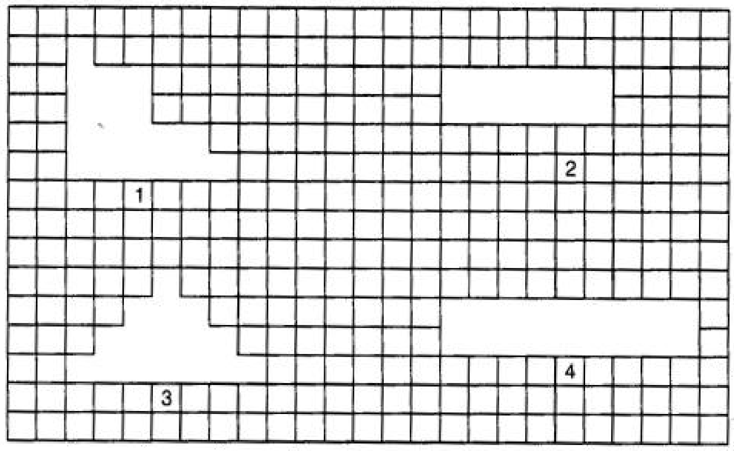
Unit 9(Perimeter & Area)

Multiple Choice Questions (MCQs)

Question 1

Observe the shapes 1, 2, 3 and 4 in the figures. Which of the following statements is not correct?



(a) Shapes 1, 3 and 4 have different areas and different perimeters

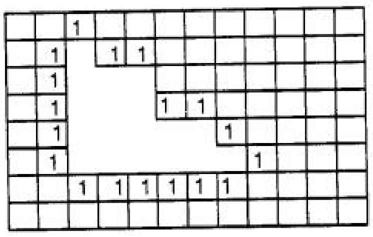
(b) Shapes 1 and 4 have the same areas as well as the same perimeters

(c) Shapes 1, 2 and 4 have the same areas

(d) Shapes 1, 3 and 4 have the same perimeters

Solution:

(a) **Shape 1**



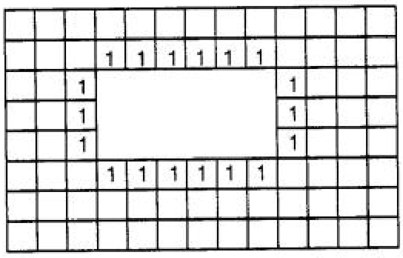
Perimeter = 1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1

= 22 units

Area = 18 × 1

= 18 sq units

Shape 2



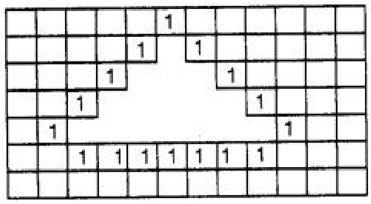
Perimeter = 1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1

= 18 units

Area = 18 × 1

= 18 sq units

Shape 3



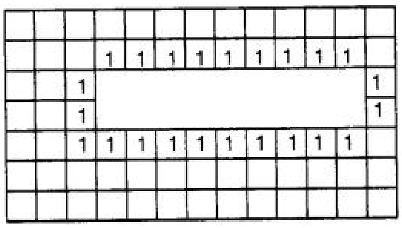
Perimeter = 1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1

= 22 units

Area = 16 × 1

= 16 sq units

Shape 4



Perimeter = 1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1

= 22 units

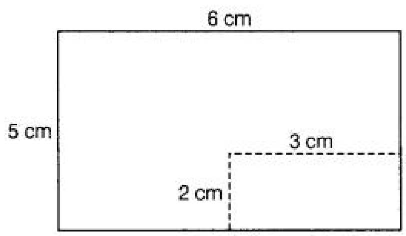
Area = 18 × 1

= 18 sq units

So, only option (a) is false.

Question 2:

A rectangular piece of dimensions 3 cm x 2 cm was cut from a rectangular sheet of paper of dimensions 6 cm x 5 cm (see the figure). Area of remaining sheet of paper is



(a) 30 cm^2 (b) 36 cm^2 (c) 24 cm^2 (d) 22 cm^2

Solution:

(c) Given dimensions of the bigger rectangle are 6 cm and 5 cm.

$\therefore$ Area of bigger rectangle = 6 cm × 5 cm 30 cm^2

[$\because$ area of rectangle = length × breadth]

Also given, dimensions of the smaller rectangle are 3 cm and 2 cm.

$\therefore$ Area of smaller rectangle = 3 cm × 2 cm = 6 cm^2

$\therefore$ Area of remaining sheet of paper = Area of bigger rectangle − Area of smaller rectangle

$= (30 - 6) cm^2 = 24 cm^2$

Question 3:

36 unit squares are joined to form a rectangle with the least perimeter. Perimeter of the rectangle is

(a) 12 units (b) 26 units (c) 24 units (d) 36 units

Solution:

(b) Area of rectangle formed = 36 units

We have,

$$36 = 6 \times 6 = 2 \times 3 \times 2 \times 3 = 2^2 \times 3^2 = 4 \times 9$$

So, the sides of a rectangle are 4 cm and 9 cm.

$\therefore$ Perimeter

$$= 2(l + b) = 2(4 + 9) = 2 \times 13 = 26 \text{ units}$$

Question 4:

A wire is bent to form a square of side 22 cm. If the wire is rebent to form a circle, its radius is

(a) 22 cm (b) 14 cm (c) 11 cm (d) 7 cm

Solution:

(b) Given, side of a square = 22 cm

Perimeter of square and circumference of circle are equal, because the wire has same length.

According to the question,

Perimeter of square = Circumference of circle

$\Rightarrow \quad 4 \times (\text{Side}) = 2 \times \pi \times r$

$\Rightarrow \quad 4 \times 22 = 2 \times \frac{22}{7} \times r \qquad \left[\because \pi = \frac{22}{7}\right]$

$\Rightarrow \quad r = \frac{4 \times 22 \times 7}{2 \times 22}$

$\Rightarrow \quad r = 14 \text{ cm}$

Hence, the radius is 14 cm.

Question 5:

Area of the circle obtained in Q.4 is

(a) 196 cm^2 (b) 212 cm^2 (c) 616 cm^2 (d) 644 cm^2

Solution:

Area of the circle = $\pi r^2 = \frac{22}{7} \times 14 \times 14 = 616 \text{ cm}^2$ [$\because r = 14$ cm, find above]

Question 6:

Area of a rectangle and the area of a circle are equal. If the dimensions of the rectangle are 14 cm x 11 cm, then radius of the circle is

(a) 21 cm (b) 10.5 cm (c) 14 cm (d) 17 cm

Solution:

(d) Given, dimensions of rectangle, $l = 14$ cm and $b = 11$ cm

According to the question,

Area of rectangle = Area of circle

$\Rightarrow \quad l \times b = \pi r^2$

$\Rightarrow \quad 14 \times 11 = \frac{22}{7} \times r^2 \Rightarrow r^2 = \frac{14 \times 11 \times 7}{22}$ $\left[\because \pi = \frac{22}{7}\right]$

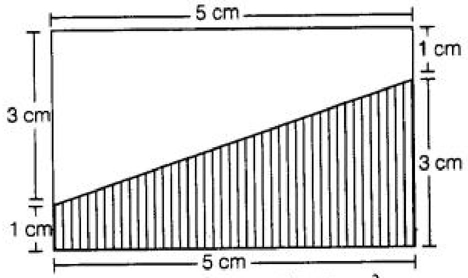
$\Rightarrow \quad r^2 = 49 \Rightarrow r = \sqrt{49}$

$\Rightarrow \quad r = 7$ cm

Hence, the radius of circle is 7 cm.

Question 7:

Area of shaded portion in the figure given below is



(a) 25 cm^2 (b) 15 cm^2
(c) 14 cm^2 (d) 10 cm^2

Solution:

(d) From the given figure,

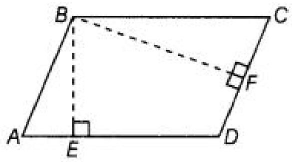
Length of rectangle $(l) = 5$ cm and breadth of rectangle $(b) = 3 + 1 = 4$ cm

$\therefore$ Area of shaded portion $= \frac{1}{2} \times$ Area of rectangle $= \frac{1}{2} \times (l \times b)$

$= \frac{1}{2} \times 5 \times 4 = 10\ cm^2$

Question 8:

Area of parallelogram ABCD (see the figure) is not equal to



(a) $DE \times DC$ (b) $BE \times AD$
(c) $BF \times DC$ (d) $BE \times BC$

Solution:

(a) We know that,

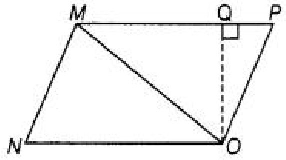
Area of parallelogram = Base x Corresponding Height

So, area of parallelogram ABCD = AD x BE = BCx BE [∵ AD = BC]

or area of parallelogram ABCD = DC xBF

Question 9:

Area of Δ MNO in the figure is



(a) $\frac{1}{2} MN \times NO$ (b) $\frac{1}{2} NO \times MO$
(c) $\frac{1}{2} MN \times OQ$ (d) $\frac{1}{2} NO \times OQ$

Solution:

(d) We know that,

$$\text{Area of triangle} = \frac{1}{2} \times \text{Base} \times \text{Height}$$

$$= \frac{1}{2} \times NO \times OQ$$

Question 10:

Ratio of area of ΔMNO to the area of parallelogram MNOP in the same figure of Q.9 is

(a) 2 : 3 (b) 1 : 1

(c) 1:2 (d) 2 : 1

Solution:

(c) Area of ΔMNO : Area of parallelogram $MNOP$

$$= \frac{1}{2} \times \text{Base} \times \text{Height} : \text{Base} \times \text{Corresponding Height}$$

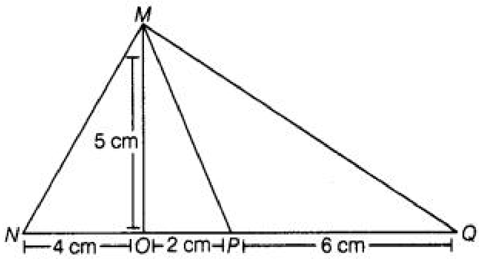
$$= \frac{1}{2} \times NO \times OQ : MP \times OQ = \frac{1}{2} \times NO : NO \qquad [\because NO = MP]$$

$$= 1 : 2$$

Hence, the required ratio is 1 : 2.

Question 11:

Ratio of areas of ΔMNO, ΔMOP and ΔMPQ in the given figure is



(a) 2 : 1 : 3 (b) 1 : 3 : 2

(c) 2 : 3 : 1 (d) 1 : 2 : 3

Solution:

(a) From the given figure,

$$\text{Area of } \Delta MNO = \frac{1}{2} \times NO \times MO = \frac{1}{2} \times 4 \times 5 = 10\text{cm}^2$$

$$\left[\because \text{area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}\right]$$

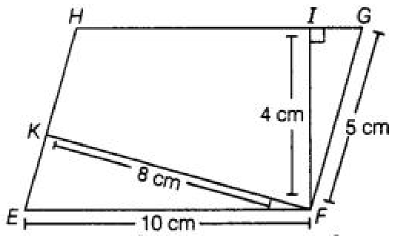
$$\text{Area of } \Delta MOP = \frac{1}{2} \times OP \times MO = \frac{1}{2} \times 2 \times 5 = 5\text{cm}^2$$

$$\text{Area of } \Delta MPQ = \frac{1}{2} \times PQ \times MO = \frac{1}{2} \times 6 \times 5 = 15\text{cm}^2$$

Hence, required ratio = 10 : 5 : 15 = 2 : 1 : 3

Question 12:

In the given figure, EFGH is a parallelogram, altitudes FK and FI are 8 cm and 4 cm, respectively. If EF = 10 cm, then the area of EFGH is



(a) 20 cm^2 (b) 32 cm^2 (c) 40 cm^2 (d) 80 cm^2

Solution:

(c) In parallelogram EFGH, EF = HG = 10 cm [Given]

Area of parallelogram EFGH = Base x Corresponding height =10 x 4 = 40 cm^2

Question 13:

In reference to a circle the value of π is equal to

(a) $\frac{\text{Area}}{\text{Circumference}}$ (b) $\frac{\text{Area}}{\text{Diameter}}$ (c) $\frac{\text{Circumference}}{\text{Diameter}}$ (d) $\frac{\text{Circumference}}{\text{Radius}}$

Solution:

(c) We know that,

Circumference of a circle $= 2\pi r$

Circumference $= \pi \times$ Diameter [∵ diameter $= 2r$]

$\Rightarrow \quad \pi = \frac{\text{Circumference}}{\text{Diameter}}$

Question 14:

Circumference of a circle is always

(a) more than three times of its diameter

(b) three times of its diameter

(c) less than three times of its diameter

(d) three times of its radius

Solution:

(a) We know that,

Circumference of a circle = 2πr

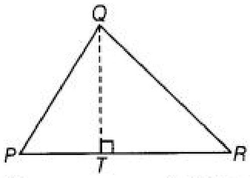
∴ Circumference = 2 x 3.14 x r [∵ π = 3.14]

⇒ Circumference = 3.14 x d [∵ d = 2r]

So, circumference of circle is always more than three times of its diameter.

Question 15:

Area of Δ PQR is 100 cm^2 as shown in the below figure. If altitude QT is 10 cm, then its base PR is



(a) 20 cm (b) 15 cm (c) 10 cm (d) 5 cm

Solution:

(a) Given, area of $\Delta PQR = 100\,cm^2$

We know that,

Area of a triangle $= \frac{1}{2} \times$ Base $\times$ Height

∴ Area of $\Delta PQR = \frac{1}{2} \times PR \times QT$

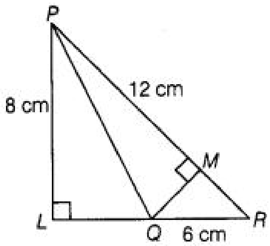
$\Rightarrow \quad 100 = \frac{1}{2} \times PR \times 10$ [∵ $QT = 10$ cm, given]

$\Rightarrow \quad PR = \frac{100 \times 2}{10}$

$\Rightarrow \quad PR = 20$ cm

Question 16:

In the given figure, if PR = 12 cm, QR = 6 cm and PL = 8 cm, then QM is



(a) 6 cm (b) 9 cm (c) 4 cm (d) 2 cm

Solution:

(c) Given that, PR = 12 cm, QR = 6 cm and PL = 8 cm

Now, in right angled APLR, using Pythagoras theorem,

$(\text{Hypotenuse})^2 = (\text{Perpendicular})^2 + (\text{Base})^2$

$\Rightarrow \quad PR^2 = PL^2 + LR^2$

$\Rightarrow \quad LR^2 = PR^2 - PL^2 = (12)^2 - (8)^2$

$\Rightarrow \quad LR^2 = 144 - 64 = 80$

$\Rightarrow \quad LR = \sqrt{80} = 4\sqrt{5}$ cm

$\because \quad LR = LQ + QR \Rightarrow LQ = LR - QR = (4\sqrt{5} - 6)$ cm

Now, area of ΔPLR,

$$A_1 = \frac{1}{2} \times LR \times PL$$
$$= \frac{1}{2} \times (4\sqrt{5}) \times 8$$
$$= 16\sqrt{5} \text{ cm}^2$$

Again, area of ΔPLQ,

$$A_2 = \frac{1}{2} \times LQ \times PL$$
$$= \frac{1}{2} \times (4\sqrt{5} - 6) \times 8$$
$$= (16\sqrt{5} - 24) \text{cm}^2$$

$\therefore$ Area of ΔPLR = Area of ΔPLQ + Area of ΔPQR

$\Rightarrow \quad 16\sqrt{5} = (16\sqrt{5} - 24) +$ Area of ΔPQR

$\Rightarrow \quad$ Area of $\Delta PQR = 24 \text{ cm}^2$

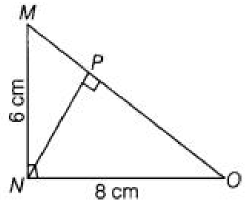
$\Rightarrow \quad \frac{1}{2} \times PR \times QM = 24$

$\Rightarrow \quad \frac{1}{2} \times 12 \times QM = 24$

$\therefore \quad QM = 4$cm

Question 17:

In the given figure, ΔMNO is a right angled triangle. Its legs are 6 cm and 8 cm long. Length of perpendicular NP on the side MO is



(a) 4.8 cm (b) 3.6 cm (c) 2.4 cm (d) 1.2 cm

Solution:

(a) Given, ΔMNO is a right angled triangle.

So, according to Pythagoras theorem,

$$MO^2 = MN^2 + NO^2 = 6^2 + 8^2 = 36 + 64$$

$\Rightarrow \quad MO^2 = 100 \Rightarrow MO = \sqrt{100}$

$\Rightarrow \quad MO = 10$ cm

$\therefore$ Area of $\Delta MNO = \frac{1}{2} \times \text{Base} \times \text{Height}$

$\Rightarrow \quad \frac{1}{2} \times MN \times NO = \frac{1}{2} \times MO \times NP$

$\Rightarrow \quad \frac{1}{2} \times 6 \times 8 = \frac{1}{2} \times 10 \times NP$

$\Rightarrow \quad NP = \frac{24}{5}$

$\Rightarrow \quad NP = 4.8$ cm

Question 18:

Area of a right angled triangle is 30 cm^2. If its smallest side is 5 cm, then its hypotenuse is

(a) 14 cm (b) 13 cm (c) 12 cm (d) 11 cm

Solution:

(b) Given, area of a right angled triangle = 30 cm^2
and smallest side i.e. base = 5 cm
We know that,
Area of right angled triangle = $\frac{1}{2} \times$ Base $\times$ Height

$\therefore \quad 30 = \frac{1}{2} \times 5 \times \text{Height}$

$\Rightarrow \quad \text{Height} = \frac{30 \times 2}{5}$

$\Rightarrow \quad \text{Height} = 12 \text{ cm}$

Now, according to Pythagoras theorem,
$(\text{Hypotenuse})^2 = (\text{Perpendicular})^2 + (\text{Base})^2$

$\Rightarrow \quad (\text{Hypotenuse})^2 = (12)^2 + (5)^2 \quad$ [$\because$ height = perpendicular]

$\Rightarrow \quad (\text{Hypotenuse})^2 = 144 + 25$

$\Rightarrow \quad (\text{Hypotenuse})^2 = 169$

$\Rightarrow \quad \text{Hypotenuse} = \sqrt{169}$

$\Rightarrow \quad \text{Hypotenuse} = 13 \text{ cm}$

Question 19:

Circumference of a circle of diameter 5 cm is

(a) 14 cm (b) 31.4 cm (c) 15.7 cm (d) 1.57 cm

Solution:

(c) Given, diameter of a circle = 5 cm

$\therefore$ Radius = $\frac{5}{2}$ cm $\quad \left[\because \text{radius} = \frac{\text{diameter}}{2}\right]$

Now, circumference = $2\pi r = 2 \times \frac{22}{7} \times \frac{5}{2} = \frac{110}{7} = 15.7$ cm

Question 20:

Circumference of a circular disc is 88 cm. Its radius is

(a) 8 cm (b) 11 cm (c) 14 cm (d) 44 cm

Solution:

(c) We know that, circumference = $2\pi r$

$\Rightarrow \quad 88 = 2 \times \frac{22}{7} \times r \quad \Rightarrow \quad r = \frac{88 \times 7}{2 \times 22}$ [$\because$ circumference = 88 cm, given]

$\Rightarrow \quad r = 14 \text{ cm}$

Hence, the radius is 14 cm.

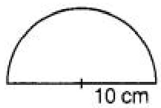
Question 21:

Length of tape required to cover the edges of a semi-circular disc of radius 10 cm is

(a) 62.8 cm (b) 51.4 cm (c) 31.4 cm (d) 15.7 cm

Solution:

(b) In order to find the length of tape required to cover the edges of a semi-circular disc, we have to find the perimeter of semi-circle



From the above figure it is clear that,

Perimeter of semi-circle = Circumference of semi-circle + Diameter

$\because$ Circumference of semi-circle = $\frac{2\pi r}{2} = \pi \times r = \frac{22}{7} \times 10 = \frac{220}{7} = 31.4$ cm

$\therefore$ Total tape required = $31.4 + 2 \times 10 = 51.4$ cm $\quad$ [$\because$ diameter = 2 $\times$ radius]

Question 22:

Area of a circular garden with diameter 8 m is

(a) $12.56 m^2$ (b) $25.12 m^2$ (c) $50.24 m^2$ (d) $2000.96 m^2$

Solution:

(c) Given, diameter = 8 m

So, radius $= \frac{8}{2} m = 4 m$ $\left[\because \text{radius} = \frac{\text{diameter}}{2}\right]$

$\therefore$ Area of circular garden $= \pi r^2 = \frac{22}{7} \times 4 \times 4 = 50.24 m^2$

Question 23:

Area of a circle with diameter (m), radius (n) and circumference (p) is

(a) $2\pi n$ (b) πm^2 (c) πp^2 (d) πn^2

Solution:

(d) Given, diameter = m, radius = n and circumference = p

$\therefore$ Area of circle $= \pi r^2 = \pi n^2$

Question 24:

A table top is semi-circular in shape with diameter 2.8 m. Area of this table top is

(a) 3.08 m^2 (b) 6.16 m^2 (c) 12.32 m^2 (d) 24.64 m^2

Solution:

(a) Given, diameter = 2.8 m

Now, radius $= \frac{2.8}{2} m = 1.4 m$ $\left[\because \text{radius} = \frac{\text{diameter}}{2}\right]$

$\therefore$ Area of table top = Area of semi-circle $= \frac{\pi r^2}{2} = \frac{22}{7} \times \frac{1.4}{2} \times 1.4 = 3.08 m^2$

Question 25:

If 1 m^2 = x mm^2, then the value of x is

(a) 1000 (b) 10000 (c) 100000 (d) 1000000

Solution:

(d) Given, $1 m^2 = x\, mm^2$

$\therefore$ $(1000\, mm)^2 = x\, mm^2$ $[\because 1\, m = 1000\, mm]$

$\Rightarrow$ $1000000\, mm^2 = x\, mm^2$

$\Rightarrow$ $x = 1000000$

Question 26:

If p squares of each side 1mm makes a square of side 1cm, then p is equal to

(a) 10 (b) 100

(c)1000 (d) 10000

Solution:

(b) $\because$ Area of 1 square of side 1 mm $= 1 \times 1\, mm^2 = 1\, mm^2$ $[\because \text{area of square} = (\text{side})^2]$

Area of square of side 1 cm $= 1 \times 1 cm^2 = 1 cm^2$

According to the question,

Area of sqaures of side 1mm = Area of square side 1cm

$\Rightarrow$ $p \times 1 mm^2 = 1 cm^2$ $\Rightarrow$ $p\, mm^2 = 1 cm^2$

$\Rightarrow$ $p\, mm^2 = (10\, mm)^2$ $[\because 1\, cm = 10\, mm]$

$\Rightarrow$ $p\, mm^2 = 100\, mm^2$

So, $p = 100$

Question 27:

12 m^2 is the area of

(a) a square with side 12m (b) 12 squares with side 1 m each

(c) 3 squares with side 4 m each (d) 4 squares with side 3 m each

solution:

(b) For option (a), Area of a square with side 12 cm = $12 \times 12 = 144\ m^2$

[∵ area of square = $(side)^2$]

For option (b), Area of 12 squares with side 1 m each = $12 \times 1 \times 1 = 12\ m^2$

For option (c), Area of 3 squares with side 4 m each = 3 × Area of square of side 4 m

$= 3 \times 4 \times 4 = 48 m^2$

For option (d), Area of 4 squares with side 3 m = 4 × Area of square of side 3 m

$= 4 \times 3 \times 3 = 36 m^2$

Hence, option (b) is correct.

Question 28:

If each side of a rhombus is doubled, how much will its area increase?

(a) 1.5 times (b) 2 times

(c) 3 times (d) 4 times

Solution:

(b) Let b be the side and h be the height of a rhombus.

∴ Area of rhombus = b x h [∵ area of rhombus = base x corresponding height]

If each side of rhombus is doubled, then side of rhombus = 2b

Now, area of rhombus = 2b x h = 2(b x h) = 2 times of original

Hence, the area of rhombus will be increased by 2 times.

Question 29:

If the sides of a parallelogram are increased to twice its original lengths, how much will the perimeter of the new parallelogram increase?

(a) 1.5 times (b) 2 times

(c) 3 times (d) 4 times

Solution:

(b) Let the length and breadth of the parallelogram be l and b, respectively.

Then, perimeter = 2(1 + b) [∵ perimeter of parallelogram = 2 x (length + breadth)]

If both sides are increased twice, then new length and breadth will be 21 and 2b, respectively.

Now, new perimeter = 2(21 + 2b) = 2 x 2(l + b) = 2 times of original perimeter.

Hence, the perimeter of parallelogram will be increased 2 times.

Question 30:

If radius of a circle is increased to twice its original length, how much will the area of the circle increase?

(a) 1.4 times (b) 2 times (c) 3 times (d) 4 times

Solution:

(d) Let r be the radius of the circle.

∴ Area of circle = π^2

If radius is increased to twice its original length, then radius will be 2r.

Now, area of new circle = $\pi(2r)^2 = 4\pi^2$ = 4 times of original area

Hence, the area of circle will be increased by 4 times.

Question 31:

What will be the area of the largest square that can be cut-out of a circle of radius 10 cm?

(a) 100 cm^2 (b) 200 cm^2 (c) 300 cm^2 (d) 400 cm^2

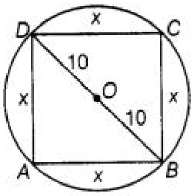
Solution:

(b) Given, radius of circle = 10 cm

The largest square that can be cut-out of a circle of radius 10 cm will have its diagonal equal to the diameter of the circle.

Let the side of a square be x

Then, area of the square $= x \times x = x^2 \text{ cm}^2$ [$\because$ area of square $= (\text{side})^2$]



Now, in right angled ΔDAB,

$(BD)^2 = (AD)^2 + (AB)^2$ [by Pythagoras theorem]

$\because$ $(20)^2 = x^2 + x^2$

[$\because$ diagonal = diameter and diameter $= 2 \times$ radius $= 2 \times 10 = 20$ cm]

$\Rightarrow$ $2x^2 = 400$

$\Rightarrow$ $x^2 = 200$

$\therefore$ $(\text{Side})^2 = 200$

Hence, the area of the largest square is 200 cm^2.

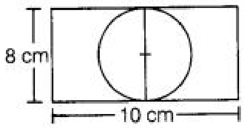
Question 32:

What is the radius of the largest circle that can be cut-out of the rectangle measuring 10 cm in length and 8 cm in breadth?

(a) 4 cm (b) 5 cm (c) 8 cm (d) 10 cm

Solution:

(a)



From the above figure, it is clear that largest circle will have diameter equals smaller side i.e. 8 cm.

So, diameter = 8 cm

$\therefore$ Radius $= \frac{\text{Diameter}}{2} =$ 4 cm

Question 33:

The perimeter of the figure ABCDEFGHIJ is

(a) Perimeter = Sum of all sides

So, $AJ + JI + IH + HG + GF + FE + ED + CD + BC + AB$

$= (AJ + IH + GF + BC) + 3 + 5 + 2 + 20 + 4 + 6$

$= DE + 40$ [$\because AJ + IH + GF + BC = DE$]

$= 20 + 40 = 60$ cm

Solution:

(b) Let the radius of circle be R.

$\therefore$ Area of circle $= \pi R^2$

$\Rightarrow$ $81\pi r^2 = \pi R^2$ $\Rightarrow$ $R = \sqrt{81 r^2}$

$\Rightarrow$ $R = 9r$

Now, circumference of circle $= 2\pi R = 2\pi(9r) = 18\pi r$

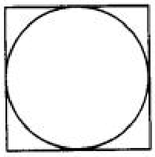
Question 34:

The circumference of a circle whose area is $81\pi r^2$, is

(a) $9\pi r$ (b) $18\pi r$ (c) $3\pi r$ (d) $81\pi r$

Solution:

(b) Let the side of square be a cm.



Given, area of square = $100\,cm^2$

$\therefore$ Area of square $= a^2$

$\Rightarrow \quad a^2 = 100\,cm^2 \quad$ [$\because$ area of square = $(side)^2$]

$\Rightarrow \quad a = \sqrt{100}$

$\Rightarrow \quad a = 10\,cm$

Now, for the largest circle in the square, diameter of the circle must be equal to the side of square.

$\therefore$ Diameter = Side of a square = 10 cm

$\Rightarrow \quad 2r = 10\,cm \quad$ [$\because$ diameter = $2 \times$ radius]

$\Rightarrow \quad r = 5\,cm$

$\therefore$ Circumference of the circle $= 2\pi r = 2 \times \pi \times 5 = 10\pi\,cm$

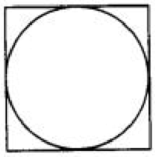
Question 35:

The area of a square is 100 cm^2. The circumference (in cm) of the largest circle cut of it is

(a) 5π (b) 10π (c) 15π (d) 20π

Solution:

(b) Let the side of square be a cm.



Given, area of square = $100\,cm^2$

$\therefore$ Area of square $= a^2$

$\Rightarrow \quad a^2 = 100\,cm^2 \quad$ [$\because$ area of square = $(side)^2$]

$\Rightarrow \quad a = \sqrt{100}$

$\Rightarrow \quad a = 10\,cm$

Now, for the largest circle in the square, diameter of the circle must be equal to the side of square.

$\therefore$ Diameter = Side of a square = 10 cm

$\Rightarrow \quad 2r = 10\,cm \quad$ [$\because$ diameter = $2 \times$ radius]

$\Rightarrow \quad r = 5\,cm$

$\therefore$ Circumference of the circle $= 2\pi r = 2 \times \pi \times 5 = 10\pi\,cm$

Question 36:

If the radius of a circle is tripled, the area becomes

(a) 9 times (b) 3 times (c) 6 times (d) 30 times

Solution :

(a) Let r be the radius of a circle.

$\therefore$ Area of circle = πr^2

If radius is tripled, then new radius will be 3r.

$\therefore$ Area of new circle = $\pi(3r)^2 = 9\pi^2$ = 9 times of original

Hence, the area of a cirlce becomes 9 times to the original area.

Question 37:

The area of a semi-circle of radius 4r is

(a) $8\pi r^2$ (b) $4\pi r^2$ (c) $12\pi r^2$ (d) $2\pi r^2$

Solution :

(a) Given, radius of semi-circle = 4r

$\because$ Area of semi-circle $= \frac{1}{2} \times \pi r^2$

$= \frac{1}{2} \times \pi \times (4r)^2 = \frac{16}{2}\pi r^2 = 8\pi r^2$

Fill in the Blank

In questions 38 to 56, fill in the blanks to make the statements true.

Question 38:

Perimeter of a regular polygon = Length of one side x_________

Solution :

Perimeter of regular polygon = Length of one side x**Number of sides.**

Question 39:

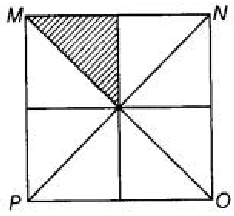
If a wire in the shape of a square is rebent into a rectangle, then the________of both shapes remain same, but______may vary.

Solution :

When we change the shape, then the**perimeter** remains same as the length of wire is fixed, but **area** changes as shape changes.

Question 40:

Area of the square MNOP of the given figure is 144 cm^2. Area of each triangle is______ .



Solution :

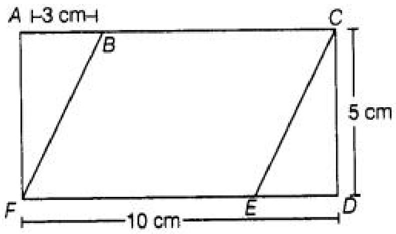
Given, area of square MNOP = 144 cm^2

Since, there are 8 identical triangles in the given square MNOP.

Hence, area of each triangle =1/8 x Area of square MNOP= 1/8 x 144= 18 cm^2

Question 41:

In the given figure, area of parallelogram BCEF is________ cm^2, where ACDF is rectangle.



Solution :

Area of parallelogram $BCEF$ = Area of rectangle $ACDF$ − Area of ΔABF − Area of ΔCDE

$$= 10 \times 5 - 2 \times \left(\frac{1}{2} \times 3 \times 5\right) \quad [\because \text{area of } \Delta ABF = \text{area of } \Delta CDE]$$

$$= 50 - 15 = \mathbf{35}\, cm^2$$

$$[\because \text{area of tringle} = \frac{1}{2} \times \text{base} \times \text{height and area of rectangle} = \text{length} \times \text{breadth}]$$

Question 42:

To find area, any side of a parallelogram can be chosen as__________ of the parallelogram.

Solution :

While calculating the area of the parallelogram, we can choose any side as**base.**

Question 43:

Perpendicular dropped on the base of a parallelogram from the opposite vertex is known as the corresponding______of the base.

Solution :

Perpendicular dropped on the base of a parallelogram from the opposite vertex is known as the corresponding **height/altitude** of the base.

Question 44:

The distance around a circle is its______

Solution :

The distance around a circle is its **circumference.**

In case of circle, perimeter is known as circumference.

Question 45:

Ratio of the circumference of a circle to its diameter is denoted by symbol_______.

Solution :

$\because$ Circumference $= 2\pi r$

$\Rightarrow \quad C = \pi d \quad [\because d = 2r]$

$\Rightarrow \quad \frac{C}{d} = \pi \quad \Rightarrow \quad \pi = C : d$

Hence, π is the answer.

Question 46:

If area of a triangular piece of cardboard is 90 cm^2, then the length of altitude corresponding to 20 cm long base is_____cm.

Solution :

Area of triangle $= \frac{1}{2} \times$ Base $\times$ Height

$\Rightarrow \quad 90 = \frac{1}{2} \times 20 \times h \quad \Rightarrow \quad h = 9\,\text{cm}$

$\therefore$ Altitude or height = **9** cm.

Question 47:

Value of n is____________ approximately.

Solution :

We know that, π = 22/7 =**3.14**

Question 48:

Circumference C of a circle can be found by multiplying diameter d with_____.

Solution :

∵ Circumference = 2πr

Since, diameter (d) = 2r

So, C = π x d

Hence, π is the answer.

Question 49:

Circumference 'C' of a circle is equal to 2π x______.

Solution :

Circumference = 2π x r

Hence, r is the answer.

Question 50:

1 m^2 =_____ cm^2

Solution :

We know that, 1 m = 100 cm

$\therefore$ 1 m^2 =$(100)^2 cm^2$

$\Rightarrow$ 1m^2=**10000** cm^2

Question 51:

$11\ cm^2$ = _______ mm^2

Solution :

We know that, 1 cm = 10 mm

$\therefore 1\ cm^2 = (10)^2\ mm^2 = \mathbf{100}\ mm^2$

Question 52:

1 hectare = ________ m^2

Solution :

1 hectare = **10000** m^2

Question 53:

Area of triangle = 1/2 x base x______.

Solution :

Area of triangle = 1/2 x Base x**Height.**

Question 54:

$1\ km^2$ = _______ m^2

Solution :

We know that, 1 km = 1000 m

$\therefore 1\ km^2 = (1000)^2\ m^2 = \mathbf{1000000}\ m^2$

Question 55:

Area of a square of side 6 m is equal to the area of________________ squares of each side 1 cm.

Solution :

Let number of squares having side 1 cm = x

According to the question,

Area of side 6 m square = Area of side 1 cm square [$\because$ area of square = $(\text{side})^2$]

$\therefore \quad (6\ m)^2 = x \times (1\ cm)^2$ [$\because$ 1 m = 100 cm]

$\Rightarrow \quad (600\ cm)^2 = x \times (1\ cm)^2$

$\Rightarrow \quad 360000\ cm^2 = x\ cm^2$

$\Rightarrow \quad x = 360000$

Question 56:

$10\ cm^2$ = ______ m^2.

Solution :

$\because 10\,cm^2 = 10\left(\frac{1}{100}\right)^2 m^2 = \frac{10}{10000} m^2$ $\left[\because 1\ cm = \frac{1}{100} m\right]$

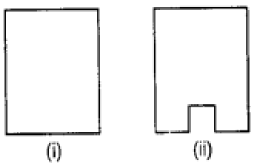
$\Rightarrow 10\ cm^2 = \frac{1}{1000} m^2$

$\therefore 10\ cm^2 = \mathbf{0.001}\ m^2$

True/False

Question 57:

In the given figure, perimeter of (ii) is greater than that of (i), but its area is smaller than that of (i).



Solution :

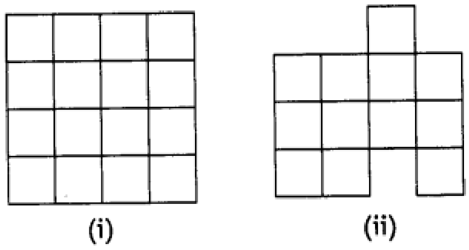
True

Perimeter is the sum of sides of any polygon and area is space that the polygon required. So, by observing the figures we can say that, perimeter of (ii) is greater than (i) and area is less than that of (i).

Question 58:

In the given figure,

(a) Area of (i) is the same as the area of (ii)



(b) Perimeter of (ii) is the same as (i).

(c) If (ii) is divided into squares of unit length, then its area is 13 unit squares.

(d) Perimeter of (ii) is 18 units.

Solution :

(a) **True**

Area of both figures is same, because in both number of blocks are same.

(b) **False**

Because 2 new sides are added in (ii). So, the perimeter of (ii) is greater than (i).

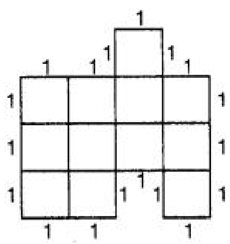
(c) **False**

∴ Area of 1 square = 1 x 1 = 1 unit squares

∵ Number of squares = 12 So, total area = 12 x 1 = 12 unit squares

(d) **True**

∵ Perimeter is the sum of all sides. So, it is 18 units.



Question 59:

If perimeter of two parallelograms are equal, then their areas are also equal.

Solution :

False

Their corresponding sides and height may be different. So, area cannot be equal.

Question 60:

All congruent triangles are equal in area.

Solution :

True

Congruent triangles have equal shape and size. Hence, their areas are also equal.

Question 61:

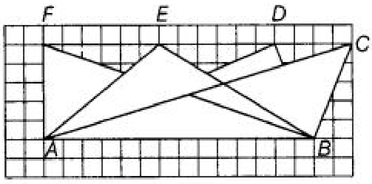
All parallelograms having equal areas have same perimeters.

Solution :

False

It is not necessary that all parallelograms having equal areas have same perimeters as their base and height may be different.

In questions 62 to 65, observe all the four triangles FAB, EAB, DAB and CAB as shown in the given figure.



Question 62:

All triangles have the same base and the same altitude.

Solution :

True

It is clear from the figure that all triangles have same base AB and all the vertices lie on the same line, so the distance between vertex and base of triangle (i.e. length of altitude) are equal.

Question 63:

All triangles are congruent.

Solution :

False

It is clear from the figure that all triangles have only base line is equal and no such other lines are equal to each other.

Question 64:

All triangles are equal in area.

Solution :

True

Because the triangles on same base and between same parallel lines have equal in area.

Question 65:

All triangles may not have the same perimeter.

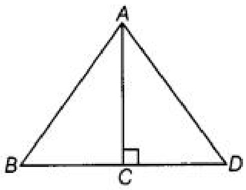
Solution :

True

It is clear from the figure that all triangles may not have the same perimeter.

Question 66:

In the given figure, ratio of the area of ΔABC to the area of ΔACD is the same as the ratio of base BC of ΔABC to the base CD of ΔACD.



Solution :

True

$\because$ Area of ΔABC : Area of $\Delta ACD = \frac{1}{2} \times BC \times AC : \frac{1}{2} \times CD \times AC$

[$\because$ area of triangle = base × height]

$= BC : CD$

Question 67:

Triangles having the same base have equal area.

Solution :

False

∵ Area of triangle = 1/2 x Base x Height

So, area of triangle does not only depend on base, it also depends on height. Hence, if triangles have equal base and equal height, then only their areas are equal.

Question 68:

Ratio of circumference of a circle to its radius is always Zπ : 1.

Solution :

True

∵ Circumference : Radius = 2πr: r = 2π : 1

Question 69:

5 hectare = 500 m^2

Solution :

As we know that, 1 hectare = 10000 m^2

So, 5 hectare = 5 x 10000 m^2 = 50000 m^2

Question 70:

An increase in perimeter of a figure always increases the area of the figure.

Solution :

False

This is not necessary. See the Q. 57.

Question 71:

Two figures can have the same area but different perimeters.

Solution :

True

See the Q. 58.

Question 72:

Out of two figures, if one has larger area, then its perimeter need not to be larger than the other figure.

Solution :

True

Question 73:

A hedge boundary needs to be planted around a rectangular lawn of size 72 m x 18 m. If 3 shrubs can be planted in a metre of hedge, how many shrubs will be planted in all?

Solution :

Here, length of rectangular lawn = 72 m and breadth of rectangular lawn = 18 m

∵ Perimeter of rectangle =2 x (Length + Breadth)

∴ Perimeter of rectangular lawn = 2 (72 + 18) = 2 (90) = 180 m

If 3 shrubs can be planted in a metre of hedge.

Then, number of shrubs = 3 x Perimeter of rectangular lawn = 3 x 180 = 540

Question 74:

People of Khejadli village take good care of plants, trees and animals. They say that plants and animals can survive without us, but we cannot survive without them. Inspired by her elders Amrita marked some land for her pets (camel and ox) and plants. Find the ratio of the areas kept for animals and plants to the living area. What value depicted here?

Solution :

We know that,

Area of rectangle =l x b and area of circle = πr^2

From the given figure,

Area of total rectangular land = 15 m x 10 m=150 m^2

Area of land covered by plants = 9 m x 1 m = 9 m^2

Area of land covered by camel = 5 m x 3 m = 15 m^2

∴ Region of land covered by ox is circular area.

So, diameter, d = 2.8 m

∴ Radius $= \frac{d}{2} = \frac{2.8}{2} = 1.4$ m $\left[\because \text{radius} = \frac{\text{diameter}}{2}\right]$

∴ Area of land covered by ox $= \pi r^2 = \frac{22}{7} \times 1.4 \times 1.4 = 6.16\ m^2$

Total area covered by plants, camel and ox = 9 + 15 + 6.16 = 30.16 m^2

Remaining land for living = Total area − Area covered by plants and animals

$= (150 - 30.16) m^2 = 119.84\ m^2$

∴ Ratio of areas kept for animals and plants to the living area

$= 30.16 : 119.84 = 3016 : 11984 = 377 : 1498$

The value depicted here is that, we should save our environment and balance the environment.

Question 75:

The perimeter of a rectangle is 40 m. Its length is four metres less than five times its breadth. Find the area of the rectangle.

Solution :

Let breadth of the rectangle = x

Then, length of the rectangle = $5x - 4$

We know that,

Perimeter of rectangle = $2(l + b)$

$\Rightarrow 40 = 2(l + b)$ [∵ perimeter = 40 m, given]

$\Rightarrow 40 = 2(5x - 4 + x)$

$\Rightarrow 40 = 2(6x - 4)$

$\Rightarrow 12x - 8 = 40$

$\Rightarrow 12x = 40 + 8$

$\Rightarrow 12x = 48$

$\Rightarrow x = \frac{48}{12} = 4$

So, breadth = x = 4 m and length = $5x - 4 = 5 \times 4 - 4 = 16$ m

∵ Area of rectangle $= l \times b = 4 \times 16 = 64\ m^2$

Hence, the area of rectangle is 64 m^2.

Question 76:

A wall of a room is of dimensions 5 m x 4 m. It has a window of dimensions 1.5 m x 1 m and a door of dimensions 2.25 m x 1 m. Find the area of the wall, which is to be painted.

Solution :

Given,a wall of a room is of dimensions 5 m x m.

∴ Length of the room = 5 m and breadth of the room = 4 m

∴ Area of the room = l x b=5 x 4 = 20 m^2

Also, length of the window = 1.5 m and breadth of the window = 1 m

[given]

∴ Area of the window = l x b = 1.5 x 1 = 1.5 m^2

Now, length of the door = 2.25 m and breadth of the door = 1 m

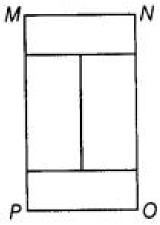
∴ Area of the door = l x b = 2.25 x 1 = 2.25 m^2

Now, area of the wall to be painted = Area of the room – (Area of the window + Area of the door)

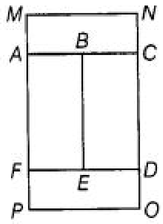
= 20 – (1.5 + 2.25) = 20 – 3.75 = 16.25 m^2

Question 77:

Rectangle MNOP is made up of four congruent rectangles. If the area of one of the rectangles is $8m^2$ and breadth is 2 m, then find the perimeter of MNOP.



Solution :



We have, area of one rectangle = $8\,m^2$

and breadth = 2m

We know that,

Area of rectangle = $l \times b$

$\Rightarrow \quad l \times b = 8$

$\Rightarrow \quad l \times 2 = 8$

$\Rightarrow \quad l = 4\,m$

Now, we have to find the perimeter of *MNOP*, which contains four congruent rectangles, it means they have same length and breadth.

$\therefore$ Perimeter of rectangle $MNOP = MN + NC + CD + DO + PO + PF + FA + MA$

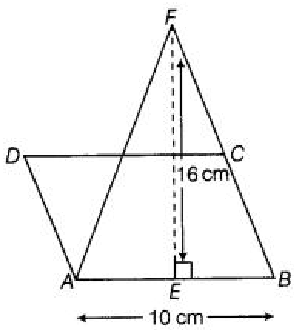
$= 4 + 2 + 4 + 2 + 4 + 2 + 4 + 2$

$= 24\,m$

Hence, the perimeter of *MNOP* is 24 m.

Question 78:

In the given figure, area of ΔAFB is equal to the area of parallelogram ABCD. If altitude EF is 16 cm long, find the altitude of the parallelogram to the base AB of length 10 cm. What is the area of ΔDAO, where 0 is the mid-point of DC



Solution :

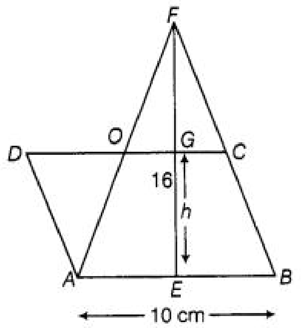
Given,

Area of ΔAFB = Area of parallelogram *ABCD*

$\Rightarrow \quad \frac{1}{2} \times AB \times EF = CD \times$ (Corresponding height)

[$\because$ area of triangle = base × height and area of parallelogram = base × corresponding height]

$\Rightarrow \quad \frac{1}{2} \times AB \times EF = CD \times EG$



Let the corresponding height be h.

Then, $\frac{1}{2} \times 10 \times 16 = 10 \times h$

[$\because$ altitude, $EF = 16$ cm and base, $AB = 10$ cm, given] [$\because AB = CD$]

$\Rightarrow \quad h = 8$ cm

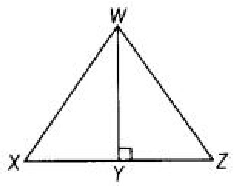
In ΔDAO, $DO = 5$ cm [$\because O$ is the mid-point of CD]

$\therefore$ Area of $\Delta DAO = \frac{1}{2} \times OD \times h$

$= \frac{1}{2} \times 5 \times 8 = 20 \text{ cm}^2$

Question 79:

Rat'o of the area of ΔWXY to the area of ΔWZY is 3 :4 in the given figure. If the area of ΔWXZ is 56 cm^2 and WY = 8 cm, find the lengths of XY and YZ.



Solution :

Given, area of $\Delta WXZ = 56 \text{ cm}^2$

$\Rightarrow \quad \frac{1}{2} \times WY \times XZ = 56$ $\left[\because \text{ area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}\right]$

$\Rightarrow \quad \frac{1}{2} \times 8 \times XZ = 56 \Rightarrow XZ = 14$ cm [$\because WY = 8$ cm, given]

$\therefore$ Area of ΔWXY : Area of $\Delta WZY = 3 : 4$

$\Rightarrow \quad \frac{\text{Area of } \Delta WXY}{\text{Area of } \Delta WZY} = \frac{3}{4}$

$\Rightarrow \quad \frac{\frac{1}{2} \times WY \times XY}{\frac{1}{2} \times YZ \times WY} = \frac{3}{4}$

$\Rightarrow \quad \frac{XY}{YZ} = \frac{3}{4}$

$\Rightarrow \quad \frac{XY}{XZ - XY} = \frac{3}{4}$ [$\because YZ = XZ - XY$]

$\Rightarrow \quad \frac{XY}{14 - XY} = \frac{3}{4}$ [by cross-multiplication]

$\Rightarrow \quad 4XY = 42 - 3XY$

$7XY = 42 \Rightarrow XY = 6$ cm

So, $YZ = XZ - XY = 14 - 6$

$YZ = 8$ cm

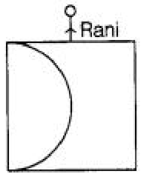
Hence, $XY = 6$ cm and $YZ = 8$ cm.

Question 80:

Rani bought a new field that is next to one she already owns in the given figure. This field is in the shape of a square of side 70 m. She makes a semi-circular lawn of maximum area in this field.

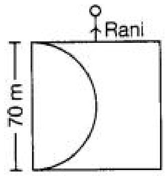
(i) Find the perimeter of the lawn.

(ii) Find the area of the square field excluding the lawn.



Solution :

(i) Given, side of a square = 70 m



From the given figure, the diameter of semi-circle is same as the side of a square.

$\therefore$ Diameter of semi-circle = 70 m

$\because$ Dimeter of semi-circle = Side of square

$\therefore$ Radius $= \frac{70}{2} = 35$ m $\quad \left[\because \text{radius} = \frac{\text{diameter}}{2}\right]$

$\therefore$ Perimeter of lawn $= \pi r + 2r = \frac{22}{7} \times 35 + 2 \times 35 = 110 + 70 = 180$ m

(ii) Area of square = Side × Side = 70 × 70 = 4900 m^2

$\therefore$ Required area = Area of square − Area of semi-circle

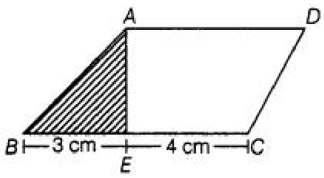
$= 4900 - \frac{1}{2} \times \pi \times (35)^2 \quad \left[\because \text{area of semi-circle} = \frac{1}{2}\pi r^2\right]$

$= 4900 - \frac{1}{2} \times \frac{22}{7} \times 35 \times 35 = 4900 - 1925$

$= 2975\ m^2$

Question 81:

In the given figure, find the area of parallelogram ABCD, if the area of shaded triangle is 9 cm^2.



Solution :

Given, area of shaded triangle = 9 cm^2

and base of the triangle = 3 cm

$\because$ Area of a triangle $= \frac{1}{2} \times$ Base × Height

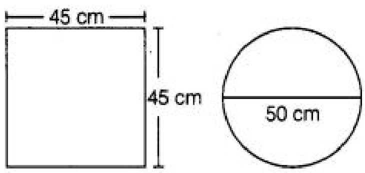
$\Rightarrow \quad 9 = \frac{1}{2} \times 3 \times h \Rightarrow \frac{18}{3} = h$

$\Rightarrow \quad h = 6$ cm

$\therefore$ Area of parallelogram = Height × Base of parallelogram = 6 × (3 + 4) = 6 × 7 = 42 cm^2

Question 82:

Pizza factory has comeout with two kinds of pizzas. A square pizza of side 45 cm costs Rs 150 and a circular pizza of diameter 50 cm cost Rs 160. Which pizza is a better deal?



Solution :

Given, side of square pizza = 45 cm

∴ Area of a square pizza = $(\text{Side})^2 = (45)^2 = 2025 \text{ cm}^2$

Diameter of circular pizza = 50 cm

∴ Radius = $\frac{50}{2} = 25$ cm $\left[\because \text{radius} = \frac{\text{diameter}}{2}\right]$

Now, area of the circular pizza = $\frac{22}{7} \times 25 \times 25$

$= \frac{22}{7} \times 625$

$= \frac{13750}{7} = 1964.28 \text{ cm}^2$ $[\because \text{area of circle} = \pi r^2]$

∴ Price of 1 cm square pizza = $\frac{2025}{150}$ = ₹13.5

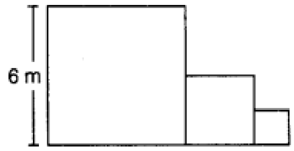
and price of 1 cm circular pizza = $\frac{1964.28}{160}$

= ₹12.27

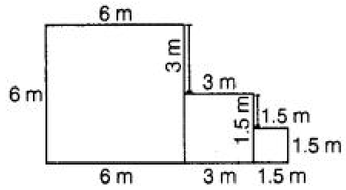
Hence, the circular pizza is a better deal.

Question 83:

Three squares are attached to each other as shown in the figure given below. Each square is attached at the mid-point of the side of the square to its right.



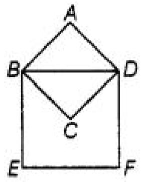
Solution :



∴ Perimeter of the complete figure = 6 + 6 + 6 + 3 + 1.5 + 1.5 + 1.5 + 3 + 3 + 1.5 = 33 m

Question 84:

In the following figure, ABCD is a square with AB = 15 cm. Find the area of the square BDFE.



Solution :

Given, *ABCD* is a square and *AB* = 15 cm

∴ Diagonal of square *ABCD* = $\sqrt{2}a = \sqrt{2} \times 15 = 15\sqrt{2}$ cm

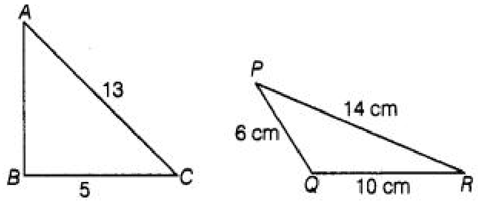
From the figure, diagonal of square *ABCD* is the side of square *BDEF*.

∴ Area of the square *BDFE* = $(\text{Side})^2 = (15\sqrt{2})^2 = 15 \times 15 \times \sqrt{2} \times \sqrt{2}$

$= 225 \times 2 = 450 \text{ cm}^2$

Question 85:

In the given figures, perimeter of ΔABC = perimeter of ΔPQR. Find the area of ΔABC.



Solution :

Given, perimeter of ΔABC = perimeter of ΔPQR

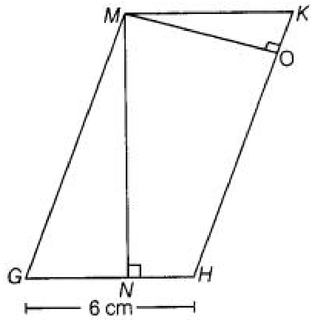
$\therefore$ Perimeter of $\Delta PQR = 14 + 6 + 10 = 30$ cm [$\because$ perimeter of triangle = sum of all sides]

Now, perimeter of $\Delta ABC = AB + BC + CA$

$$30 = AB + BC + AC$$
$$\Rightarrow \quad 30 = AB + 5 + 13$$
$$\Rightarrow \quad 30 = AB + 18$$
$$\Rightarrow \quad AB = 30 - 18 = 12 \text{ cm}$$
$$\therefore \quad \text{Area of } \Delta ABC = \frac{1}{2} \times \text{Base} \times \text{Height}$$
$$= \frac{1}{2} \times 5 \times 12 = 5 \times 6 = 30 \text{ cm}^2$$

Question 86:

Altitudes MN and MO of parallelogram MGHK are 8 cm and 4 cm long respectively in the below figure. One side GH is 6 cm long. Find the perimeter of MGHK.



Solution :

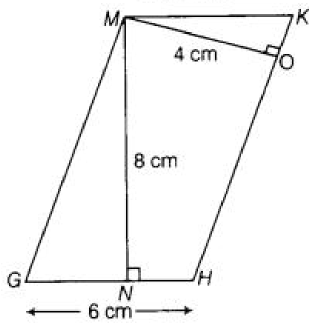
Given, $MGHK$ is a parallelogram, where $MN = 8$ cm, $MO = 4$ cm and $GH = 6$ cm.

$\therefore$ Area of parallelogram $MGHK$, when base is GH [$\because$ area of parallelogram = base $\times$ height]

$$= GH \times MN$$
$$= 6 \times 8 \text{ cm}^2 = 48 \text{ cm}^2 \quad \ldots\text{(i)}$$

Area of parallelogram $MGHK$, when base is HK

$$= HK \times MO$$



$$\Rightarrow \quad 48 = HK \times 4 \quad \text{[from Eq. (i)]}$$
$$\Rightarrow \quad HK = \frac{48}{4}$$
$$\Rightarrow \quad HK = 12 \text{ cm}$$

In parallelogram, opposite sides are equal.

So, $GH = MK = 6$ cm and $MG = HK = 12$ cm

$\therefore$ Perimeter of parallelogram $MGHK = (6 + 6 + 12 + 12)$ cm $= 36$ cm

Question 87:

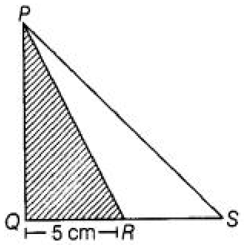
In the given figure, area of ΔPQR is 20 cm^2 and area of ΔPQS is 44 cm^2. Find the length RS, if PQ is perpendicular to QS and QR is 5 cm.

Solution :

Given, area of $\Delta PQR = 20\,cm^2$ and area of $\Delta PQS = 44\,cm^2$

We know that,

Area of triangle $= \frac{1}{2} \times$ Base $\times$ Height



$\therefore$ Area of $\Delta PQR = \frac{1}{2} \times PQ \times QR$ $\quad [\because PQ \perp QR]$

$\Rightarrow \quad 20 = \frac{1}{2} \times PQ \times 5 \Rightarrow \frac{20 \times 2}{5} = PQ$ $\quad [\because QR = 5\,cm$, given$]$

$\Rightarrow \quad PQ = 8\,cm$

$\therefore$ Area of $\Delta PQS = \frac{1}{2} \times PQ \times QS$

$\Rightarrow \quad 44 = \frac{1}{2} \times 8 \times QS \Rightarrow QS = \frac{44 \times 2}{8}$ $\quad [\because PQ = 8\,cm]$

$\Rightarrow \quad QS = 11\,cm$

Now, $RS = QS - QR = 11 - 5 = 6\,cm$

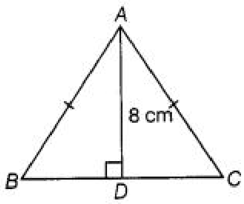
Question 88:

Area of an isosceles triangle is 48 cm^2. If the altitudes corresponding to the base of the triangle is 8 cm, find the perimeter of the triangle.

Solution :

Given, area of $\Delta ABC = 48\,cm^2$ and altitude $= 8\,cm$

$\because$ ΔABC is an isosceles triangle, where $AB = AC$



$\therefore \quad$ Area of $\Delta ABC = \frac{1}{2} \times BC \times AD = 48$

[$\because$ area of triangle = base $\times$ height]

$\Rightarrow \quad 48 = \frac{1}{2} \times BC \times AD$

$\Rightarrow \quad \frac{1}{2} \times BC \times 8 = 48 \Rightarrow BC = \frac{48 \times 2}{8}$

$BC = 12\,cm$

Now, in an isosceles triangle, $BD = DC = 6\,cm$ $\quad [\because AD \perp BC]$

Applying Pythagoras theorem in right angled ΔADB,

$AB^2 = BD^2 + AD^2$

$\Rightarrow \quad AB^2 = 6^2 + 8^2 = 36 + 64$

$\Rightarrow \quad AB^2 = 100$

$\Rightarrow \quad AB = 10cm$

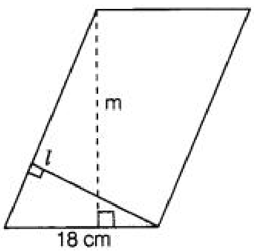
Now, perimeter of triangle $= AB + AC + BC = AB + AB + BC$ $\quad [\because AB = AC]$

$= 10 + 10 + 12$

$= 32\,cm$

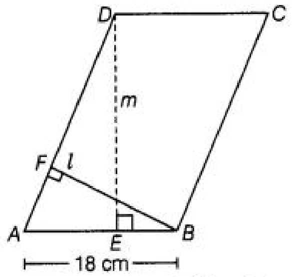
Question 89:

Perimeter of a parallelogram shaped land is 96 m and its area is 270 m^2. If one of the sides of this parallelogram is 18 m, find the length of the other side. Also, find the lengths of altitudes l and m in the given figure.



Solution :

Given, perimeter of parallelogram = 96 m and area of parallelogram = 270 m^2.
In a parallelogram $ABCD$, $AB = CD = 18$ m and $AD = BC$



As we know, perimeter of a parallelogram $ABCD = AB + BC + CD + AD$

$\Rightarrow \quad 96 = 18 + AD + 18 + AD \qquad [\because AD = BC]$

$\Rightarrow \quad 96 = 36 + 2AD$

$\Rightarrow \quad 2AD = 60$

$\Rightarrow \quad AD = 30\text{cm}$

So, $\quad AD = BC = 30\text{ cm}$

Now, area of parallelogram $ABCD$ = Base × Corresponding height

$\Rightarrow \quad 270 = AB \times DE \qquad [\because \text{base} = AB]$

$\Rightarrow \quad 270 = 18 \times DE$

$\Rightarrow \quad \frac{270}{18} = DE$

$\Rightarrow \quad DE = 15\text{ m}$

Also, area of parallelogram $ABCD = AD \times BF \qquad [\because \text{base} = AD]$

$\Rightarrow \quad 270 = 30 \times l$

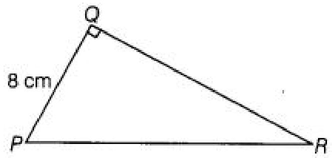
$\Rightarrow \quad l = \frac{270}{30}$

$\Rightarrow \quad l = 9\text{m}$

Hence, altitudes $l = 9$ m and $m = 15$ m.

Question 90:

Area of a ΔPQR right angled at Q is 60 cm^2 in the figure. If the smallest side is 8 cm long, find the length of the other two sides.



Solution :

Given, area of $\Delta PQR = 60\text{ cm}^2$ and side $PQ = 8$ cm

$\therefore \quad \text{Area of } \Delta PQR = \frac{1}{2} \times PQ \times QR \qquad [\because \text{area of triangle} = \text{base} \times \text{height}]$

$\Rightarrow \quad 60 = \frac{1}{2} \times 8 \times QR \quad \Rightarrow \quad QR = \frac{60 \times 2}{8}$

$\Rightarrow \quad QR = 15\text{cm}$

In right angled ΔPQR, $\quad PR^2 = PQ^2 + QR^2 \qquad$ [by Pythagoras theorem]

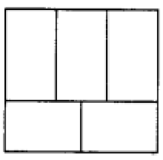
$\Rightarrow \quad PR^2 = 8^2 + 15^2 = 64 + 225$

$\Rightarrow \quad PR^2 = 289 \quad \Rightarrow \quad PR = \sqrt{289} \quad = 17\text{ cm}$

Hence, the length of two sides are 15 cm and 17 cm.

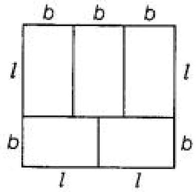
Question 91:

In the given figure, a rectangle with perimeter 264 cm is divided into five congruent rectangles. Find the perimeter of one of the rectangles.



Solution :

Let l and b be the length and breadth of each rectangle, respectively.



Given, perimeter of a rectangle = 264 cm

According to the figure, $4l + 5b = 264$ ... (i)

and $2l = 3b$ ... (ii)

Put the value of $3b$ from Eq.(ii) in Eq.(i), $2(2l) + 5b = 264$

$\Rightarrow \quad 2 \times 3b + 5b = 264$

$\Rightarrow \quad 6b + 5b = 264$

$\Rightarrow \quad 11b = 264 \Rightarrow b = \frac{264}{11}$

$\Rightarrow \quad b = 24\text{ cm}$

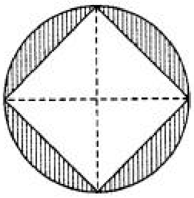
$\therefore \quad l = \frac{3b}{2} = \frac{3 \times 24}{2} = 36\text{ cm}$

Hence, perimeter of the rectangle $= 2(l + b) = 2(36 + 24) = 120\text{ cm}$

Question 92:

Find the area of a square inscribed in a circle whose radius is 7 cm in the below figure.

[Hint Four right angled triangles joined at right angles to form a square]

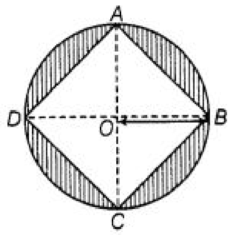


Solution :

Given that $ABCD$ is a square.

According to the question,

Area of square $ABCD = 4 \times$ Area of a right angled triangle



$\therefore$ Area of square $ABCD = 4 \times$ Area of ΔAOB

$= 4 \times \left(\frac{1}{2} \times AO \times BO\right)$

$\left[\because \text{ area of a right angled triangle} = \frac{1}{2} \times \text{base} \times \text{height}\right]$

$= 2 \times 7 \times 7 = 98\text{ cm}^2$

[$\because AO = BO =$ radius of circle = 7cm, given]

Hence, the area of inscribed square is 98 cm^2.

Question 93:

Find the area of the shaded portion in question 92.

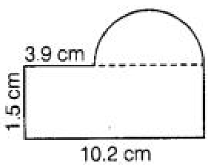
Solution :

Area of shaded portion = Area of circle – Area of square $= \pi r^2 - 98$

$= \frac{22}{7} \times 7 \times 7 - 98 = 154 - 98 = 56\text{cm}^2$

In questions 94 to 97, find the area enclosed by each of the following figures.

Question 94:



Solution :

The given shape contains a rectangle and a semi-circle.

$\therefore$ Area of rectangle $= l \times b = (10.2 \times 1.5)\text{ cm}^2 = 15.3\text{ cm}^2$

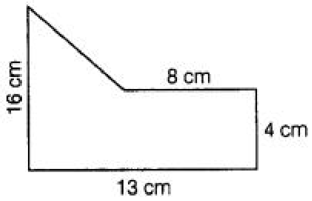
Here, diameter of semi-circle $= (10.2 - 3.9)\text{ cm} = 6.3\text{ cm}$

So, radius $= \frac{\text{diameter}}{2} = \frac{6.3}{2} = 3.15\text{ cm}$

$\therefore$ Area of semi-circle $= \frac{1}{2}\pi r^2 = \frac{22}{7} \times \frac{1}{2} \times 3.15 \times 3.15 = 15.59\text{ cm}^2$

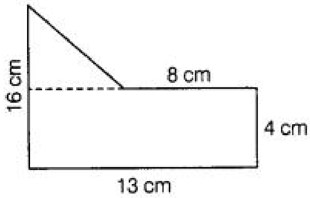
$\therefore$ Total area = Area of rectangle + Area of semi-circle $= 15.3 + 15.59 = 30.89\text{ cm}^2$

Question 95:



Solution :

The given shape has a triangle and a rectangle.



For rectangle, $l = 13$ cm and $b = 4$ cm

$\therefore$ Area of rectangle $= l \times b = 13 \times 4 = 52\text{ cm}^2$

For triangle, base $(b) = 5$ cm

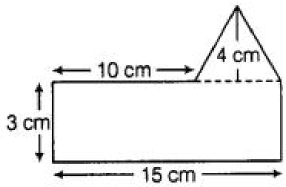
and height $(h) = (16 - 4)\text{ cm} = 12$ cm

$\therefore$ Area of triangle $= \frac{1}{2} \times b \times h = \frac{1}{2} \times 5 \times 12 = 30\text{ cm}^2$

$\therefore$ Total area enclosed by the shape

$= (52 + 30)\text{ cm}^2 = 82\text{ cm}^2$

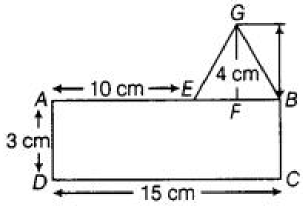
Question 96:



Solution :

The given shape contains a rectangle and a triangle.

For rectangle, $l = 15$ cm and $b = 3$ cm



$\therefore$ Area of rectangle $= l \times b = 15 \times 3 = 45\text{ cm}^2$

According to the figure,

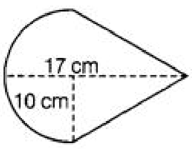
$$BE = AB - AE = 15 - 10 = 5\text{ cm}$$

For triangle, base $(b) = BE = 5$ cm and height $(h) = 4$ cm

$\therefore$ Area of $\Delta BEG = \frac{1}{2} \times b \times h = \frac{1}{2} \times 5 \times 4 = 10\text{ cm}^2$

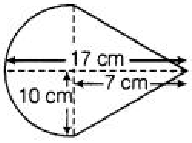
$\therefore$ Total area enclosed by the shape $= (45 + 10)\text{ cm}^2 = 55\text{ cm}^2$.

Question 97:



Solution :

The given shape contains a semi-circle and a triangle.



Area of semi-circle $= \frac{1}{2}\pi r^2 = \frac{1}{2} \times \frac{22}{7} \times 10 \times 10 = \frac{1100}{7} \text{cm}^2$

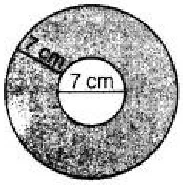
Area of triangle $= \frac{1}{2} \times \text{Base} \times \text{Height} = \frac{1}{2} \times 20 \times 7 = 70 \text{ cm}^2$

Hence, total area enclosed by the shape $= \frac{1100}{7} + 70 = \frac{1100 + 490}{7}$

$= \frac{1590}{7} = 227 \text{ cm}^2$ (approx.)

In questions 98 and 99, find the areas of the shaded region.

Question 98:



Solution :

Let radius of smaller circle be r and bigger circle be R.

From the figure, $r = \frac{7}{2}$ cm and $R = \frac{7}{2} + 7 = \frac{21}{2}$ cm

$\therefore$ Area of shaded region = Area of bigger circle – Area of smaller circle

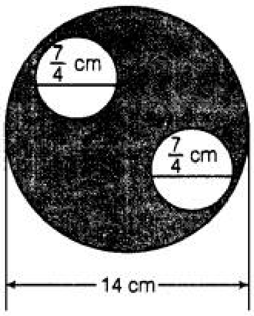
$= \pi R^2 - \pi r^2$

$= \pi(R^2 - r^2) = \pi\left(\frac{21}{2} \times \frac{21}{2} - \frac{7}{2} \times \frac{7}{2}\right)$

$= \pi\left(\frac{441}{4} - \frac{49}{4}\right) = \frac{22}{7} \times \frac{392}{4} = 308 \text{ cm}^2$

Hence, the area of shaded region is 308 cm^2.

Question 99:



Solution :

$\because$ Diameter of complete circle = 14 cm

$\therefore$ Radius $= \frac{14}{2} = 7$ cm $\quad \left[\because \text{radius} = \frac{\text{diameter}}{2}\right]$

So, area of complete circle $= \pi r^2 = \frac{22}{7} \times 7 \times 7 = 154 \text{ cm}^2$

$\because$ Diameter of small circle $= \frac{7}{4}$ cm

$\therefore$ Radius $= \frac{7}{4 \times 2} = \frac{7}{8}$ cm

$\therefore$ Area of two small circles $= 2 \times \pi r^2 = 2 \times \frac{22}{7} \times \frac{7}{8} \times \frac{7}{8} = \frac{77}{16} \text{ cm}^2$

$\therefore$ Area of shaded region = Area of complete circle – Area of two small circles

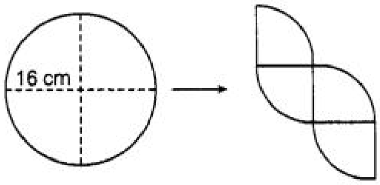
$= 154 - \frac{77}{16} = \frac{154 \times 16 - 77}{16}$ [taking LCM]

$= \frac{2464 - 77}{16} = \frac{2387}{16} = 149\frac{3}{16} \text{ cm}^2$

Hence, the area of shaded region is $149\frac{3}{16}$ cm^2.

Question 100:

A circle with radius 16 cm is cut into four equal parts and rearranged to form another shaped as shown in the below figure.



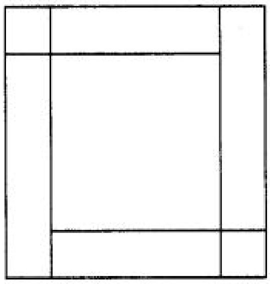
Does the perimeter change? If it does change, by how much does it increase or decrease?

Solution :

Yes, the perimeter changes. The perimeter is increased by 2r = 2 x 16= 32 cm.

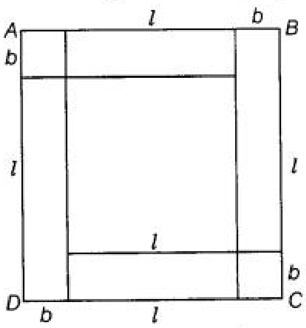
Question 101:

A large square is made by arranging a small square surrounded by four congruent rectangles as shown in the given figure. If the perimeter of each of the rectangle is 16 cm, find the area of the large square.



Solution :

Let the length and breadth of rectangle be l and b, respectively.



It is given that, perimeter of one rectangle = 16 cm^2

$\Rightarrow$ $2(l + b) = 16$ [$\because$ perimeter of rectangle = $2(l + b)$]

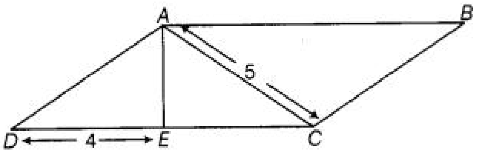
$\Rightarrow$ $l + b = 8$cm

Since, the side of larger square is $(l + b)$.

Hence, area = $(\text{side})^2 = (l + b)^2 = (8)^2 = 64$ cm^2

Question 102:

ABCD is a parallelogram in which AE is perpendicular to CD as shown in the given figure. Also, AC = 5 cm, DE = 4 cm and area of ΔAED = 6 cm^2. Find the perimeter and area of parallelogram ABCD.



Solution :

Given, area of $\Delta AED = 6\,cm^2$ and $AC = 5\,cm$ and $DE = 4\,cm$

$\therefore$ Area of $\Delta AED = \frac{1}{2} \times DE \times AE$ [$\because$ area of triangle = base × height]

$\Rightarrow \frac{1}{2} \times 4 \times AE = 6$

$\Rightarrow AE = \frac{6 \times 2}{4}$

$\Rightarrow AE = 3\,cm$

Now, in right angled ΔAEC, $AE = 3\,cm$ and $AC = 5\,cm$

So, $(EC)^2 = (AC)^2 - (AE)^2$ [by Pythagoras theorem]

$\Rightarrow (EC)^2 = 5^2 - 3^2 = 25 - 9$

$\Rightarrow EC = \sqrt{16}$

$\Rightarrow EC = 4cm$

$\because DE + EC = DC$

$\Rightarrow DC = 4 + 4 = 8cm$

$\because ABCD$ is a parallelogram.

So, $AB = DC = 8cm$

Now, in right angled ΔAED, $AD^2 = AE^2 + ED^2$ [by Pythagoras theorem]

$\Rightarrow AD^2 = 3^2 + 4^2 = 9 + 16$

$\Rightarrow AD = \sqrt{25}$

$\Rightarrow AD = 5\,cm$

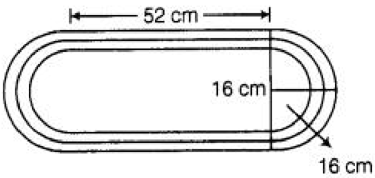
So, $AD = BC = 5\,cm$ [$\because ABCD$ is a parallelogram]

$\therefore$ Perimeter of parallelogram $ABCD = 2(l + b) = 2(DC + AD) = 2(8 + 5) = 2 \times 13 = 26\,cm$

Area of parallelogram $ABCD$ = Base × Height = $DC \times AE = 8 \times 3 = 24\,cm^2$

Question 103:

Ishika has designed a small oval race track for her remote control car. Her design is shown in the given figure. What is the total distance around the track? Round your answer to the nearest whole centimetre.



Solution :

Total distance around the track = Length of 2 parallel strips + Length of 2 semi-circles

$= 2 \times 52 + 2 \times \pi \times 16$ [$\because r = 16cm$]

$= 104 + 2 \times 3.14 \times 16$

$= 104 + 100.5009$

$= 205\,cm$ (approx.)

Question 104:

A table cover of dimensions 3 m 25 cm x 2 m 30 cm is spread on a table. If 30 cm of the table cover, is hanging all around the table, find the area of the table cover, which is hanging outside the top of the table. Also, find the cost of polishing the table top at Rs 16 per square metre.

Solution :

To find the cost of polishing the table top, we have to find its area for which we require its length and breadth.

Given, length of cover = 3m 25cm = 3.25 m and breadth of cover = 2m 30cm = 2.30m

$\therefore$ Area of the table cover = $3.25 \times 2.30 = 7.475\,m^2$

Since, 30 cm width of cloth is outside the table an each side.

$\therefore$ Length of the table = $3.25 - 2 \times 0.30 = 2.65$ m $\left[\because 1\,cm = \frac{1}{100}\,m\right]$

and breadth of the table = $2.30 - 2 \times 0.30 = 1.70$ m

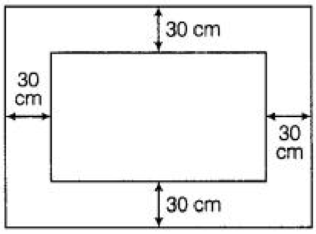
$\therefore$ Area of the top of the table = $(2.65 \times 1.70)\,m^2$

$= 4.505\,m^2$

Area of the hanging table cover = Area of table cover − Area of the top of the table

$= (7.475 - 4.505)\,m^2$

$= 2.97\,m^2$



It is given that, the cost of polishing the table top is at the rate of ₹ 16 per square metre.
Therefore, cost of polishing the top = Area × Rate per square metre

$= 4.505 \times 16$

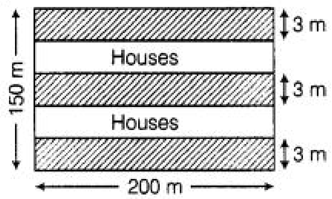
= ₹7.208

Question 105:

The dimensions of a plot are 200 m x 150 m. A builder builds 3 roads which are 3 m wide along the length on either side and one in the middle. On either side of the middle road he builds houses to sell. How much area did he get for building the houses?

Solution :

Given that, dimersions of plot = $200\,m \times 150\,m$ and width of road = 3 m



$\therefore$ Total area available for houses = Area of total plot − Area of 3 roads

$= 200 \times 150 - 3 \times (3 \times 200)$ [$\because$ area of rectangle = length × breadth]

$= 30000 - 1800 = 28200\,m^2$

Question 106:

A room is 4.5 m long and 4 m wide. The floor of the room is to be covered with tiles of size 15 cm by 10 cm. Find the cost of covering the floor with tiles at the rate of Rs 4.50 per tile.

Solution :

Given, length of room = 4.5 m, width of room = 4 m and size of tiles = 15 cm × 10 cm

$\because$ Area of room = $l \times b = 4.5 \times 4 = 18\,m^2 = 18 \times (100)^2\,cm^2 = 180000\,cm^2$ [$\because$ 1 m = 100 cm]

$\therefore$ Area of 1 tile = $15 \times 10 = 150\,cm^2$

So, number of tiles = $\frac{\text{Area of room}}{\text{Area of 1 tile}} = \frac{180000}{150} = 1200$

$\therefore$ Cost of covering the floor with tiles = ₹ 4.50 × 1200 = ₹ 5400

Question 107:

Find the total cost of wooden fencing around a circular garden of diameter 28 m, if 1 m of fencing costs Rs 300.

Solution :

Given, diameter of a circular garden = 28 m
Length of the fencing = Circumference of circle

$$= \pi d = \frac{22}{7} \times 28 = 88 \text{ m}$$

$\therefore$ Total cost of fencing = 88 × 300 = ₹ 26400

Question 108:

Priyanka took a wire and bent it to form a circle of radius 14 cm. She bent it into a rectangle with one side 24 cm long. What is the length of the wire? Which figure encloses more area, the .circle or the rectangle?

Solution :

Given that, radius of circle (r) = 14 cm and length of rectangle (l) = 24 cm

$\therefore$ Length of the wire = Circumference of the circle $= 2\pi r = 2 \times \frac{22}{7} \times 14 = 88$ cm

Let b be the width of rectangle.
Since, the wire is rebent in the form of rectangle.
$\therefore$ Perimeter of rectangle = Circumference of circle

$\Rightarrow \quad 2(24 + b) = 88$

$\Rightarrow \quad 24 + b = 44 \Rightarrow b = 44 - 24$

$\Rightarrow \quad b = 20$ cm

$$\text{Area of circle} = \pi r^2 = \frac{22}{7} \times (14)^2 = 616 \text{cm}^2$$

$\because$ Area of rectangle $= l \times b = 24 \times 20 = 480 \text{ cm}^2$

Hence, the circle encloses more area than rectangle.

Question 109:

How much distance, in metres, a wheel of 25 cm radius will cover, if it rotates 350 times?

Solution :

Given, radius of wheel (r) = 25 cm $= \frac{25}{100}$ m $= \frac{1}{4}$ m $\quad \left[\because 1 \text{ cm} = \frac{1}{100} \text{ m}\right]$

$\because$ Distance travelled in one rotation $= 2\pi r = 2 \times \frac{22}{7} \times \frac{1}{4} = \frac{11}{7}$ m

$\therefore$ Distance travelled in 350 rotation $= \frac{11}{7} \times 350 = 550$ m

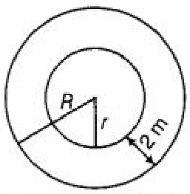
Hence, the wheel coveres 550 m distance.

Question 110:

A circular pond is surrounded by a 2 m wide circular path. If outer circumference of circular path is 44 m, find the inner circumference of the circular path. Also, find area of the path.

Solution :

Let R and r be the radius of outer circle and inner circle, respectively.



It is given that, circumference of outer circle is 44 m.

$\therefore \quad 2\pi R = 44 \quad [\because \text{circumference of circle} = 2\pi r]$

$\Rightarrow \quad 2 \times \frac{22}{7} \times R = 44$

$\Rightarrow \quad R = \frac{44}{2 \times \frac{22}{7}} = \frac{7 \times 44}{2 \times 22} = 7$ m

Since, $\quad r = (R - 2)\text{m} = (7 - 2)\text{m} = 5\text{m}$

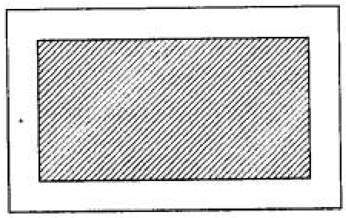
$\therefore$ Inner circumference of the circular path $= 2\pi r = 2 \times \frac{22}{7} \times 5 = 31.43$ m (approx.)

$\because$ Area of path = Area of outer circle − Area of inner circle $= \pi(R^2 - r^2)$

$$= \frac{22}{7}(7^2 - 5^2) = \frac{22}{7} \times 24 = 75.43 \text{ m}^2 \text{ (approx.)}$$

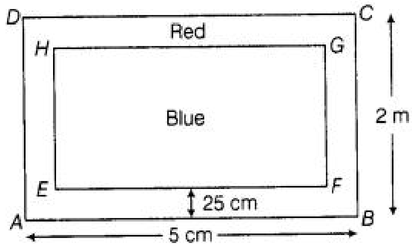
Question 111:

A carpet of size 5 m x 2 m has 25 cm wide red border. The inner part of the carpet is blue in colour (see the figure). Find the area of blue portion. What is the ratio of areas of red portion to blue portion?



Solution :

Given, size of carpet = $5\,m \times 2\,m$ and width of border = 25 cm = $\frac{25}{100} \times m = 0.25\,m$



$\therefore$ Area of carpet $ABCD = AB \times BC = 5 \times 2 = 10\,m^2$ [$\because$ area of rectangle = length $\times$ breadth]

So, length of inner blue portion, $EF = AB - (2 \times 0.25\,cm) = 5 - 0.50 = 4.5\,m$

and breadth of inner blue portion $FG = BC - (2 \times 0.25) = 2 - 0.50 = 1.5\,m$

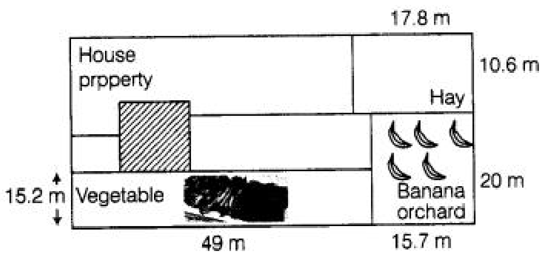
Area of blue portion = Area of rectangle $EFGH = EF \times FG = 4.5 \times 1.5 = 6.75\,m^2$

Now, area of red portion = Area of $ABCD$ – Area of $EFGH = 10 - 6.75 = 3.25\,m^2$

$\therefore$ Ratio of areas of red portion to blue portion = $3.25 : 6.75 = 13 : 27$

Question 112:

Use the following figure, showing the layout of a farm house.



(a) What is the area of land used to grow hay?

(b) It costs Rs 91 per m^2 to fertilise vegetable garden. What is total cost?

(c) A fence is to be enclosed around the house. The dimensions of house are 18.7 m x 12.6 m. Atleast how many metres of fencing are needed?

(d) each banana tree required 1.25 m^2 of ground space. How many banana trees can there be in the orchard?

Solution :

(a) Area of land used to grow hay = $17.8\,m \times 10.6\,m = 188.68\,m^2$

[$\because$ area of rectangle = length $\times$ breadth]

(b) $\therefore$ Area of vegetable garden = $49\,m \times 15.2\,m = 744.80\,m^2$

$\because$ Cost to fertilise $1\,m^2$ vegetable garden = ₹ 91

$\therefore$ Cost to fertilise $744.80\,m^2$ vegetable garden = ₹ 91×744.80 = ₹ 67776.80

(c) Since, fence is to be enclosed around the house of dimensions $18.7\,m \times 12.6\,m$.

$\because$ Perimeter of the house = $2 \times (l + b)$

$\therefore$ Total length of fence = $2 \times (18.7 + 12.6)m = 2 \times 31.3\,m = 62.6\,m$

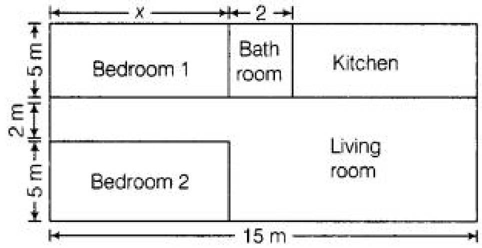
(d) Area covered by banana orchard = $20\,m \times 15.7\,m = 314\,m^2$

Since, $1.25\,m^2$ area is required by 1 banana tree.

$\therefore 314\,m^2$ area is required by number of banana trees = $\frac{314}{1.25} = 251.25 \approx 251$ trees

Question 113:

Study the layout given in the figure and answer the questions.



(a) Write an expression for w the total area covered by both the bedrooms and the kitchen.

(b) Write an expression to calculate the perimeter of the living room.

(c) If the cost of carpeting is Rs 50 per m^2, write an expression for calculating the total cost of carpeting both the bedrooms and the living room.

(d) If the cost of tiling is Rs 30 per m^2, write an expression for calculating the total cost of floor tiles used for the bathroom and kitchen floors.

(e) If the floor area of each bedroom is 35 m^2, then find x.

Solution :

(a) Area of both bedrooms and the kitchen = (Area of bedroom) × 2 + Area of kitchen

$= (5 \times x)2 + 15 - (x + 2) \times 5$

$= 10x + (75 - 5x - 10) = 10x + 65 - 5x$

$= (65 + 5x)\ m^2$

(b) Perimeter of the living room $= 15 + 2 + 5 + (15 - x) + 5 + x + 2 = 44$ m

(c) Total area of both the bedrooms and the living room $= 5 \times x + 7 \times 15 = (5x + 105)\ m^2$

$\therefore$ Total cost of carpeting $= (5x + 105) \times 50 = ₹\ 250\ (x + 21)$

(d) Total area of bathroom and kitchen $= (15 - x) \times 5\ m^2$

$\therefore$ Total cost of tiling $= (15 - x) \times 5 \times 30 = ₹\ 150\ (15 - x)$

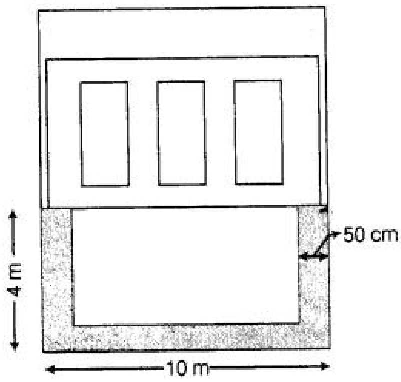
(e) Given, area of floor of each bedroom = 35 m^2

Area of one bedroom $= 5x\ m^2$

$\therefore 5x = 35 \Rightarrow x = 7$ m

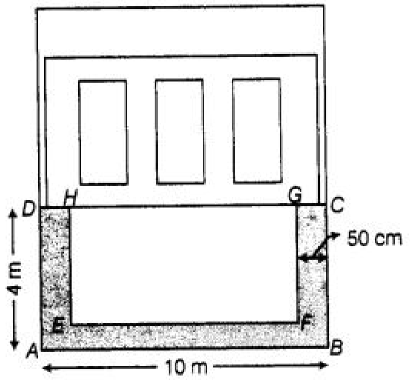
Question 114:

10 m long and 4 m wide rectangular lawn is in front of a house. Along its three sides, a 50 cm wide flower bed is there is shown in the given figure. Find the area of the remaining portion.



Solution :

Given, dimensions of rectangular lawn = 10 m × 4 m and width of flower bed = 50 cm



Length of remaining portion, $EF = AB - (50 \times 2 \text{ cm})$

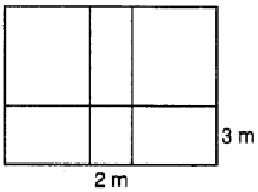
$= 10\text{ m} - 100\text{ cm} = 10\text{ m} - 1\text{ m} = 9\text{ m}$ $\left[\because 1\text{ cm} = \frac{1}{100}\text{ m}\right]$

Breadth of remaining portion, $EH = AD - 50\text{ cm} = 4\text{ m} - 0.5\text{ m} = 3.5\text{ m}$

$\therefore$ Required area = Area of portion $EFGH = EF \times EH = 9 \times 3.5 = 31.5\text{ m}^2$

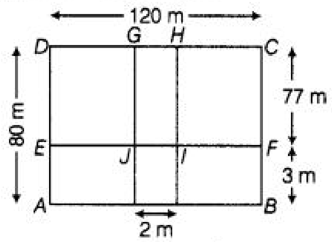
Question 115:

school playground is divided by a 2 m wide path, which is parallel to the width of the playground and a 3 m wide path which is parallel to the length of the ground in the given figure. If the length and width of the playground are 120 m and 80 m respectively, find the area of the remaining playground.



Solution :

Given, dimensions of playground = 120 m × 80 m



$\because$ Area of rectangle $ABCD = 120 \times 80 = 9600\text{ m}^2$

Area of rectangle $ABFE = AB \times BF$

$= 120 \times 3 = 360\text{ m}^2$ [$\because$ area of rectangle = length × breadth]

Area of rectangle $GHIJ = JI \times IH = 2 \times 77 = 154\text{ m}^2$

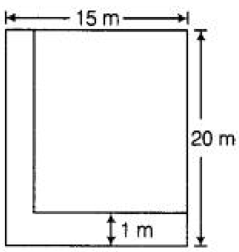
$\therefore$ Area of remaining ground rectangle $GHIJ$ = Area of rectangle $ABCD$

− Area of rectangle $ABFE$ − Area of $GHIJ$

$= 9600 - 360 - 154 = 9086\text{ m}^2$

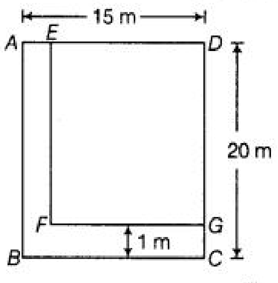
Question 116:

In a park of dimensions 20 m x 15 m, there is a L shaped 1 m wide flower bed as shown in the figure. Find the total cost of manuring for the flower bed at the rate of Rs 45 per m^2.



Solution :

Given, dimensions of a park = 20 m × 15 m and with of a flower bed = 1 m



From the figure, $FG = BC - 1\text{m} = (15 - 1) = 14\text{ m}$

$EF = DC - 1\text{m} = (20 - 1) = 19\text{ m}$

∴ Area of flower bed = Area of $ABCD$ – Area of $EFGD$

$= 20 \times 15 - 19 \times 14 = 300 - 266 = 34\text{ m}^2$

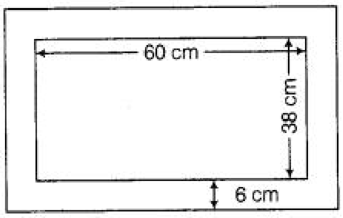
[∵ area of rectangle = length × breadth]

∵ Cost of manuring 1 m^2 of flower bed = ₹ 45

∴ Cost of manuring 34 m^2 the flower bed of = ₹34 × 45 = ₹ 1530

Question 117:

Dimensions of a painting are 60 cm x 38 cm. Find the area of the wooden frame of width 6 cm around painting as shown in given figure.



Solution :

We have,

and length and breadth of inner rectangle is 60 cm and 38 cm, respectively.

∴ Area of inner rectangle = $60 \times 38 = 2280\text{ cm}^2$ [∵ area of rectangle = length × breadth]

∴ Breadth of outer rectangle = $38 + 6 + 6 = 50$ cm

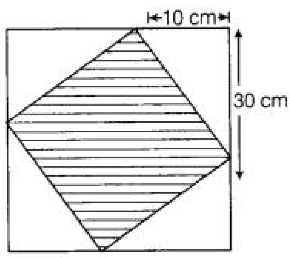
Length of outer rectangle = $60 + 6 + 6 = 72$ cm [∵ width of frame = 6 cm, given]

∴ Area of outer rectangle = $50 \times 72 = 3600\text{ cm}^2$

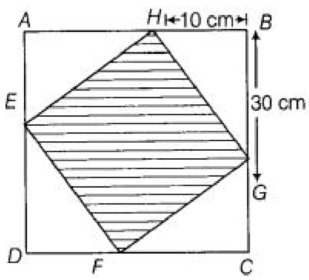
Now, area of wooden frame = $3600 - 2280 = 1320\text{ cm}^2$

Question 118:

A design is made up of four congruent right triangles as shown in the given figure. Find the area of the shaded portion.



Solution :



Area of one right angled triangle $= \frac{1}{2} \times Bn \times BG = \frac{1}{2} \times 10 \times 30 = 150\,\text{cm}^2$

So, area of 4 right angled triangles $= 4 \times 150 = 600\,\text{cm}^2$

[$\because$ all the right angled triangles are congruent]

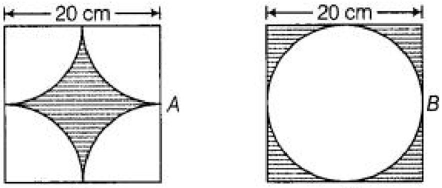
$\because$ Area of square $= (\text{Side})^2$ [$GC = 10$ cm, because all the triangles are congruent]

Area of portion $ABCD = (30 + 10)^2 = 40^2 = 1600\,\text{cm}^2$

$\therefore$ Area of shaded portion $= 1600 - 600 = 1000\,\text{cm}^2$

Question 119:

A square tile of length 20 cm has four quarter circles at each corner as shown in the figure (i). Find the area of shaded portion. Another tile with same dimensions has a circle in the centre of the tile in the figure (ii). If the circle touches all the four sides of the square tile, find the area of the shaded portion. In which tile, area of shaded portion will be more? (Take, π= 3.14)



(i) (ii)

Solution :

(i) Area of shaded portion

$= $ Area of square $- 4 \times$ Area of quarter circle

$= 20 \times 20 - 4 \times \frac{\pi r^2}{4}$

[$\because$ area of square $= (\text{side})^2$ and area of quarter circle $= \frac{1}{4}$ area of a circle]

$= 400 - 4 \times \frac{22}{7} \times \frac{1}{4} \times 10 \times 10$ [$\because$ radius of quarter circle $= \frac{1}{2}$ side of square $= 10$ cm]

$= 400 - \frac{2200}{7} = \frac{600}{7} = 85.71\,\text{cm}^2 \approx 86\,\text{cm}^2$

(ii) Area of shaded portion

$=$ Area of square $-$ Area of circle

$= 20 \times 20 - \frac{22}{7} \times 10 \times 10$ [$\because$ radius of circle $= \frac{1}{2}$ side of square $= 10$ cm]

$= 400 - \frac{2200}{7} = \frac{600}{7} \approx 86\,\text{cm}^2$

Hence, area in both cases is equal i.e. $86\,\text{cm}^2$.

Question 120:

A rectangular field is 48 m long and 12 m wide. How many right triangular flower beds can be laid in this field, if sides including the right angle measure 2 m and 4 m, respectively?

Solution :

Given, dimenstions of a rectangular field = 48 m x 12 m

and dimensions of a right angled triangle = 2 m x 4 m

$\therefore$ Number of right triangular flower beds $= \frac{\text{Area of field}}{\text{Area of right angled triangle}} = \frac{48 \times 12}{\frac{1}{2} \times 2 \times 4}$

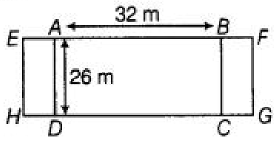
$= 144$ [$\because$ area of rectangle $=$ length $\times$ breadth and area of a right angled triangle $= \frac{1}{2} \times$ height $\times$ breadth]

Question 121:

Ramesh grew wheat in a rectangular field that measured 32 metres long and 26 metres wide. This year he increased the area for wheat by increasing the length but not the width. He increased the area of the wheat field by 650 square metres. What is the length of the expanded wheat field?

Solution :

Given, dimenstions of a rectanglular field 32 m × 26 m.
and area increased = 650 m^2



∴ Increased area of wheat field = Area of $EFGH$ − Area of $ABCD$ wheat field

$$650 = EF \times EH - AB \times AD$$

[∵ area of rectangle = length × breadth]

⇒ $650 = EF \times 26 - 32 \times 26$

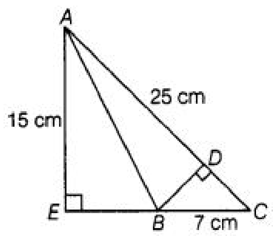
⇒ $650 = 26EF - 832$

⇒ $1482 = 26EF \Rightarrow EF = 57\,m$

Hence, the length of the expanded wheat field is 57 m.

Question 122:

In the given figure, Δ AEC is right angled at E, B is a point on EC, BD is the altitude of Δ ABC, AC = 25 cm, BC = 7 cm and AE = 15 cm. Find the area of Δ ABC and the length of DB.



Solution :

Given, $AC = 25\,cm$, $BC = 7\,cm$, and $AE = 15\,cm$

In ΔAEC, using Pythagoras theorem,

$$AC^2 = AE^2 + EC^2$$

⇒ $EC^2 = AC^2 - AE^2$

⇒ $EC^2 = (25)^2 - (15)^2 = 625 - 225$

$$= 400$$

$$EC = \sqrt{400} = 20\,cm$$

and $EB = EC - BC = 20 - 7$

$$= 13\,cm$$

$$\text{Area of } \Delta AEC = \frac{1}{2} \times AE \times EC$$

$$= \frac{1}{2} \times 15 \times 20 = 150\,cm^2$$

and $\text{Area of } \Delta AEB = \frac{1}{2} \times AE \times EB = \frac{1}{2} \times 15 \times 13 = 97.5\,cm^2$

∴ $\text{Area of } \Delta ABC = \text{Area of } \Delta AEC - \text{Area of } \Delta AEB$

$$= 150 - 97.5$$

$$= 52.5\,cm^2$$

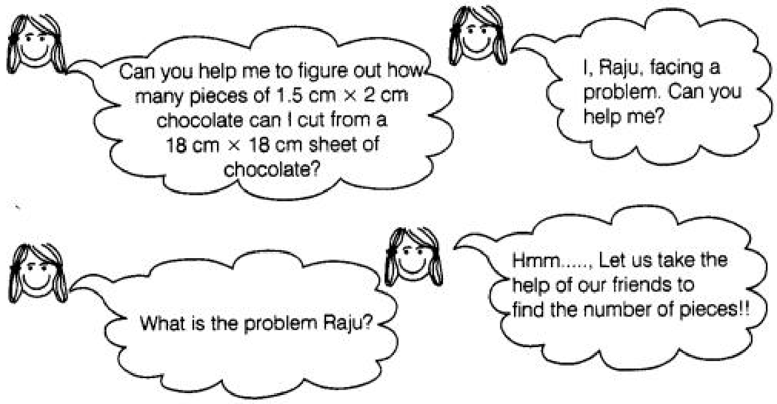
$$\text{Again, Area of } \Delta ABC = \frac{1}{2} \times BD \times AC$$

$$52.5 = \frac{1}{2} \times BD \times 25$$

⇒ $BD = \frac{52.5 \times 2}{25} = 4.2\,cm$

Hence, the area of ΔABC is 52.5 cm^2 and the length of DB is 4.2 cm.

Question 123:



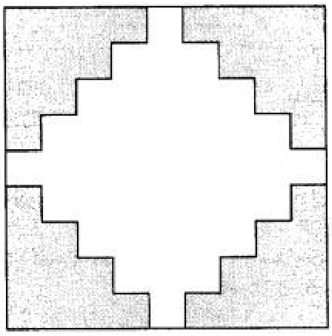
Solution :

Number of pieces of chocolate

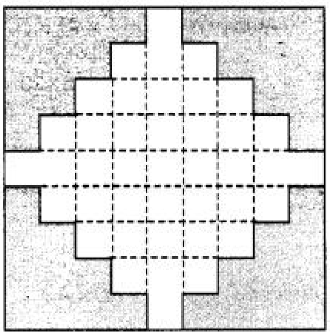
$$= \frac{\text{Area of sheet of chocolate}}{\text{Area of one chocolate}} = \frac{18 \times 18}{1.5 \times 2} = \frac{324}{3} = 108$$

Question 124:

Calculate the area of shaded region in the given figure, where all of the short line segments are at right angles to each other and 1 cm long.



Solution :



Length of the larger rectangle = 1 × 9 cm = 9 cm

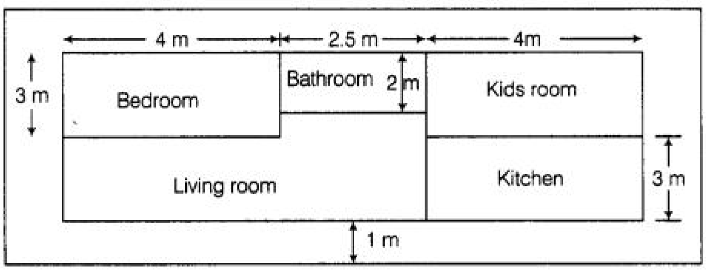
Breadth of the larger rectangle = 1 × 9 cm = 9 cm

∴ Area of shaded region = Area of larger square – Area of 41 small identical square

$= 9 \times 9 - 41 \times 1 \times 1 = 81 - 41 = 40\ cm^2$

Question 125:

The plan and measurement for a house are given in the figure. The house is surrounded by a path 1 m wide.



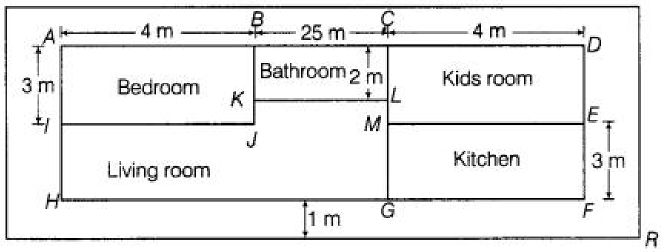
Find the following

(i) Cost of paving the path with bricks at rate of Rs 120 per m .

(ii) Cost of wooden flooring inside the house except the bathroom at the cost of Rs 1200 per m^2.

(iii) Area of living room.

Solution :



(i) Area of path = Area of rectangle $PQRS$ − Area of rectangle $ADFH$

$= PQ \times QR - AD \times DF$

$= (4+2.5+4+1+1) \times (3+3+1+1) - (4+2.5+4) \times (3+3)$

$= 12.5 \times 8 - 10.5 \times 6$

$= 37 m^2$

∴ Cost of paving the path with bricks

$=$ Cost per unit $m^2 \times$ Total area of path

$= 120 \times 37$

$=$ ₹ 4440

(ii) Area of house except bathroom

= Area of house − Area of bathroom

= Area of rectangle $ADFH$ − Area of rectangle $BCLK$

$= (4+2.5+4) \times (3+3) - 2.5 \times 2$

$= 63 - 5 = 58 m^2$

∴ Cost of flouring = Cost per unit $m^2 \times$ Total area

$= 1200 \times 58 =$ ₹ 69600

(iii) Area of living room = Area of rectangle $ACGH$ − Area of rectangle $ABJI$

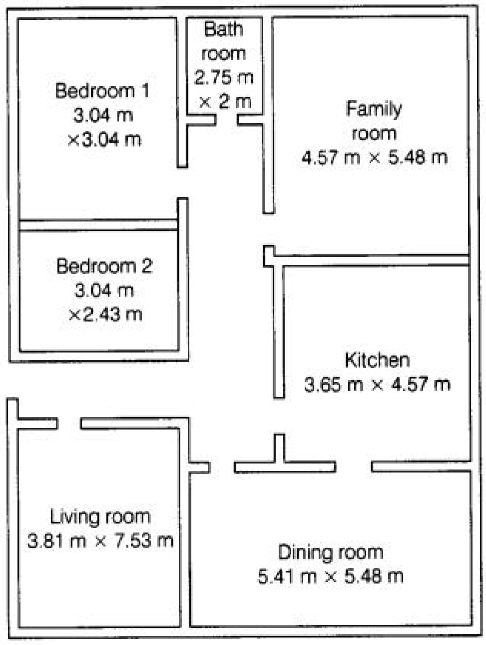
− Area of rectangle $BCLK$

$= (4+2.5) \times (3+3) - 4 \times 3 - 2.5 \times 2 = 39 - 12 - 5$

$= 22 m^2$

Question 126:

Architects design many types of buildings. They draw plans for houses, such as the plant is shown in the following figure.



An architect wants to install a decorative moulding around the ceilings in the rooms. The decorative moulding costs Rs 500 per m.

(a) Find how much moulding will be needed for each room.

(i) family room (ii) living room

(iii) dining room (iv) bedroom 1

(v) bedroom 2

(b) The carpet costs Rs 200 per m^2. Find the cost of carpeting each room.

(c) What is the total cost of moulding for all the five rooms?

Solution :

(a) (i) Given, breadth of the family room = 5.48 m

and length of the family room = 4.57 m

$\therefore$ Perimeter of the family room = 2(Length + Breadth) = 2(5.48 + 4.57)

$= 2 \times 10.05 = 20.10$ m

(ii) Given, length of the living room = 3.81 m

and breadth of the living room = 7.53 m

$\therefore$ Perimeter of the living room = 2(Length + Breadth) = 2(3.81 + 7.53)

$= 2 \times 11.34 = 22.68$ m

(iii) Given, breadth of the dining room = 5.48 m

and length of the dining room = 5.41 m

$\therefore$ Perimeter of dinning room = 2 (Length + Breadth) = 2(5.41 + 5.48)

$= 2 \times 10.89 = 21.78$ m

(iv) Given, length of bedroom 1 = 3.04 m

and breadth of bedroom 1 = 3.04 m

$\therefore$ Perimeter of the bedroom 1 = 2(Length + Breadth) = 2(3.04 + 3.04)

$= 2 \times 6.08 = 12.16$ m

(v) Given, breadth of bedroom 2 = 2.43 m and length of bedroom 2 = 3.04 m

$\therefore$ Perimeter of the bedroom 2 = 2(Length + Breadth) = 2(3.04 + 2.43)

$= 2 \times 5.47 = 10.94$ m

(b) For bedroom 1,

Given, length of bedroom 1 = 3.04 m and breadth of bedroom 1 = 3.04 m

$\therefore$ Area of bedroom 1 = Length $\times$ Breadth

$\therefore$ Area of bedroom 1 = $3.04 \times 3.04 = 9.2416$ sq m

$\because$ Cost of carpeting 1 sq m = ₹ 200

$\therefore$ Cost of carpeting $9.2416 m^2 = 9.2416 \times 200 =$ ₹ 1848

For bedroom 2,

Given, length of bedroom 2 = 3.04 m

and breadth of bedroom 2 = 2.43 m

$\therefore$ Area of bedroom 2 = Length $\times$ Breadth = $3.04 \times 2.43 = 7.3872\ m^2$

$\therefore$ Cost of carpeting $1 m^2$ = ₹ 200

$\therefore$ Cost of carpeting $7.3872\ m^2 = 7.3872 \times 200 =$ ₹ 1477

For living room,

Given, length of living room = 3.81 m and breadth of living room = 7.53 m

$\therefore$ Area of living room = $3.81 \times 7.53 = 28.6893 m^2$

Cost of carpeting of living room $1 m^2$ = ₹ 200

$\because$ Cost of carpeting $28.6893\ m^2$ = ₹ 200×28.6893 = ₹ 5737.86

For dining room,

Given, length of dining room = 5.41 m

and breadth of dining room = 5.48 m

$\because$ Area of dining room = $5.41 \times 5.48 = 29.6468\ m^2$

$\because$ Cost of carpeting $1\ m^2$ = ₹ 200

$\therefore$ Cost of carpeting $29.6468\ m^2 = 29.6468 \times 200 =$ ₹ 5929.36

For family room,

Given, length of family room = 4.57 m

and breadth of family room = 5.48 m

$\therefore$ Area of family room = $5.48 \times 4.57 = 25.0436\ m^2$

So, cost of carpeting family room = 25.0436×200 = ₹ 5008.72

(c) Total perimeter of all the five rooms

= 20.10 m + 22.68 m + 21.78 m + 12.16 m + 10.94 m = 87.66 m

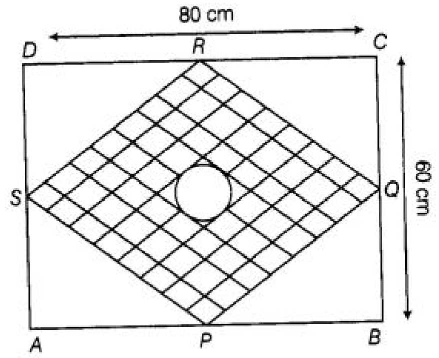
$\because$ Given, cost of moulding each room = ₹ 500 per m

$\therefore$ Total cost of moulding all five rooms = 87.66×500 = ₹ 43830

Question 127:

ABCD is a given rectangle with length as 80 cm and breadth as 60 cm. P, Q, R, S are the mid-points of sides AB, BC, CD, DA, respectively.

A circular rangoli of radius 10 cm is drawn at the centre as shown in the given figure. Find the area of shaded portion.



Solution :

Here, $AP = \frac{1}{2} AB = \frac{1}{2} \times 80 = 40\,cm$

Also, $AS = \frac{1}{2} AD = \frac{1}{2} \times 60 = 30\,cm$

Area of $\Delta APS = \frac{1}{2} \times AP \times AS = \frac{1}{2} \times 40 \times 30 = 600\,cm^2$

Area of portion $PQRS$ = Area of rectangle $ABCD - 4 \times$ Area of $\Delta APS = 80 \times 60 - 4 \times 600$
$= 4800 - 2400 = 2400\,cm^2$

Area of circular rangoli $= \pi \times (10)^2 = \frac{22}{7} \times 100 = 314\,cm^2$ [$\because$ radius of circle = 10 cm]

$\therefore$ Area of shaded region $= 2400 - 314 = 2086\,cm^2$

Question 128:

4 squares each of the side 10 cm have been cut from each corner of a rectangular sheet of paper of size 100 cm x 80 cm. From the remaining piece of paper, an isosceles right triangle is removed whose equal sides are each of 10 cm length. Find the area of the remaining part of the paper.

Solution :

Area of each square $=(10)^2\ cm^2 = 100\ cm^2$ [$\because$ area of square = (side)^2]

Area of rectangular sheet = 100 x 80 cm^2 [$\because$ area of rectangle = length x breadth]
= 8000 cm^2

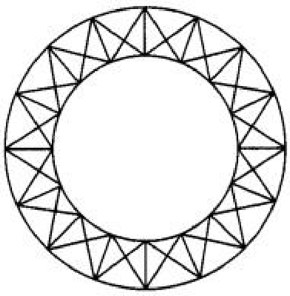
Area of an isosceles right triangle $= \frac{1}{2} \times 10 \times 10 = 50\,cm^2$

$\left[\because \text{area of an isosceles right triangle} = \frac{1}{2} \times \text{base} \times \text{height}\right]$

$\therefore$ Area of remaining part of paper $= 8000 - 4 \times 100 - 50$
$= 7550\,cm^2$

Question 129:

A dinner plate is in the form of circle. A circular region encloses a beautiful design as shown in the given figure. The inner circumference is 352 mm and outer is 396 mm. Find the width of circular design.



Solution :

Let the radius of inner and outer circle be r and R, respectively.
Given, inner circumference = 352 mm

$\Rightarrow \quad 2\pi r = 352 \quad$ [$\because$ circumference $= 2\pi r$]

$\Rightarrow \quad 2 \times \frac{22}{7} \times r = 352$

$\Rightarrow \quad r = \frac{352 \times 7}{2 \times 22} = \frac{2464}{44} = 56$ mm

and outer circumference = 396 mm [given]

$\Rightarrow \quad 2\pi R = 396$

$\Rightarrow \quad 2 \times \frac{22}{7} \times R = 396$

$\Rightarrow \quad R = \frac{396 \times 7}{2 \times 22} = 63$ mm

$\therefore$ Width of circular design $= R - r = 63 - 56 = 7$ mm

Question 130:

The moon is about 384000 km from earth and its path around the earth is nearly circular. Find the length of path described by moon in one complete revolution. (Take,$\pi = 3.14$)

Solution :

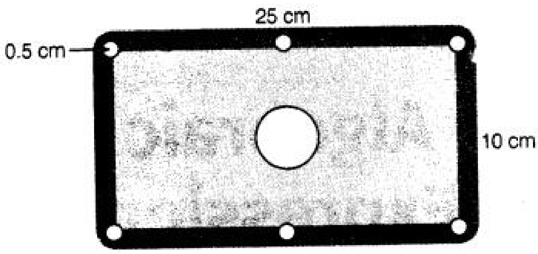
Length of path described by moon in one complete revolution = $2\pi r$

= 2 x 3.14 x 384000 [$\because$ radius = distance of moon from the earth]

= 2411520 km

Question 131:

A photograph of Billiard/Snooker table has dimensions as 1/10 th of its actual size as shown in the given figure.



The portion excluding six holes each of diameter 0.5 cm needs to be polished at rate of Rs 200 per m^2. Find the cost of polishing.

Solution :

Actual length $= 25 \times 10 = 250$ cm
Actual breadth $= 10 \times 10 = 100$ cm
Area of table $= 250 \times 100 = 25000 \text{ cm}^2$

Radius of 1 hole $= \frac{0.5}{2} = 0.25$ cm

Area of 6 holes $= 6 \times \pi r^2 = 6 \times \frac{22}{7} \times 0.25 \times 0.25 = 1.18 \text{ cm}^2$

Area of portion excluding holes $= 25000 - 1.18 = 24998.8 \text{ cm}^2$

$\therefore$ Cost of polishing = ₹ $\frac{24999}{10000} \times 200$ = ₹ 500 (approx.)