Practice Set 15.1 8th Std Maths Answers Chapter 15 Area

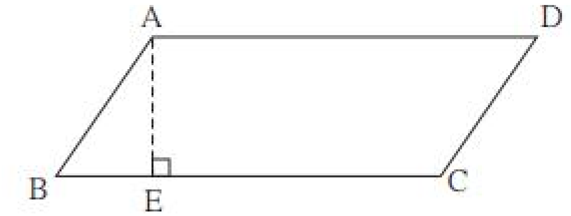
Question 1.
If base of a parallelogram is 18 cm and its height is 11 cm, find its area.
Solution:
Given, base = 18 cm, height = 11 cm
Area of a parallelogram = base × height
= 18 × 11
= 198 sq.cm
∴ Area of the parallelogram is 198 sq.cm.

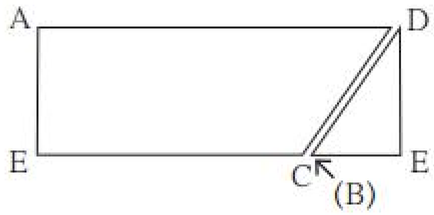
Question 2.
If area of a parallelogram is 29.6 sq. cm and its base is 8 cm, find its height.
Solution:
Given, area of a parallelogram = 29.6 sq.cm,
base = 8 cm
Area of a parallelogram = base × height
∴ 29.6 = 8 × height
∴ height = 29.68 = 3.7 cm
∴ Height of the parallelogram is 3.7 cm.

Question 3.
Area of a parallelogram is 83.2 sq.cm. If its height is 6.4 cm, find the length of its base.
Solution:
Given, area of a parallelogram = 83.2 sq.cm, height = 6.4 cm
Area of a parallelogram = base × height
∴ 83.2 = base × 6.4
∴ base = 83.26.4 = 13 cm
∴ The length of the base of the parallelogram is 13 cm.

Maharashtra Board Class 8 Maths Chapter 15 Area Practice Set 15.1 Intext Questions and Activities

Question 1.
Draw a big enough parallelogram ABCD on a paper as shown in the figure.
Draw perpendicular AE on side BC.
Cut the right angled ΔAEB. Join it with the remaining part of ₹ABCD as shown in the figure.
The new figure formed is a rectangle.
The rectangle is formed from the parallelogram.
So, areas of both the figures are equal.
Base of parallelogram is one side (length) of the rectangle and its height is the other side (breadth) of the rectangle.
∴ Area of a parallelogram = base × height (Textbook pg. no.94)





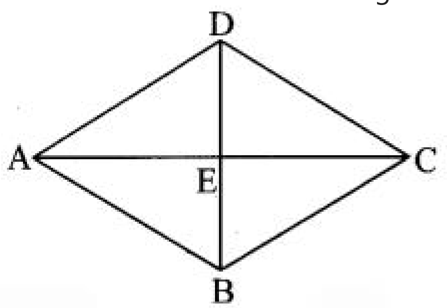
Solution:
Draw a big enough parallelogram ABCD on a paper as shown in the figure.
Draw perpendicular AE on side BC.
Cut the right angled ΔAEB. Join it with the remaining part of ₹ABCD as shown in the figure.
The new figure formed is a rectangle.
The rectangle is formed from the parallelogram.
So, areas of both the figures are equal.
Base of parallelogram is one side (length) of the rectangle and its height is the other side (breadth) of the rectangle.
∴ Area of a parallelogram = Area of a rectangle = length × breadth = base × height

Practice Set 15.2 8th Std Maths Answers Chapter 15 Area

Question 1.
Lengths of the diagonals of a rhombus are 15 cm and 24 cm, find its area.
Solution:
Lengths of the diagonals of a rhombus are 15 cm and 24 cm.
Area of a rhombus
= $\frac{1}{2}$ × product of lengths of diagonals
= $\frac{1}{2}$ × 15 × 24
= 15 × 12
= 180 sq.cm
∴ The area of the rhombus is 180 sq. cm.

Question 2.
Lengths of the diagonals of a rhombus are 16.5 cm and 14.2 cm, find its area.
Solution:
Lengths of the diagonals of a rhombus are 16.5 cm and 14.2 cm.
Area of a rhombus
= 12 × product of lengths of diagonals
= 12 × 16.5 × 14.2
= 16.5 × 7.1
= 117.15 sq cm
∴ The area of the rhombus is 117.15 sq. cm.

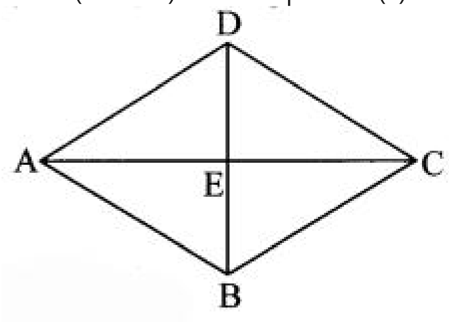
Question 3.
If perimeter of a rhombus is 100 cm and length of one diagonal is 48 cm, what is the area of the quadrilateral?
Solution:
Let ₹ABCD be the rhombus. Diagonals AC and BD intersect at point E.



l(AC) = 48 cm ...(i)
l(AE) = 12l(AC) ...[Diagonals of a rhombus bisect each other]
= 12 × 48 ...[From (i)]
= 24 cm ...(ii)
Perimeter of rhombus = 100 cm ...[Given]
Perimeter of rhombus = 4 × side
∴ 100 = 4 × l(AD)
∴ l(AD) = 1004 = 25 cm ...(iii)
In ΔADE,
m∠AED = 90° ...[Diagonals of a rhombus are perpendicular to each other]
∴ $[l(AD)]^2 = [l(AE)]^2 + [l(DE)]^2$ ... [Pythagoras theorem]
∴ $(25)^2 = (24)^2 + l(DE)^2$ ... [From (ii) and (iii)]
∴ $625 = 576 + l(DE)^2$
∴ $l(DE)^2 = 625 – 576$
∴ $l(DE)^2 = 49$
∴ l(DE) = √49
... [Taking square root of both sides]
l(DE) = 7 cm ...(iv)
l(DE) = 12l(BD) ....[Diagonals of a rhombus bisect each other]
∴ 7 = 12l(BD) ...[From (iv)]
∴ l(BD) = 7 × 2
= 14 cm ...(v)

Area of a rhombus
= 12 × product of lengths of diagonals
= 12 × l(AC) × l(BD)
= 12 × 48 × 14 … [From (i) and (v)]
= 48 × 7
= 336 sq.cm
∴ The area of the quadrilateral is 336 sq.cm.

Question 4.
If length of a diagonal of a rhombus is 30 cm and its area is 240 sq.cm, find its perimeter.
Solution:
Let ₹ABCD be the rhombus.
Diagonals AC and BD intersect at point E.
l(AC) = 30 cm …(i)
and A(₹ABCD) = 240 sq. cm .. .(ii)

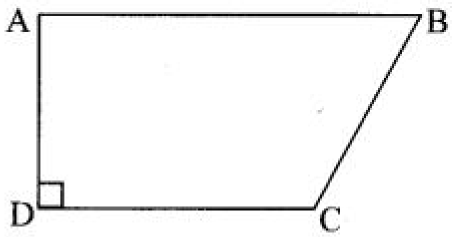


Area of the rhombus = 12 × product of lengths of diagonal
∴ 240 = 12 × l(AC) x l(BD) …[From (ii)]
∴ 240 = 12 × 30 × l(BD) …[From (i)]
∴ l(BD) = 240×230
∴ l(BD) = 8 × 2 = 16 cm …(iii)
Diagonals of a rhombus bisect each other.
∴ l(AE) = 12l(AC)
= 12 × 30 … [From (i)]
= 15 cm …(iv)
and l(DE) = 12l(BD)
= 12 × 16
= 8 cm
In ΔADE,
m∠AED = 90°
…[Diagonals of a rhombus are perpendicular to each other]
∴$[l(AD)]^2 = [l(AE)]^2 + [l(DE)]^2$
…[Pythagoras theorem]
∴$l(AD)^2 = (15)^2 + (8)^2$ … [From (iv) and (v)]
= 225 + 64
∴$l(AD)^2 = 289$
∴l(AD) = √289
…[Taking square root of both sides]
∴l(AD) = 17 cm

Perimeter of rhombus = 4 × side
= 4 × l(AD)
= 4 × 17
= 68 cm
∴The perimeter of the rhombus is 68 cm.

Practice Set 15.3 8th Std Maths Answers Chapter 15 Area

Question 1.
In the given figure, ☐ABCD is a trapezium, side AB || side DC, l(AB) = 13 cm, l(DC) = 9 cm, l(AD) = 8 cm, find the area ☐ABCD.

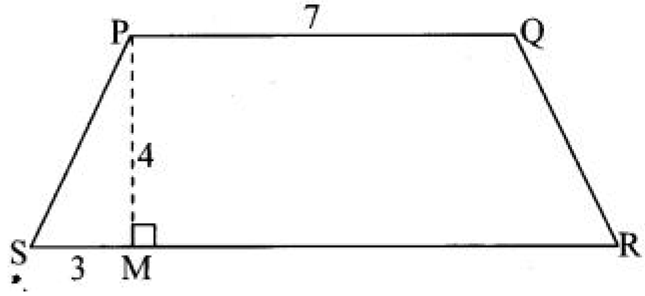


Solution:
☐ABCD is a trapezium, side AB || side DC,
l(AB) = 13 cm, l(DC) = 9 cm, l(AD) = 8 cm,
Area of a trapezium = 12 x sum of lengths of parallel sides x height
∴ A (☐ABCD) = 12 x [l(AB) + l(DC)] x l(AD)
= 12 x (13 + 9) x 8
= 12 x 22 x 8
= 11 x 8
= 88 sq.cm
∴ The area of ☐ABCD is 88 sq. cm.
[Note: The question is modified.]

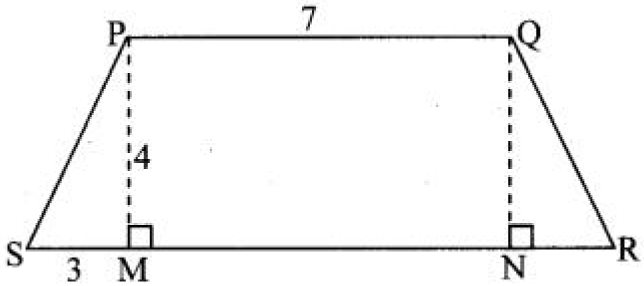
Question 2.
Length of the two parallel sides of a trapezium are 8.5 cm and 11.5 cm respectively and its height is 4.2 cm, find its area.
Solution:
Length of the two parallel sides of a trapezium are 8.5 cm and 11.5 cm and its height is 4.2 cm.
Area of a trapezium
= 12 x sum of lengths of parallel sides x height

= $\frac{1}{2}$ x (8.5 + 11.5) x 4.2
= $\frac{1}{2}$ x 20 x 4.2
= 10 x 4.2
= 42 sq. cm
∴ The area of the trapezium is 42 sq. cm.

Question 3.
☐PQRS is an isosceles trapezium. l(PQ) = 7 cm, seg PM ⊥ seg SR, l(SM) = 3 cm. Distance between two parallel sides is 4 cm, find the area of ☐PQRS.



Solution:
☐PQRS is an isosceles trapezium.
l(PQ) = 7 cm, seg PM ⊥ seg SR,
l(SM) = 3 cm, l(PM) = 4cm
Draw seg QN ⊥ seg SR.
In ☐PMNQ,
seg PQ || seg MN
∠PMN = ∠QNM = 90°
∴ ☐PMNQ is a rectangle.



Opposite sides of a rectangle are congruent.
∴ l(PM) = l(QN) = 4 cm and
l(PQ) = l(MN) = 7 cm
In ΔPMS, m∠PMS = 90°
∴ $[l(PS)]^2 = [l(PM)]^2 + [l(SM)]^2$ ... [Pythagoras theorem]
∴ $[l(PS)]^2 = (4)^2 + (3)^2$
∴ $[l(PS)]^2 = 16 + 9 = 25$
∴ l(PS) = √25 = 5 cm
...[Taking square root of both sides]
☐PQRS is an isosceles trapezium.
∴ l(PS) = l(QR) = 5 cm
In ΔQNR, m ∠QNR = 90°
∴ $[l(QR)]^2 = [l(QN)]^2 + [l(NR)]^2$
... [Pythagoras theorem]
∴ $(5)^2 = (4)^2 + [l(NR)]^2$

∴ $25 = 16 + [l(NR)]^2$
∴ $[l(NR)]^2 = 25 – 16 = 9$
∴ $l(NR) = \sqrt{9} = 3$ cm
...[Taking square root of both sides]
l(SR) = l(SM) + l(MN) + l(NR)
= 3 + 7 + 3
= 13 cm
Area of a trapezium
= 12 x sum of lengths of parallel sides x height
∴ A(☐PQRS) = 12 x [l(PQ) + l(SR)] x l(PM)
= 12 x (7+ 13) x 4
= 12 x 20 x 4
= 40 sq.cm
∴ The area of ☐PQRS is 40 sq. cm.

Practice Set 15.4 8th Std Maths Answers Chapter 15 Area

Question 1.
Sides of a triangle are 45 cm, 39 cm and 42 cm, find its area.
Solution:
Sides of a triangle are 45 cm, 39 cm and 42 cm.
Here, a = 45cm, b = 39cm, c = 42cm
Semi perimeter of triangle = s = 12(a+b+c)
= 12(45+39+42)
= 1262
= 63
Area of a triangle

$= \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{63(63-45)(63-39)(63-42)}$

$= \sqrt{63 \times 18 \times 24 \times 21}$

$= \sqrt{7 \times 9 \times 2 \times 9 \times 2 \times 2 \times 2 \times 3 \times 3 \times 7}$

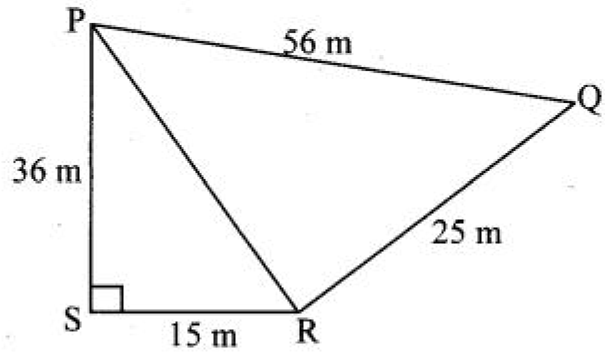
$= \sqrt{7^2 \times 9^2 \times 2^2 \times 2^2 \times 3^2}$

$= 7 \times 9 \times 2 \times 2 \times 3$

$= 756$ sq. cm

∴ The area of the triangle is 756 sq.cm.

Question 2.
Look at the measures shown in the given figure and find the area of □PQRS.



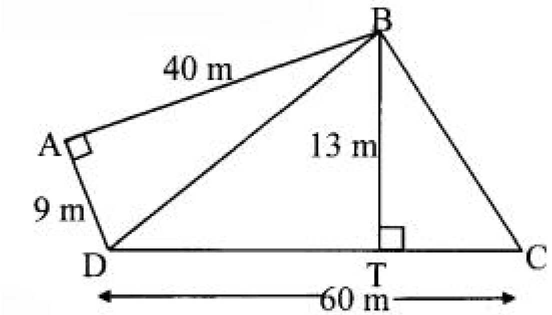
Solution:
A (□PQRS) = A(ΔPSR) + A(ΔPQR)
In ΔPSR, l(PS) = 36 m, l(SR) = 15 m
A(ΔPSR)
= $\frac{1}{2}$ x product of sides forming the right angle
= $\frac{1}{2}$ x l(SR) x l(PS)
= $\frac{1}{2}$ x 15 x 36
= 270 sq.m
In ΔPSR, m∠PSR = 90°
$[l(PR)]^2 = [l(PS)]^2 + [l(SR)]^2$
...[Pythagoras theorem]
$= (36)^2 + (15)^2$
= 1296 + 225
∴ $l(PR)^2 = 1521$
∴ l(PR) = 39m
...[Taking square root of both sides]
In ΔPQR, a = 56m, b = 25m, c = 39m

$$\text{Semiperimeter of } \Delta PQR = s = \frac{1}{2}(a + b + c)$$
$$= \frac{56 + 25 + 39}{2}$$
$$= \frac{120}{2}$$
$$= 60$$

$$\therefore \quad A(\Delta PQR) = \sqrt{s(s-a)(s-b)(s-c)}$$
$$= \sqrt{60(60-56)(60-25)(60-39)}$$
$$= \sqrt{60 \times 4 \times 35 \times 21}$$
$$= \sqrt{3 \times 4 \times 5 \times 4 \times 5 \times 7 \times 3 \times 7}$$
$$= \sqrt{3^2 \times 4^2 \times 5^2 \times 7^2}$$
$$= 3 \times 4 \times 5 \times 7$$
$$= 420 \text{ sq. m}$$

A(☐PQRS) = A(ΔPSR) + A(ΔPQR)
= 270 + 420
= 690 sq. m
∴ The area of ☐PQRS is 690 sq.m

Question 3.
Some measures are given in the figure, find the area of ☐ABCD.



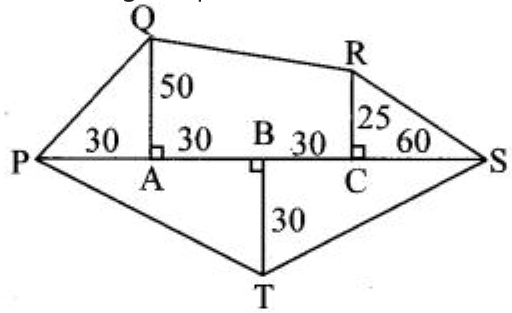
Solution:
A(☐ABCD) = A(ΔBAD) + A(ΔBDC)
In ΔBAD, m∠BAD = 90°, l(AB) = 40m, l(AD) = 9m
A(ΔBAD) = 12 x product of sides forming the right angle
= 12 x l(AB) x l(AD)
= 12 x 40 x 9
= 180 sq. m
In ΔBDC, l(BT) = 13m, l(CD) = 60m
A(ΔBDC) = 12 x base x height
= 12 x l(CD) x l(BT)
= 12 x 60 x 13
= 390 sq. m
A (☐ABCD) = A(ΔBAD) + A(ΔBDC)

= 180 + 390
= 570 sq. m
∴ The area of ☐ABCD is 570 sq.m.

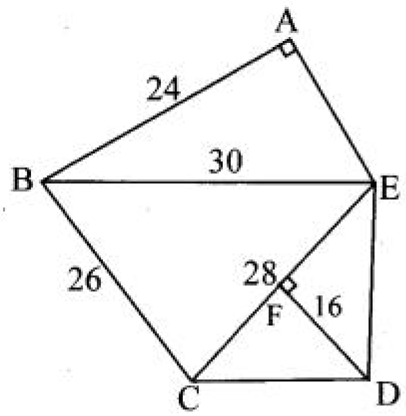
Practice Set 15.5 8th Std Maths Answers Chapter 15 Area

Question 1.
Find the areas of given plots. (All measures are in meters.)

i.



ii.



Solution:
i. Here, ΔQAP, ΔRCS are right angled triangles and ☐QACR is a trapezium.
In ΔQAP, l(AP) = 30 m, l(QA) = 50 m
A(ΔQAP)
= 12 x product of sides forming the right angle
= 12 x l(AP) x l(QA)
= 12 x 30 x 50
= 750 sq. m
In ☐QACR, l(QA) = 50 m, l(RC) = 25 m,
l(AC) = l(AB) + l(BC)
= 30 + 30 = 60 m
A(☐QACR)
= 12 x sum of lengths of parallel sides x height
= 12 x [l(QA) + l(RC)] x l(AC)
= 12 x (50 + 25) x 60

= 12 x 75 x 60
= 2250 sq.m
In ΔRCS, l(CS) = 60 m, l(RC) = 25 m A(ΔRCS)
= 12 x product of sides forming the right angle
= 12 x l(CS) x l(RC)
= 12 x 60 x 25
= 750 sq. m
In ΔPTS, l(TB) = 30 m,
l(PS) = l(PA) + l(AB) + l(BC) + l(CS)
= 30 + 30 + 30 + 60
= 150m
A(ΔPTS) = 12 x base x height
= 12 x l(PS) x l(TB)
= 12 x 150 x 30
= 2250 sq. m
∴ Area of plot QPTSR = A(ΔQAP) + A(☐QACR) + A(ΔRCS) + A(ΔPTS)
= 750 + 2250 + 750 + 2250
= 6000 sq. m
∴ The area of the given plot is 6000 sq.m.

ii. In ΔABE, m∠BAE = 90°, l(AB) = 24 m, l(BE) = 30 m
∴ $[l(BE)]^2 = [l(AB)]^2 + [l(AE)]^2$
...[Pythagoras theorem]
∴ $(30)^2 = (24)^2 + [l(AE)]^2$
∴ $900 = 576 + [l(AE)]^2$
∴ $[l(AE)]^2 = 900 – 576$
∴ $[l(AE)]^2 = 324$
∴ l(AE) = √324 = 18 m
...[Taking square root of both sides]
A(ΔABE)
= 12 x product of sides forming the right angle
= 12 x l(AE) x l(AB)
= 12 x 18 x 24
= 216 sq. m
In ΔBCE, a = 30m, b = 28m, c = 26m

Semiperimeter of $\Delta BCE = s = \frac{1}{2}(a + b + c)$

$$= \frac{30 + 28 + 26}{2}$$

$$= \frac{84}{2}$$

$$= 42 \text{ m}$$

$$A(\Delta BCE) = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{42(42-30)(42-28)(42-26)}$$

$$= \sqrt{42 \times 12 \times 14 \times 16}$$

$$= \sqrt{2 \times 3 \times 7 \times 2 \times 2 \times 3 \times 2 \times 7 \times 4 \times 4}$$

$$= \sqrt{2^2 \times 2^2 \times 3^2 \times 4^2 \times 7^2}$$

$$= 2 \times 2 \times 3 \times 4 \times 7$$

$$= 336 \text{ sq. m}$$

In ΔEDC, $l(CE) = 28$ m, $l(DF) = 16$ m

$$A(\Delta EDC) = \frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{2} \times l(CE) \times l(DF)$$

$$= \frac{1}{2} \times 28 \times 16$$

$$= 224 \text{ sq. m}$$

∴ Area of plot ABCDE
= A(ΔABE) + A(ΔBCE) + A(ΔEDC)
= 216 + 336 + 224
= 776 sq. m
∴ The area of the given plot is 776 sq.m.
[Note: In the given figure, we have taken l(DF) = 16 m]

Practice Set 15.6 8th Std Maths Answers Chapter 15 Area

Question 1.
Radii of the circles are given below, find their areas.

i. 28 cm
ii. 10.5 cm
iii. 17.5 cm
Solution:
i. Radius of the circle (r) = 28 cm … [Given]
Area of the circle = πr^2
= 227 x $(28)^2$
= 227 x 28 x 28
= 22 x 4 x 28
= 2464 sq. cm

ii. Radius of the circle (r) = 10.5 cm … [Given]
Area of the circle = πr^2
= 227 x $(10.5)^2$
= 227 x 10.5 x 10.5
= 22 x 1.5 x 10.5
= 346.5 sq. cm

iii. Radius of the circle (r) = 17.5 cm … [Given]
Area of the circle = πr^2
= 227 x$(17.5)^2$
= 227 x 17.5 x 17.5
= 22 x 2.5 x 17.5
= 962.5 sq. cm

Question 2.
Areas of some circles are given below, find their diameters.
i. 176 sq.cm
ii. 394.24 sq. cm
iii. 12474 sq. cm
Solution:
i. Area of the circle =176 sq. cm .. .[Given]
Area of the circle = πr^2
∴ 176 = 227 x r^2
∴ r^2 = 176 x 722
∴ r^2 = 56
∴ r = √56 … [Taking square root of both sides]
Diameter = 2r = 2√56 CM

ii. Area of the circle = 394.24 sq. cm … [Given]
Area of the circle = πr^2

$\therefore \quad 394.24 = \frac{22}{7} \times r^2$

$\therefore \quad r^2 = 394.24 \times \frac{7}{22}$

$\therefore \quad r^2 = \frac{394.24 \times 100}{1 \times 100} \times \frac{7}{22}$

$\therefore \quad r^2 = \frac{39424}{100} \times \frac{7}{22}$

$\therefore \quad r^2 = \frac{1792}{100} \times 7$

$\therefore \quad r^2 = \frac{12544}{100}$

$\therefore \quad r^2 = \frac{112^2}{10^2}$

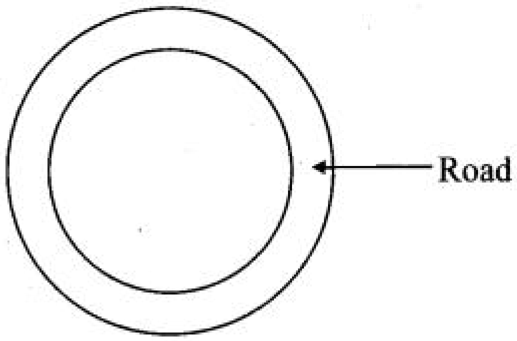
$\therefore \quad r = \frac{112}{10}$ ...[Taking square root of both sides]

$\therefore \quad r = 11.2$ cm

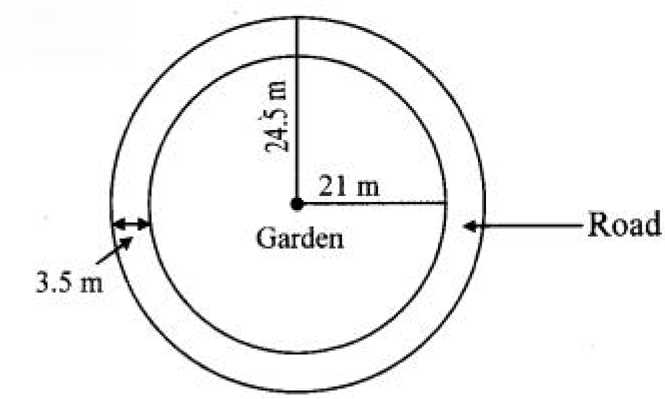
∴ Diameter = 2r = 2 x 11.2 = 22.4 cm

iii. Area of the circle = 12474 sq. cm ...[Given]
Area of the circle = πr^2
∴ 12474 = 227 x r^2
∴ r^2 = 12474 x 722
∴ r^2 = 567 x 7
∴ r^2 = 3969
∴ r = 63 ...[Taking square root of both sides]
∴ Diameter = 2r = 2 x 63 = 126cm

Question 3.
Diameter of the circular garden is 42 m. There is a 3.5 m wide road around the garden. Find the area of the road.



Solution:



Diameter of the circular garden is 42 m. … [Given]
∴ Radius of the circular garden (r) = 422 = 21 m
Width of the road = 3.5 m …[Given]
Radius of the outer circle (R)
= radius (r) + width of the road
= 21 + 3.5
= 24.5 m
Area of the road = area of outer circle – area of circular garden
= $\pi R^2 - \pi r^2$
= $\pi (R^2 - r^2)$
= 227 $[(24.5)^2 - (21)^2]$
= 227 (24.5 + 21) (24.5 – 21)
…..[∵ $a^2-b^2 = (a+b)(a-b)$]
= 227 x 45.5 x 3.5
= 22 x 45.5 x 0.5
= 500.50 sq. m
∴ The area of the road is 500.50 sq. m.

Question 4.
Find the area of the circle if its circumference is 88 cm.
Solution:
Circumference of the circle = 88 cm …[Given]
Circumference of the circle = 2πr
∴ 88 = 2 x 227 x r

∴ r=88×72×22 ∴ r = 14cm
Area of the circle = πr^2 = 227 x $(14)^2$
= 227 x 14 x 14 = 22 x 2 x 14 = 616 sq. cm
∴ The area of circle is 616 Sq cm

Maharashtra Board Class 8 Maths Chapter 15 Area Practice Set 15.6 Intext Questions and Activities

Question 1.
Draw a circle of radius 28mm. Draw any one triangle and draw a trapezium on the graph paper. Find the area of these figures by counting the number of small squares on the graph paper. Verify your answers using formula for area of these figures.
Observe that smaller the squares of graph paper, better is the approximation of area.

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(Textbook pg. no. 105)

Solution:

(Students should do this activity on their own.)