 4a	• **Circle** Perimeter = 2 × pi × r
• **Rectangle:** Perimeter = 2a + 2b	• **Parallelogram:** Perimeter = 2a + 2b
• **Triangle:**  Perimeter = a + b + c	• **Trapezoid:** Perimeter = a + b + c + d = 2m + c + d
• **Rhombus:** Perimeter = 4a	• **Regular N-gon:** Perimeter = ns, n = # of sides
• **Ellipse:**  Perimeter = 2 pi $\sqrt{\frac{a^2+b^2}{2}}$	

Q1

Answer :

Perimeter of a rectangle = $2 \times (\text{Length} + \text{Breadth})$

(i) Length = 16.8 cm

Breadth = 6.2 cm

Perimeter = $2 \times (\text{Length} + \text{Breadth})$

$= 2 \times (16.8 + 6.2) = 46$ cm

(ii) Length = 2 m 25 cm

=(200+25) cm (1 m = 100 cm)

= 225 cm

Breadth =1 m 50 cm

= (100+50) cm (1 m = 100 cm)

= 150 cm

Perimeter = $2 \times (\text{Length} + \text{Breadth})$

$= 2 \times (225 + 150) = 750$ cm

(iii) Length = 8 m 5 dm

= (80+5) dm (1 m = 10 dm)

= 85 dm

Breadth = 6 m 8 dm

= (60+8) dm (1 m = 10 dm)

= 68 dm

Perimeter = $2 \times (\text{Length} + \text{Breadth})$

$= 2 \times (85 + 68) = 306$ dm

Q2

Answer :

Length of the field = 62 m

Breadth of the field = 33 m

Perimeter of the field = 2(l + b) units

= 2(62 + 33) m =190 m

Q3

Cost of fencing per metre = Rs 16

Total cost of fencing = Rs (16×190) = Rs 3040

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Answer :

Let the length of the rectangle be 5*x* m.
Breadth of the rectangle = 3*x* m
Perimeter of the rectangle = 2(*l* + *b*)
= 2(5*x* + 3*x*) m
= (16*x*) m
It is given that the perimeter of the field is 128 m.

$$\therefore 16x = 128$$
$$\Rightarrow x = \frac{128}{16} = 8$$
$$\therefore \text{Length} = \left(5 \times 8\right) = 40\text{m}$$
$$\text{Breadth} = \left(3 \times 8\right) = 24\text{m}$$

Q4

Answer :

Total cost of fencing = Rs 1980
Rate of fencing = Rs 18 per metre

Perimeter of the field = $\frac{\text{Total cost}}{\text{Rate}} = \frac{\text{Rs } 1980}{\text{Rs } 18/\text{m}} = \left(\frac{1980}{18}\right)\text{m} = 110\text{ m}$

Let the length of the field be *x* metre.
Perimeter of the field = 2(*x* + 23) m

$$\therefore 2(x + 23) = 110$$
$$\Rightarrow (x + 23) = 55$$
$$x = (55 - 23) = 32$$

Hence, the length of the field is 32 m.

Q5

Answer :

Total cost of fencing = Rs 3300
Rate of fencing = Rs 25/m
Perimeter of the field = $\frac{\text{Total cost}}{\text{Rate of fencing}} = \left(\frac{\text{Rs } 3300}{\text{Rs } 25/\text{m}}\right) = \frac{3300}{25}\text{ m} = 132\text{ m}$

Let the length and the breadth of the rectangular field be 7*x* and 4*x*, respectively.
Perimeter of the field = 2(7*x* + 4*x*) = 22*x*

It is given that the perimeter of the field is 132 m.

$$\therefore 22\text{x} = 132$$
$$\Rightarrow \text{x} = \frac{132}{22} = 6$$
$$\therefore \text{Length of the field} = \left(7 \times 6\right)\text{m} = 42\text{ m}$$
$$\text{Breadth of the field} = \left(4 \times 6\right)\text{m} = 24\text{ m}$$

Q6

Answer :

(i) Side of the square = 3.8 cm
Perimeter of the square = (4×side)
= (4×3.8) = 15.2 cm

(ii) Side of the square = 4.6 cm
Perimeter of the square = (4×side)
= (4×4.6) = 18.4 cm

(iii) Side of the square = 2 m 5 dm
= (20+5) dm (1 m = 10 dm)
= 25 dm
Perimeter of the square = (4×side)
= (4×25) = 100 dm

Q7

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Answer :

Total cost of fencing = Rs 4480
Rate of fencing = Rs 35/m
Perimeter of the field = $\frac{\text{Total cost}}{\text{Rate}} = \frac{\text{Rs } 4480}{\text{Rs } 35/\text{m}} = \frac{4480}{35}\ \text{m} = 128\ \text{m}$

Let the length of each side of the field be x metres.
Perimeter = $(4x)$ metres
$\therefore 4x = 128$
$\Rightarrow x = \frac{128}{4} = 32$

Hence, the length of each side of the field is 32 m.

Q8

Answer :

Side of the square field = 21m
Perimeter of the square field = (4×21) m
= 84 m

Let the length and the breadth of the rectangular field be $4x$ and $3x$, respectively.
Perimeter of the rectangular field = $2(4x + 3x) = 14x$

Perimeter of the rectangular field = Perimeter of the square field

$\therefore 14x = 84$
$\Rightarrow x = \frac{84}{14} = 6$

$\therefore$ Length of the rectangular field $= (4 \times 6)\ \text{m} = 24\ \text{m}$
Breadth of the rectangular field $= (3 \times 6)\ \text{m} = 18\ \text{m}$

Q9

Answer :

(i) Sides of the triangle are 7.8 cm, 6.5 cm and 5.9 cm.
Perimeter of the triangle = (First side + Second side + Third Side) cm
= (7.8 + 6.5 + 5.9) cm
= 20.2 cm

(ii) In an equilateral triangle, all sides are equal.
Length of each side of the triangle = 9.4 cm
$\therefore$ Perimeter of the triangle = (3 × Side) cm
= (3 × 9.4) cm
= 28.2 cm

(iii) Length of two equal sides = 8.5 cm
Length of the third side = 7 cm
$\therefore$ Perimeter of the triangle = {(2 × Equal sides) + Third side} cm
= {(2 × 8.5) + 7} cm
= 24 cm

Q10

Answer :

(i) Length of each side of the given pentagon = 8 cm
$\therefore$ Perimeter of the pentagon = (5×8) cm
= 40 cm

(ii) Length of each side of the given octagon = 4.5 cm
$\therefore$ Perimeter of the octagon = (8×4.5) cm
= 36 cm

(iii) Length of each side of the given decagon = 3.6 cm
$\therefore$ Perimeter of the decagon = (10×3.6) cm
= 36 cm

Q11

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Answer :

(i) Perimeter of the figure = Sum of all the sides
=(27 + 35 + 35 + 45) cm
= 142 cm

(ii) Perimeter of the figure = Sum of all the sides
=(18 + 18 + 18 + 18) cm
= 72 cm

(iii) Perimeter of the figure = Sum of all the sides
=(8 + 16 + 4 + 12 + 12 + 16 + 4) cm
= 72 cm

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Concepts of Perimeter and Area
Ex 21B

Q1

Answer :

(i) Radius, r = 28 cm

$\therefore$ Circumference of the circle, $C = 2\pi r$

$= \left(2 \times \frac{22}{7} \times 28\right)$

$= 176$ cm

Hence, the circumference of the given circle is 176 cm.

(ii) Radius, r = 10.5 cm

$\therefore$ Circumference of the circle, $C = 2\pi r$

$= \left(2 \times \frac{22}{7} \times 10.5\right)$

$= 66$ cm

Hence, the circumference of the given circle is 66 cm.

(iii) Radius, r = 3.5 m

$\therefore$ Circumference of the circle, $C = 2\pi r$

$= \left(2 \times \frac{22}{7} \times 3.5\right)$

$= 22$ m

Hence, the circumference of the given circle is 22 m.

Q2

Answer :

(i)

Circumference $= 2\pi r = \pi\left(2r\right) = \pi \times$ Diameter of the circle $\left(d\right)$ $\left(\text{Diameter} = 2 \times \text{radius}\right)$

$\Rightarrow$ Circumference $=$ Diameter $\times \pi$ Diameter of the given circle is 14 cm.

Circumference of the given circle $= 14 \times \pi \Rightarrow \left(14 \times \frac{22}{7}\right) = 44$ cm Circumference of the given circle is 44 cm.

(ii)

Circumference $= 2\pi r = \pi\left(2r\right) = \pi \times$ Diameter of the circle $\left(\text{d}\right)$ $\left(\text{Diameter} = 2 \times \text{Radius}\right)$

$\Rightarrow$ Circumference $=$ Diameter $\times \pi$ Diameter of the given circle is 35 cm.

$\Rightarrow$ Circumference of the given circle $= 35 \times \pi \Rightarrow \left(35 \times \frac{22}{7}\right) = 110$ cm Circumference of the given circle is 110 cm.

(iii)

Circumference $= 2\pi r = \pi\left(2r\right) = \pi \times$ Diameter of the circle $\left(d\right)$ $\left(\text{Diameter} = 2 \times \text{Radius}\right)$

$\Rightarrow$ Circumference $=$ Diameter $\times \pi$ Diameter of the given circle is 10.5 m.

Circumference of the given circle $= 10.5 \times \pi \Rightarrow \left(10.5 \times \frac{22}{7}\right) = 33$ m Circumference of the given circle is 33 m.

Q3

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Answer :

Let the radius of the given circle be r cm.
Circumference of the circle = 176 cm
Circumference = $2\pi r$
$\therefore 2\pi r = 176$
$\Rightarrow r = \frac{176}{2\pi}$
$\Rightarrow r = \left(\frac{176}{2} \times \frac{7}{22}\right)$
$\Rightarrow r = 28$
The radius of *the* given circle is 28 cm.

Q4

Answer :

Let the radius of the circle be r cm.
Diameter $= 2 \times$ Radius $= 2r$ cm
Circumference of the wheel $= 264$ cm
Circumference of the wheel $= 2\pi r$
$\therefore 2\pi r = 264$
$\Rightarrow 2r = \frac{264}{\pi}$
$\Rightarrow 2r = \left(264 \times \frac{7}{22}\right)$
$\Rightarrow 2r = 84$
Diameter of the given wheel *is* 84 cm.

Q5

Answer :

Radius of the wheel $= \frac{\text{Diameter of the wheel}}{2}$
$\Rightarrow r = \frac{77}{2}$ cm
Circumference of the wheel $= 2\pi r$
$= \left(2 \times \frac{22}{7} \times \frac{77}{2}\right)$
$= 242$ cm

In 1 revolution the wheel covers a distance equal to its circumference.

$\therefore$ Distance covered by *the* wheel in 1 revolution $= 242$ cm
$\therefore$ Distance covered by *the* wheel in 500 revolution*s* $= (500 \times 242)$ cm
$= 121000$ cm
$= 1210$ m $(100$ cm $= 1$m$)$
$= 1.21$ km $(1000$ m $= 1$ km $)$

Q6

Answer :

Radius of the wheel $(r) = \frac{\text{Diameter of } \textit{the} \text{ wheel}}{2}$
$r = \frac{70}{2}$ cm $= 35$ cm
Circumference of the wheel $= 2\pi r = \left(2 \times \frac{22}{7} \times 35\right)$
$= 220$ cm
In one revolution, *the* wheel covers *the* distance equal to its circumference.
$\therefore$ 220 cm distance $= 1$ revolution
$\therefore 1$ cm distance $= \frac{1}{220}$ revolution
$\therefore 1$ km $\left(\text{or } 100000 \text{ cm}\right)$ distance $= \frac{1 \times 100000}{220}$ revolution $\left(\because 1 \text{ km} = 100000 \text{ cm}\right)$
$\therefore 1.65$ km distance $= \frac{1.65 \times 100000}{220}$ revolutions
$= 750$ revolutions
Thus, the wheel will make 750 revolutions to travel 1.65 km.

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Concepts of Perimeter and
Ex 21C

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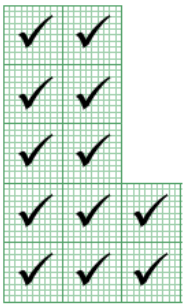
Q1

Answer :



The figure contains 12 complete squares.

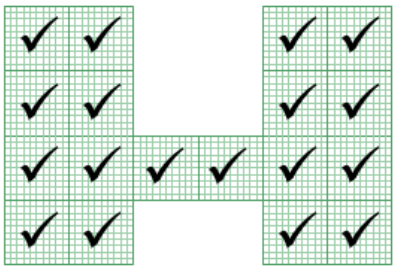
Area of 1 small square = 1 sq cm

Q2 ∴ Area of the figure = Number of complete squares × Area of the square

$=(12 \times 1)$ sq cm

=12 sq cm

Answer :



The figure contains 18 complete squares.

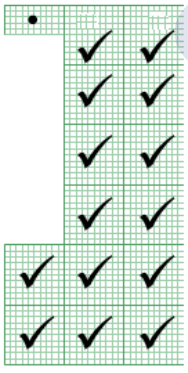
Area of 1 small square = 1 sq cm

Q3 ∴ Area of the figure = Number of complete squares × Area of the square

=(18×1) sq cm

=18 sq cm

Answer :

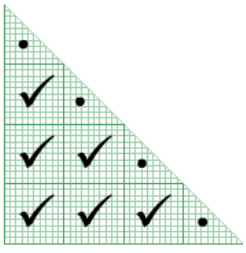


The figure contains 14 complete squares and 1 half square.

Area of 1 small square = 1 sq cm

Q4 ∴ Area of the figure = Number of squares × Area of the square

Answer :



The figure contains 6 complete squares and 4 half squares.

Area of 1 small square = 1 sq cm

∴ Area of the figure = Number of squares × Area of the square

$=\left[\left(6 \times 1\right)+\left(4 \times \frac{1}{2}\right)\right]$ sq cm

=8 sq cm

Q5

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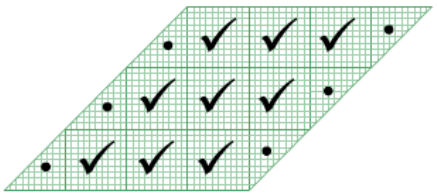
Answer :



The figure contains 9 complete squares and 6 half squares.

Area of 1 small square = 1 sq cm

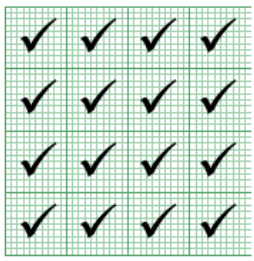
∴ Area of the figure = Number of squares × Area of the square

$$= \left[\left(9 \times 1\right) + \left(6 \times \tfrac{1}{2}\right)\right] \text{ sq cm}$$

=12 sq cm

Q6

Answer :



The figure contains 16 complete squares.

Area of 1 small square = 1 sq cm

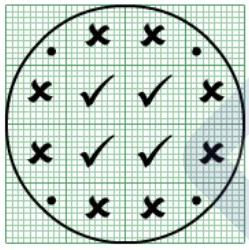
∴ Area of the figure = Number of squares × Area of a square

=(16×1) sq cm

=16 sq cm

Q7

Answer :



In the given figure, there are 4 complete squares, 8 more than half parts of squares and 4 less than half parts of squares.

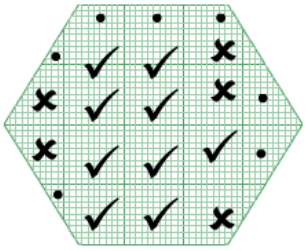
We neglect the less than half parts and consider each more than half part of the square as a complete square.

∴ Area = (4 + 8) sq cm

= 12 sq cm

Q8

Answer :



In the given figure, there are 9 complete squares, 5 more than half parts of squares and 7 less than half parts of squares.

We neglect the less than half parts of squares and consider the more than half squares as complete squares.

∴ Area of the figure = (9 + 5) sq cm

= 14 sq cm

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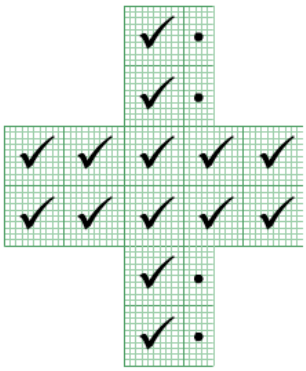
Q9

Answer :



The figure contains 14 complete squares and 4 half squares.

Area of 1 small square = 1 sq cm

Area of the figure = Number of squares × Area of one square

$$= \left[\left(14 \times 1\right) + \left(4 \times \tfrac{1}{2}\right)\right] \text{ sq cm}$$

=16 sq cm

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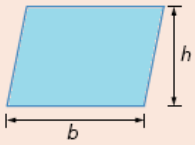
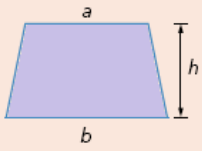
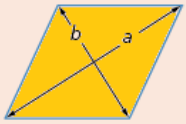
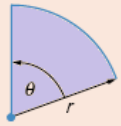
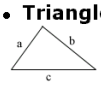
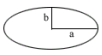
Concepts of Perimeter and A
Ex 21D

The area of a shape is a measure of the size of its surface.

Square Area = l^2	Rectangle Area = $l \times w$	Triangle Area = $\frac{1}{2} b \times h$	Parallelogram Area = $b \times h$
			
Trapezium Area = $\frac{1}{2}(a + b)h$	**Rhombus** Area = $\frac{1}{2} a \times b$	**Circle** Area = πr^2	**Sector** Area = $\frac{\theta}{360} \pi r^2$
			

Perimeter

• **Square:** Perimeter = 4a	• **Circle** Perimeter = 2 × pi × r
• **Rectangle:** Perimeter = 2a + 2b	• **Parallelogram:** Perimeter = 2a + 2b
• **Triangle:**  Perimeter = a + b + c	• **Trapezoid:** Perimeter = a + b + c + d = 2m + c + d
• **Rhombus:** Perimeter = 4a	• **Regular N-gon:** Perimeter = ns, n = # of sides
• **Ellipse:**  Perimeter = 2 pi $\sqrt{\frac{a^2 + b^2}{2}}$	

Q1

Answer :

(i) Length = 46 cm
Breadth = 25 cm
Area of the rectangle = (Length ×Breadth) sq units
= (46×25) cm^2 = 1150 cm^2

(ii) Length = 9 m
Breadth = 6 m
Area of the rectangle = (Length ×Breadth) sq units
= (9×6) m^2 = 54 m^2

(iii) Length = 14.5 m
Breadth = 6.8 m
Area of the rectangle = (Length ×Breadth) sq units
= $(\frac{145}{10} \times \frac{68}{10})$ m^2 = $\frac{9860}{100}$ m^2 =98.60 m^2

(iv) Length = 2 m 5 cm
= (200+5) cm (1 m = 100 cm)
=205cm
Breadth = 60 cm
Area of the rectangle = (Length ×Breadth) sq units
= (205×60) cm^2 = 12300 cm^2

Q2

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Answer :

Side of the square plot = 14 m
Area of the square plot = $(\text{Side})^2$ sq units
$= (14)^2\ m^2$
$= 196\ m^2$

Q3
Answer :

Length of the table = 2 m 25 cm
= (2 + 0.25) m (100 cm = 1 m)
= 2.25 m
Breadth of the table = 1 m 20 cm
= (1 + 0.20) m (100 cm = 1 m)
=1.20 m
Area of the table = (Length × Breadth) sq units
$= (2.25 \times 1.20)\ m^2$

$= \left(\frac{225}{100} \times \frac{120}{100}\right) m^2$
$= 2.7\ m^2$

Q4
Answer :

Length of the carpet = 30 m 75 cm
=(30 + 0.75) cm (100 cm = 1 m)
= 30.75 m
Breadth of the carpet = 80 cm
= 0.80 m (100 cm = 1 m)

Area of carpet = (Length × breadth) sq units

$$= \left(30.75 \times 0.80\right) \mathbf{m^2}$$
$$= \left(\frac{3075}{100} \times \frac{80}{100}\right) \mathbf{m^2}$$
$$= 24.6\ \mathbf{m^2}$$

Cost of 1 m^2 carpet= Rs 150
Cost of 24.6 m^2 carpet = Rs (24.6×150)
= Rs 3690

Q5
Answer :

Length of the sheet of paper = 3 m 24 cm = 324 cm
Breadth of the sheet of paper = 1 m 72 cm = 172 cm
Area of the sheet = (Length × Breadth)
$$= \left(324 \times 172\right)\ \mathbf{cm^2}$$
$$= 55728\ \mathbf{cm^2}$$

Length of the piece of paper required to make 1 envelope = 18 cm
Breadth of the piece of paper required to make 1 envelope = 12 cm
Area of the piece of paper required to make 1 envelope = (18×12) cm^2
= 216 cm^2

$$\text{No. of envelopes that can be made} = \frac{\text{Area of the sheet}}{\text{Area of the piece of paper required to make 1 envelope}}$$
$$\Rightarrow \text{No. of envelopes that can be made} = \frac{55728}{216} = 258 \text{ envelopes}$$

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Q6

Answer :

Length of the room = 12.5 m
Breadth of the room = 8 m
Area of the room = (Length×Breadth)
=(12.5×8) m2 = 100 m2
Side of the square carpet = 8 m
Area of the carpet = $(Side)^2$
$= 8^2\ m^2$
$= 64\ m^2$

Area of the floor which is not carpeted = Area of the room − Area of the carpet
$= (100 - 64)\ m^2$
$= 36\ m^2$

Q7

Answer :

Length of the road = 150 m = 15000 cm
Breadth of the road = 9 m = 900 cm
Area of the road = (Length×Breadth)
$= 15000 \times 900\ \ cm^2$
$= 13500000\ cm^2$
Length of the brick = 22.5 cm
Breadth of the brick = 7.5 cm
Area of one brick = (Length×Breadth)
$= (22.5 \times 7.5)\ \ cm^2$
$= 168.75\ cm^2$

$$\text{Number of bricks} = \frac{\text{Area of the road}}{\text{Area of one brick}} = \frac{13500000}{168.75} = 80000\ bricks$$

Q8

Answer :

Length of the room = 13 m
Breadth of the room = 9 m
Area of the room = (13×9) m^2 = 117 m^2

Let length of required carpet be *x* m.
Breadth of the carpet = 75 cm
= 0.75 m (100 cm = 1 m)
Area of the carpet = (0.75×x) m^2
= 0.75x m^2
For carpeting the room:
Area covered by the carpet = Area of the room
⇒0.75x=117⇒x=1170.75⇒x=117×43⇒x=156 m

So, the length of the carpet is 156 m.
Cost of 1 m carpet = Rs 65
Cost 156 m carpet = Rs (156×65)
= Rs 10140

Q9

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Answer :

Let the length of the rectangular park be 5*x*.
∴ Breadth of the rectangular park = 3*x*
Perimeter of the rectangular field = 2(Length + Breadth)
=2(5*x* + 3*x*)
= 16*x*

It is given that the perimeter of rectangular park is 128 m.

$\Rightarrow 16\mathbf{x} = 128$
$\Rightarrow \mathbf{x} = \frac{128}{16}$
$\Rightarrow \mathbf{x} = 8$

$$\text{Length of the park} = \left(5 \times 8\right)\ \text{m}$$
$$= 40\ \text{m}$$
$$\text{Breadth of the park} = \left(3 \times 8\right)\ \text{m}$$
$$= 24\ \text{m}$$

Area of the park = (Length × Breadth) sq units

$$= \left(40 \times 24\right)\ \text{m}^2$$
$$= 960\ \text{m}^2$$

Q10

Answer :

Side of the square plot = 64 m
Perimeter of the square plot = $\left(4 \times Side\right)\ \text{m} = \left(4 \times 64\right)\ \text{m} = 256\ \text{m}$
Area of the square plot = $(\text{Side})^2$
= $64^2\ \text{m}^2$
= 4096 m^2

Let the breadth of the rectangular plot be *x* m.
Perimeter of the rectangular plot = 2(l+b) m
= 2(70+*x*) m

Perimeter of the rectangular plot = Perimeter of the square plot (Given)

$\Rightarrow 2\left(70 + x\right) = 256$
$\Rightarrow 140 + 2x = 256$
$\Rightarrow 2x = 256 - 140$
$\Rightarrow 2x = 116$
$\Rightarrow x = \frac{116}{2} = 58$

So, the breadth of the rectangular plot is **58 m**.
Area of the rectangular plot = $\left(Length \times Breadth\right) = \left(70 \times 58\right)\ \text{m}^2 = 4060\ \text{m}^2$
Area of the square plot – Area of the rectangular plot
= (4096 – 4060)
= **36 m^2**

Q11

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Answer :

Total cost of cultivating the field = Rs 71400
Rate of cultivating the field = Rs 35/m^2

$$\text{Area of the field} = \frac{\text{Total cost of cultivating the field}}{\text{Rate of cultivating}} = \frac{\text{Rs } 71400}{\text{Rs } 35/\text{m}^2} = 2040\ \text{m}^2$$

Let the length of the field be *x* m.

$$\text{Area of the field} = (\text{Length} \times \text{Width})\ \text{m}^2 = (\text{x} \times 40)\ \text{m}^2 = 40\text{x}\ \text{m}^2$$

$$\text{It is given that the area of the field is } 2040\ \text{m}^2.$$
$$\Rightarrow 40\text{x} = 2040$$
$$\Rightarrow \text{x} = \frac{2040}{40} = 51$$
$$\therefore \text{Length of the field} = 51\ \text{m}$$

Perimeter of the field = 2(l+b)
= 2(51+40) m
= 182 m
Cost of fencing 1 m of the field = Rs 50
Cost of fencing 182 m of the field = Rs (182×50)
= Rs 9100

Q12

Answer :

Let the width of the rectangle be *x* cm.
Length of the rectangle = 36 cm
Area of the rectangle = (Length × Width) = (36 × x) cm^2
It is given that the area of the rectangle is 540 cm^2.

$$\Rightarrow 36 \times x = 540$$
$$\Rightarrow x = \frac{540}{36}$$
$$\Rightarrow x = 15$$
$$\therefore \text{Width of the rectangle} = 15\ \text{cm}$$

Perimeter of the rectangle = 2(Length + Width) cm
= 2(36 + 15) cm
= 102 cm

Q13

Answer :

Length of the wall = 4 m = 400 cm
Breadth of the wall = 3 m = 300 cm
Area of the wall = (400×300) cm^2 = 120000 cm^2

Length of the tile = 12 cm
Breadth of the tile = 10 cm
Area of one tile = (12×10) cm^2 = (120) cm^2

$$\text{Number of tiles required to cover the wall} = \frac{\text{Area of the wall}}{\text{Area of one tile}} = \frac{120000}{120} = 1000\ \text{tiles}$$

Cost of 1 tile = Rs 22.50
Cost of 1000 tiles = (1000 × 22.50) = Rs 22500

Thus, the total cost of the tiles is Rs 22500.

Q14

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Answer :

Let the length of the rectangle be x cm.
Breadth of the rectangle is 25 cm.
Area of the rectangle = (Length × Breadth) cm^2
$= (x \times 25)\ cm^2$
$= 25x\ cm^2$

It is given that the area of the rectangle is 600 cm^2.
$\Rightarrow 25x = 600$
$\Rightarrow x = \frac{600}{25} = 24$
So, the length of the rectangle is 24 cm.
Perimeter of the rectangle = 2(Length + Breadth) units
$= 2(25 + 24)$ cm
$= 98$ cm

Q15

Answer :

Area of the square $= \left\{\frac{1}{2} \times \left(Diagonal\right)^2\right\}$ sq units
$= \left\{\frac{1}{2} \times \left(5\sqrt{2}\right)^2\right\}\ cm^2$
$= \left\{\frac{1}{2} \times \left(5\right)^2 \times \left(\sqrt{2}\right)^2\right\}\ cm^2$
$= \left\{\frac{1}{2} \times 25 \times 2\right\}\ cm^2$
$= \left(\frac{1}{2} \times 50\right)\ cm^2 = 25\ cm^2$

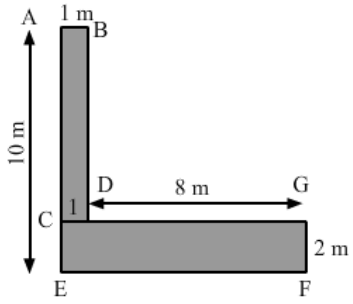
Q16

Answer :

(i) Area of rectangle ABDC = Length × Breadth
$= AB \times AC$ (AC = AE − CE)
$= (1 \times 8)m^2$
$= 8\ m^2$

Area of rectangle CEFG = Length × Breadth
$= CG \times GF$ (CG = GD + CD)
$= (9 \times 2)m^2$
$= 18\ m^2$

Area of the complete figure = Area of rectangle ABDC + Area of rectangle CEFG
$= (8 + 18)\ m^2$
$= 26\ m^2$



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(ii) Area of rectangle AEDC = Length × Breadth

= ED × CD

= $(12 \times 2)\text{m}^2$

= 24 cm^2

Area of rectangle FJIH = Length × Breadth

= HI × IJ

= $(1 \times 9)\text{m}^2$

= 9 m^2

Area of rectangle ABGF = Length × Breadth

= AB × AF {(AB = FJ − GJ) and AF = EH − (EA + FH)}

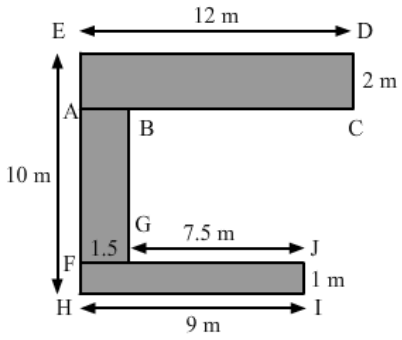
= $(7 \times 1.5)\text{m}^2$

= 10.5 m^2

Area of the complete figure = Area of rectangle AEDC + Area of rectangle FJIH + Area of rectangle ABGF

= (24 + 9 + 10.5) m^2

= 43.5 m^2



(iii) Area of the shaded portion = Area of the complete figure − Area of the unshaded figure

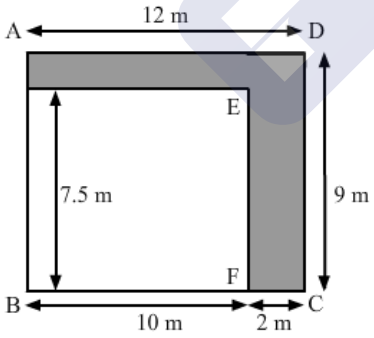
= Area of rectangle ABCD − Area of rectangle GBFE

=(CD×AD) − (GB×BF)

=$\{(12 \times 9) - (7.5 \times 10)\}\text{m}^2$ (BF = BC − FC)

=(108 − 75) m^2

=33 m^2



Q17

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Answer :

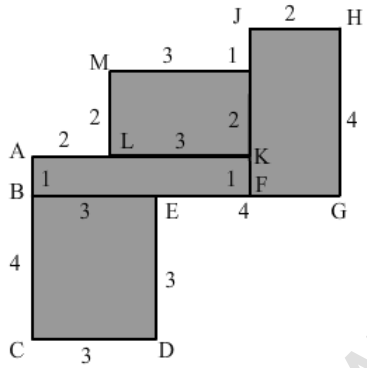
(i) Area of square BCDE= $(\text{Side})^2$
$= (CD)^2$
$= (3)^2\ cm^2$
$= 9\ cm^2$

Area of rectangle ABFK = **Length** × **Breadth**
$= AK \times AB$ [(AB = AC − BC) and (AK = AL + LK)]
$= (5 \times 1)\ cm^2$
$= 5\ cm^2$

Area of rectangle MLKG = **Length** × **Breadth**
$= ML \times MG$
$= (2 \times 3)\ cm^2$
$= 6\ cm^2$

Area of rectangle JHGF= **Length** × **Breadth**
$= JH \times HG$
$= (2 \times 4)\ cm^2$
$= 8\ cm^2$

Area of the figure = Area of rectangle ABFK + Area of rectangle MLKG + Area of rectangle JHGF + Area of square BCDE
$= (9 + 5 + 6 + 8)\ cm^2$
$= 28\ cm^2$

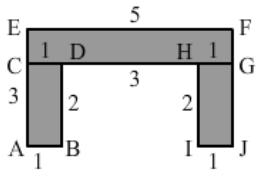


(ii) Area of rectangle CEFG= **Length** × **Breadth**
$= EF \times CE$
$= (1 \times 5)\ cm^2$ (CE = EA − AC)
$= 5\ cm^2$

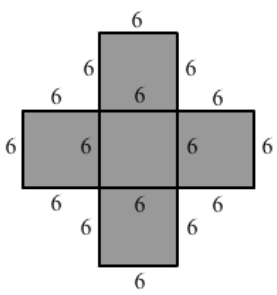
Area of rectangle ABDC = **Length** × **Breadth**
$= AB \times BD$
$= (1 \times 2)\ cm^2$
$= 2\ cm^2$

Area of rectangle HIJG = **Length** × **Breadth**
$= HI \times IJ$
$= (1 \times 2)\ cm^2$
$= 2\ cm^2$

Area of the figure = Area of rectangle CEFG + Area of rectangle HIJG + Area of rectangle ABDC
$= (5+2+2)\ cm^2$
$= 9\ cm^2$



(iii) In the figure, there are 5 squares, each of whose sides are 6 cm in length.
Area of the figure = 5 × Area of square
$= 5 \times (\text{side})^2$
$= 5 \times (6)^2\ cm^2$
$= 180\ cm^2$



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Concepts of Perimeter and Area
Exercise 21E

Q1

Answer :

(b) 28 cm

Let the length and the breadth of the rectangle be 7*x* cm and 5*x* cm, respectively.
It is given that the perimeter of the rectangle is 96 cm.
Perimeter of the rectangle = 2(7*x*+5*x*) cm

$$\Rightarrow 2\left(7x+5x\right)=96$$
$$=2\left(12x\right)=96$$
$$=24x=96$$
$$\Rightarrow x=\frac{96}{24}=4$$
$$\therefore \text{ Length } =\left(7\times 4\right)\text{cm}=28 \text{ cm}$$

Q2

Answer :

(d) 126 cm
Let length of the rectangle be L cm.
Area of the rectangle = 650 cm^2
Area of the rectangle = $(L \times 13)$ cm^2
$$\Rightarrow \left(\text{L}\times 13\right)=650$$
$$\Rightarrow \text{L}=\frac{650}{13}=50$$
$$\text{Length of the rectangle is } 50 \text{ cm}$$

Perimeter of the rectangle = 2(Length + Breadth) cm = 2(50+13) cm = 126 cm

Q3

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Answer :

(b) Rs 2340

Perimeter of the rectangular field = 2(Length + Breadth)

= 2(34 + 18) m = 104 m

Cost of fencing 1 metre = Rs 22.50

Cost of fencing 104 m = Rs (22.50×104) = Rs 2340

Q4

Answer :

(b) 16 m

Total cost of fencing = Rs 2400

Rate of fencing = Rs 30/m

Perimeter of the rectangular field = $\frac{\text{Total cost}}{\text{Rate}} = \frac{\text{Rs } 2400}{\text{Rs } 30/\text{m}} = 80 \text{ m}$

Let the breadth of the rectangular field be *x* m.

Perimeter of the rectangular field = 2(24 + *x*) m

$\Rightarrow 2\left(24+x\right)=80$

$\Rightarrow 48+2x=80$

$\Rightarrow 2x=\left(80-48\right)$

$\Rightarrow 2x=32$

$\Rightarrow x=\frac{32}{2}=16$

So, the breadth of the rectangular field is 16 m.

Q5

Answer :

(c) 17 m

Let the length and the breadth of the rectangle be *L* m and B m, respectively.

Area of the rectangular carpet = $(L \times B)$ m^2

$\Rightarrow LB=120 \quad \ldots$ (i)

Perimeter of the rectangular carpet = $2(L+B)$

$\Rightarrow 2\left(L+B\right)=46$

$\Rightarrow \left(L+B\right)=\frac{46}{2}$

$\Rightarrow \left(L+B\right)=23 \quad \ldots\left(\text{ii}\right)$

Diagonal of the rectangle $= \sqrt{L^2+B^2}$ m

$= \sqrt{(L+B)^2-2LB}$ m

$= \sqrt{(23)^2-240}$ m $\quad$ (from equations (i) and (ii))

$= \sqrt{529-240}$ m

$= \sqrt{289}$ m

$= 17$ m

Q6

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Answer :

(a) 48 cm

Let the width and the length of the rectangle be *x* cm and 3*x* cm, respectively.

Applying Pythagoras theorem:

$$\left(\text{Diagonal}\right)^2 = \left(\text{Length}\right)^2 + \left(\text{Width}\right)^2$$
$$\Rightarrow \left(6\sqrt{10}\right)^2 = \left(3x\right)^2 + \left(x\right)^2$$
$$\Rightarrow 360 = 9x^2 + x^2$$
$$\Rightarrow 360 = 10x^2$$
$$\Rightarrow x^2 = \frac{360}{10}$$
$$\Rightarrow x^2 = 36$$
$$\Rightarrow x = \pm 6$$

$\text{Since the width cannot be negative, we will neglect } -6.$

So, width of the rectangle is 6 cm.

Length of the rectangle = $(3 \times 6) = 18$ cm

Perimeter of the rectangle = 2(Length + Breadth) = 2(18 + 6) = 48 cm

Q7

Answer :

(b) 2 : 1

Let the breadth of the plot be *b* cm.

Let the length of the plot be *x* cm.

Perimeter of the plot = 3*x* cm

Perimeter of the plot =2(Length + Breadth)= 2(*x* + *b*) cm

$$\Rightarrow 2\left(x + b\right) = 3x$$
$$2x + 2b = 3x$$
$$\Rightarrow 2b = 3x - 2x$$
$$\Rightarrow 2b = x$$
$$\Rightarrow b = \frac{x}{2}$$

$\therefore \text{Ratio of the length and the breadth of the plot } = \frac{x}{\left(\frac{x}{2}\right)} = \frac{x}{x} \times 2 = \frac{2}{1}$

$\therefore \text{Ratio of the length and the breadth of the plot } = 2:1$

Q8

Answer :

(b) 200 cm^2

Area of the square = $\left\{\frac{1}{2} \times \left(\text{Diagonal}\right)^2\right\}$ sq units

$$= \left\{\frac{1}{2} \times \left(20\right)^2\right\} \text{ cm}^2$$
$$= \left\{\frac{1}{2} \times \left(20\right) \times \left(20\right)\right\} \text{ cm}^2$$
$$= \left(20 \times 10\right) \text{ cm}^2$$
$$= 200 \text{ cm}^2$$

Q9

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Answer :

(c) 20 m

Let one side of the square field be *x* m.

Total cost of fencing a square field = Rs 2000

Rate of fencing the field = Rs 25/m

$$\text{Perimeter of the square field} = \frac{\text{Total cost of fencing the field}}{\text{Rate of fencing the field}} = \frac{\text{Rs } 2000}{\text{Rs } 25/\text{m}} = \frac{2000}{25}\ \text{m} = 80\ \text{m}$$

Perimeter of the square field = $(4 \times \text{side}) = 4x$ m

$\Rightarrow 4x = 80$

$\Rightarrow x = \frac{80}{4}$

$\Rightarrow x = 20$

Each side of the field is 20 m.

Q10

Answer :

(b) 22 cm

$\text{Radius} = \frac{\text{Diameter}}{2} = \frac{7}{2}$ cm

$\text{Circumference of the circle} = 2\pi r = \left(2 \times \frac{22}{7} \times \frac{7}{2}\right)$ cm

$= 22$ cm

Q11

Answer :

(a) 28 cm

Circumference of the circle is 88 cm.

Let the radius be r cm.

It is given that the circumference of the circle is $(2\pi r)$ cm.

$\Rightarrow 2\pi r = 88$

$\Rightarrow 2 \times \frac{22}{7} \times r = 88$

$\Rightarrow r = \frac{1}{2} \times \frac{7}{22} \times 88$

$\Rightarrow r = 14$

$\therefore$ Radius $= 14$ cm

$\text{Diameter} = (2 \times \text{Radius}) = (2 \times 14)$ cm $= 28$ cm

Q12

Answer :

(b) 110 m

$\text{Radius of the wheel} = \frac{\text{Diameter}}{2} = \frac{70}{2} = 35$ cm

$\text{Circumference of the wheel} = 2\pi r = \left(2 \times \frac{22}{7} \times 35\right)$ cm $= 220$ cm

The distance covered by the wheel in one revolution is equal to its circumference.

Distance covered by the wheel in 1 revolution $= 220$ cm

$\therefore$ Distance covered by the wheel in 50 revolution $= (50 \times 220)$ cm $= 11000$ cm

$= 110$ m

Q13

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Answer :

(d) 80000
Length of the road = 150 m = 15000 cm
Breadth of the road = 9 m = 900 cm
Area of the road = (Length × Breadth)
= (15000 × 900) cm^2
= 13500000 cm^2

Length of the brick = 22.5 cm
Breadth of the brick = 7.5 cm
Area of one brick = (Length × Breadth)
= (22.5 × 7.5) cm^2
= 168.75 cm^2

$$\text{Number of bricks} = \frac{\text{Area of the road}}{\text{Area of one brick}}$$
$$= \frac{13500000\ cm^2}{168.75\ cm^2} = 80000 \text{ bricks}$$

Q14

Answer :

(b) 24.3 m^2

Length of the room = 5 m 40 cm = 5.40 m
Breadth of the room = 4 m 50 cm = 4.50 m

$$\text{Area of the room} = (\text{Length} \times \text{Breadth}) = (5.40 \times 4.50)\ m^2$$
$$= \left(\frac{540}{100} \times \frac{450}{100}\right) m^2$$
$$= \left(\frac{27}{5} \times \frac{9}{2}\right) m^2$$
$$= \frac{243}{10}\ m^2 = 24.3\ m^2$$

Q16

Answer :

(b) 64 cm
Side of the square = 16 cm
Perimeter of the square = (4 × side)
= (4 × 16) cm
= 64 cm

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