Chapter 2

Measurements

Ex 2.1

Question 1.
Find the missing values in the following table for the circles with radius (r), diameter (d) and Circumference (C).

S.No.	radius (*r*)	diameter (*d*)	Circumference (C)
(i)	15 cm		
(ii)			1760 cm
(iii)		24 m	

Solution:
(i) Given radius r = 15cm
∴ diameter d = 2 × 15 = 30 cm
Circumference C = π d units
= 227 × 30 = 6607 = 94.28 cm

(ii) Given circumference C = 1760 cm
2πr = 1760
2 × 227 × r = 1760
r = 1760×72×22 = 160×72×2 = 40 × 7 = 280 cm
diameter = 2 × r
= 2 × 280 = 560 cm

(iii) diameter d = 24m
radius r = d2 = 242 = 12 m
Circumference C = 2 π r units
= 2 × 227 × 12 = 5287 = 75.4 m

Tabulating the results

S.No.	radius (*r*)	diameter (*d*)	Circumference (C)
(i)	15 cm	30 cm	94.28 cm
(ii)	280 cm	560 cm	1760 cm
(iii)	12 m	24 m	75.42 m

Question 2.
Diameters of different circles are given below. Find their circumference (Take

π = 227)
(i) d = 70cm
(ii) d = 56m
(iii) d = 28mm

Solution:
(i) Diameter d = 70 cm
Circumference C = π d units = 227 × 70 = 22 × 10 = 220 cm

(ii) Diameter d = 56 m
Circumference = π d units
= 227 × 56 = 22 × 8 = 176 m

(iii) Diameter d = 28 mm
Circumference C = π d units = 227 × 28 = 22 × 4 = 88 mm

Question 3.
Find the circumference of the circles whose radii are given below.
(i) 49 cm
(ii) 91 mm

Solution:
Radius r = 49 cm
Circumference C = 2 π r units = 2 × 227 × 49 = 2 × 22 × 7
= 44 × 7 = 308 cm

(ii) Radius r = 91 mm
Circumference C = 2 π r units
= 2 × 227 × 91 = 2 × 22 × 13 = 44 × 13 = 572 mm

Question 4.
The diameter of a circular well is 4.2 m. What is its circumference?

Solution:
Given the diameter d = 4.2 m
Circumference C = π d units = 227 × 4.2 m = 22 × 0.6 = 13.2 m

Question 5.
The diameter of the bullock cart wheel is 1.4 m. Find the distance covered by it in 150 rotations?

Solution:
Diameter of the bullock cart wheel d= 1.4 m
Distance covered in 1 rotation = Its circumference

= π d units = 227 × 1 .4 m = 22 × 0.2 = 4.4 m
Distance covered in one rotation = 4.4 m
Distance covered in 150 rotations = 4.4 × 150 = 660.0
Distance covered in 150 rotations = 660 m

Question 6.
A ground is in the form of a circle whose diameter is 350 m. An athlete makes 4 revolutions. Find the distance covered by the athlete.

Solution:
Diameter of the ground d = 350 m
Distance covered in 1 revolution = Circumference of the circle
= π d units = 227 × 350 m = 22 × 50 = 1100 m
Distance covered in 1 rotation = 1100 m
Distance covered in 4 revolutions = 1100 × 4 = 4400 m

Question 7.
A wire of length 1320 cm is made into circular frames of radius 7 cm each. How many frames can be made?

Solution:
Length of the wire = 1320 cm
Radius of each circular frame = 7cm
Circumference of the frame 2 π r units = 2 × 227 × 7 cm = 2 × 22 = 44 cm

$$\therefore \text{Number of frames made} = \frac{\text{length of the wire}}{\text{circumference of one frame}} = \frac{1320}{44} = 30$$

30 frames can be made.

Question 8.
A Rose garden is in the form of circle of radius 63 m. The gardener wants to fence it at the rate of ₹ 150 per metre. Find the cost of fencing?

Solution:
Radius of the garden r = 63 m
Circumference of the garden = 2 π r units = 2 × 227 × 63 m = 2 × 22 × 9 = 396 m
Cost of fencing 1 meter = ₹ 150
Cost of fencing 396 meter = ₹ 150 × 396 = ₹ 59,400
∴ Cost of fencing the garden = ₹ 59,400

Question 9.
Formula used to find the circumference of a circle is
(i) 2πr units

(ii) πr2 + 2r units
(iii) πr2 sq. units
(iv) πr3 cu. units

Answer:
(i) 2πr units

Question 10.
In the formula, C = 2πr, 'r' refers to
(i) circumference
(ii) area
(iii) rotation
(iv) radius

Answer:
(iv) radius

Question 11.
If the circumference of a circle is 82π, then the value of 'r' is
(i) 41cm
(ii) 82 cm
(iii) 21cm
(iv) 20 cm

Answer:
(i) 41cm

Question 12.
Circumference of a circle is always
(i) three times of its diameter
(ii) more than three times of its diameter
(iii) less than three times of its diameter
(iv) three times of its radius

Answer:
(ii) more than three times of its diameter

Ex 2.2

Question 1.
Find the area of the dining table whose diameter is 105 cm.

Solution:

Diameter of the dinig table (d) = 105 cm
∴ Radius r = d2 = 1052 cm
Area of the circle = π r^2 = 227 × 1052 × 1052 = 8662.5 sq.cm
Area of the dinning table = 8662.5 cm^2

Question 2.
Calculate the area of the shotput ring whose diameter is 2.135 m.

Solution:
Radius of the shotput ring r = d2 = 2.1352 m
Area of the circle = π r^2
= 227 × 2.1352 × 2.1352
= 25.077 = 3.581 m^2
∴ Area of the shotput ring = 3.581 m^2

Question 3.
A sprinkler placed at the centre of a flower garden sprays water covering a circular area. If the area watered is 1386 cm2, find its radius and diameter.

Solution:
Area of the Circle = π r^2 sq.units
Area of the circular portion watered = 1386 cm^2
π r^2 = 1386
227 × r^2 = 1386
r^2 = 1386 × 722 = 63 × 7 = 9 × 7 × 7
r^2 = 3^2 × 7^2
r = 3 × 7
Radius (r) = 21 cm
Diameter (d) = 2 r = 2 × 21 cm
Diameter (d) = 42 cm

Question 4.
The circumference of a circular park is 352 m. Find the area of the park.

Solution:
Circumference of a Circle = 2 π r units
Given circumference of a circular park = 352 m
2 π r = 352
2 × 227 × r = 352
r = 352 × 722 × 12 = 56 m
Area of the park = π r^2 = 227 × 56 × 56 sq.units
= 22 × 8 × 56 = 9856 m^2
∴ Area of the Circular park = 9856 m^2

Question 5.
In a grass land, a sheep is tethered by a rope of length 4.9 m. Find the maximum area that the sheep can graze.

Solution:
Length of the rope = 4.9 m
Area that the sheep can graze = Area of circle with radius 4.9m
Area of the circle = πr^2 sq.units
$= 227 \times 4.9 \times 4.9 = 22 \times 0.7 \times 4.9 = 75.46$
$\therefore$ Area that the sheep can graze = 75.46 m^2

Question 6.
Find the length of the rope by which a bull must be tethered in order that it may be able to graze an area of 2464 m2.

Solution:
If the bull is tethered by a rope then the area it can graze is a circular area of radius
= length of the rope
Area of the circle = 2464 m^2
$\pi r^2 = 2464\ m^2$
$227 \times r^2 = 2464$
$r^2 = 2464 \times 722 = 122 \times 7 = 16 \times 7 \times 7$
$r^2 = 42 \times 72$
$r = 4 \times 7 = 28$ m
length of the rope r = 28 m

Question 7.
Lalitha wants to buy a round carpet of radius is 63 cm for her hall. Find the area that will be covered by the carpet.

Solution:
Radius of the round carpet = 63 cm
Area covered by the round carpet = πr^2 sq units
$A = 227 \times 63 \times 63 = 22 \times 9 \times 63 = 12474\ cm^2$
Area covered by the round carpet = 12,474 cm^2

Question 8.
Thenmozhi wants to level her circular flower garden whose diameter is 49 m at the rate of ₹150 per m2 Find the cost of levelling.

Solution:
Diamter of the circular garden d = 49 m
Radius r = d2 = 492 m
Area of the circular garden = πr^2 sq units
= 227 × 492 × 492 m^2 = 1,886.5 m^2
Cost of levelling a m^2 area = ₹ 150
∴ Cost of levelling 1886.5 m^2 = ₹ 150 × 1886.5 = ₹ 2,82,975
Cost of levelling the flower garden = ₹ 2,82,975

Question 9.
The floor of the circular swimming pool whose radius is 7 m has to be cemented at the rate of ₹ 18 per m2. Find the total cost of cementing the floor.

Solution:
Radius of the circular swimming pool r = 7 m
Area of the circular swimming pool A = πr^2 sq. units
= 227 × 7 × 7 m^2 = 154 m^2
Cost of cementing a m^2 floor = ₹ 18.
Cost of cementing 154 m^2 floor = ₹ 18 × 154 = ₹ 2,772

Objective Type Questions

Question 10.
The formula used to find the area of the circle is
(i) 47πr2
(ii) πr2
(iii) 2πr2
(iv) πr2 + 2r

Answer:
(ii) πr^2

Question 11.
The ratio of the area of a circle to the area of its semicircle is
(i) 2 : 1
(ii) 1 : 2
(iii) 4 : 1
(iv) 1 : 4

Answer:
(i) 2 : 1

Question 12.
Area of circle of radius 'n' units is
(i) 2πrp sq.units
(ii) πm2 sq.units
(iii) πr2 sq.units
(iv) πn2 sq.units

Answer:
(iv) πn^2 sq.units

Ex 2.3

Question 1.
Find the area of a circular pathway whose outer radius is 32 cm and inner radius is 18 cm.

Solution:
Radius of the outer circle R = 32 cm
Radius of the inner circle r = 18 cm
Area of the circular pathway = $\pi (R^2 - r^2)$ sq. units = $227 (32^2 - 18^2)$ cm^2
= $227 \times (32 + 18) \times (32 - 18)$ cm^2
= $227 \times 50 \times 14$ cm^2 = 2,200 cm^2
Area of the circular pathway = 2,200 cm^2

Question 2.
There is a circular lawn of radius 28 m. A path of 7 m width is laid around the lawn. What will be the area of the path?

Solution:
Radius of the circular lawn r = 28 m
Radius of the lawn with path = 28 + 7 m = 35 m
Area of the circular path = $\pi (R^2 - r^2)$ sq. units
Area of the path = $227 (35^2 - 28^2)$ m^2 = $227 \times (35 + 28) (35 - 28)$ m^2
= $227 \times 63 \times 7$ m^2 = 1386 m^2
Area of the path = 1386 m^2

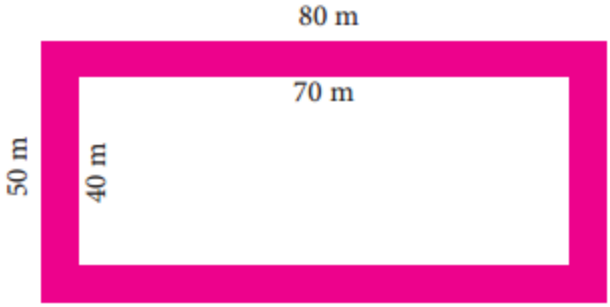
Question 3.
A circular carpet whose radius is 106 cm is laid on a circular hall of radius 120 cm. Find the area of the hall uncovered by the carpet.

Solution:
Radius of the circular hall R = 120 cm
Radius of the circular carpet r = 106 cm
Area of the hall uncovered = Area of the hall – Area of the carpet
$= \pi (R^2 - r^2)\ cm^2$
$= 227 \times (120^2 - 106^2)\ cm^2$
$= 227 \times (120 + 106) \times (120 - 106)\ cm^2$
$= 227 \times 226 \times 14\ cm^2 = 9{,}944\ cm^2$
Area of the hall uncovered = 9, 944 cm^2

Question 4.
A school ground is in the shape of a circle with radius 103 m. Four tracks each of 3 m wide has to be constructed inside the ground for the purpose of track events. Find the cost of constructing the track at the rate of ₹ 50 per sq.m.

Solution:
Radius of the ground R = 103 m
Width of a track W = 3 m
Width of 4 tracks = 4 × 3 = 12 m
Radius of the ground without track
r = (103 – 12)m
r = 91 m
Area of 4 tracks = Area of the ground
– Area of the ground without crack
$= \pi R^2 - \pi r^2$ sq.units
$= \pi(R^2 - r^2)$ sq.units
$= 227\ [103^2 - 91^2]$
$= 227\ [103 + 91]\ [103 - 91] m^2$
$= 227 \times 194 \times 12 = 512167 = 7316.57\ m^2$
∴ Area of 4 tracks = 7316.57 m^2
Cost of constructing 7316.57 m^2 = ₹ 50
∴ Cost of constructing 7316.57 m^2 = ₹ 50 × 7316.57 = ₹ 3,65,828,57
Cost of constructing the track ₹ 3,65,828,57

Question 5.
The figure shown is the aerial view of the pathway. Find the area of the pathway.



Solution:
Area of the rectangle = (Lenght × Breadth) sq. units
Area of the outer rectangle = (L × B) sq. units
Length of the outer rectangle L = 80 m
Breadth of the outer rectangle B = 50 m
Length of the inner rectangle l = 70 m
Breadth of the inner rectangle b = 40 m
Area of the outer rectangle = 80 × 50 m^2 = 4000 m^2
Area of the inner rectangle = l × b sq. unit = 70 × 40 m^2 = 2800 m^2
Area of the pathway = Area of the outer rectangle
– Area of the inner rectangle
= 4000 – 2800 m^2 = 1200 m^2
Area of the pathway = 1200 m^2

Question 6.
A rectangular garden has dimensions 11 m × 8 m. A path of 2 m wide has to be constructed along its sides. Find the area of the path.

Solution:
Area of the rectangular garden L × B = 11 m × 8 m = 88 m^2
Length of the inner rectangle L = L – 2 W = 11 – 2(2) = 11 – 4 = 7 m
Breadth of the inner rectangle b = B – 2W = 8 – 2(2) = 8 – 4 = 4 m
Area of the inner rectangle = l × b sq. units = 7 × 4 m^2 = 28 m^2
Area of the path = Area of the outer rectangular garden
– Area of the inner rectangle
= 88 m^2 – 28m^2 = 60 m^2
Area of the path = 60 m^2

Question 7.
A picture is painted on a ceiling of a marriage hall whose length and breadth are 18 m and 7 m respectively. There is a border of 10 cm along each of its sides. Find the area of the border.

Solution:
Length of the ceiling L = 18 m

Breadth of the ceiling B = 7 m
Area of the ceiling = L × B sq. units = 18 × 7 m^2 = 126 m^2
Width of the boarder W = 10 cm = 10100 m = 0.1 m
Length of the ceiling without border = L – 2W = 18 – 2(0.1) m
= 18 – 0.2 m = 17.8 m
Breadth of the ceiling without border = B – 2W = 7 – 2 (0.1) m
= 7 – 0.2 m = 6.8 m
Area of the ceiling without border = l × b sq.units
= 17.8 × 6.8 m^2 = 121.04 m^2
∴ Area of the border = Area of the ceiling
– Area of the ceiling without border
= 126 – 121.04 m^2 = 4.96 m^2
Area of the border = 4.96 m^2

Question 8.
A canal of width 1 m is constructed all along inside the field which is 24 m long and 15 m wide. Find (i) the area of the canal (ii) the cost of constructing the canal at the rate of ₹ 12 per sq.m.

Solution:
Length of the field L = 24 m
Width (Breadth) of the field B = 15 m
(i) Area of the field = L × B sq. units = 24 × 15 m^2 = 360 m^2
(ii) Width of the canal (W) = 1 m
Length of the field without canal (l) = L – 2(W) = 24 – 2(1) m
= 24 – 2 m = 22 m
Width of the field without canal (b) = B – 2W = 15 – 2(1) m
= 15 – 2 m = 13 m
Area of the field without canal = l × b sq. units = 22 × 13 m^2 = 286 m^2
Area of the canal = 360 – 286 = 74 m^2
Cost of constructing 1 m^2 canal = ₹ 12
Cost of the constructing 74 m^2 canal = ₹ 12 × 74 = ₹ 888

Objective Type Question

Question 9.
The formula to find the area of the circular path is
(i) π(R2 – r2) sq. units
(ii) πr2 sq. units
(iii) 2πr2 sq. units
(iv) πr2 + 2r sq. units

Answer:
(i) π(R^2 – r2) sq. units

Question 10.
The formula used to find the area of the rectangular path is
(i) p(R2 – r2) sq. units
(ii) (L × B) – (l × b) sq. units
(iii) LB sq. units
(iv) lb sq. units

Answer:
(ii) (L × B) – (l × b) sq. units

Question 11.
The formula to find the width of the circular path is
(i) (L – l) units
(ii) (B – b) units
(iii) (R – r) units
(iv) (r – R) units

Answer:
(iii) (R – r) units

Ex 2.4

Miscellaneous Practice Problems

Question 1.
A wheel of a car covers a distance of 3520 cm in 20 rotations. Find the radius of the wheel?

Solutions:
Distance covered by circular wheel in 20 rotation = 3520 cm
∴ Distance covered ini rotation = 352020 cm = 176 cm
∴ Circumference of the wheel = 176 cm
∴ $2\pi r = 176$
$2 \times -26 \times r = 176$
$r = 176 \times 72 \times 22$
r = 28 cm
Radius of the wheel = 28 cm

Question 2.
The cost of fencing a circular race course at the rate of ₹ 8 per metre is ₹2112. Find the diameter of the race course.

Solution:

Cost of fencing the circumference = ₹ 2112
Cost of fencing one meter = ₹ 8
∴ Circumference of the circle = 21128 = 264 m
πd = 264 m
227 × d = 264
d = 264×722 = 12 × 7 m = 84 m
∴ Diameter of the race cource = 84 m

Question 3.
A path 2 m long and 1 m broad is constructed around a rectangular ground of dimensions 120 m and 90 m respectively. Find the area of the path.

Solution:
Length of the rectangular ground l = 120 m
Breadth b = 90 m
Length of the path W_1 = 2m
Length of the path W_2 = 1m
Length of the ground with path L = 1 + 2 (W_2) = 120 + 2(1) m
= 120 + 2 = 122 m
Breadth of the ground with path B = l + 2(W_1) units
= 90 + 2(2) m = 90 + 4 m = 94 m
∴ Area of the path = (L × B) – (1 × b) sq. units
= (122 × 94) – (122 × 94) m^2 = 668 m^2
∴ Area of the path = 668 m^2

Question 4.
The cost of decorating the circumference of a circular lawn of a house at the rate of ₹55 per metre is ₹16940. What is the radius of the lawn?

Solution:
Cost of decorating the circumference = ₹ 16,940
Cost of decorating per meter = ₹ 55
∴ Length of the circumference = 1694055 m = 308 m
Circumference of the circular lawn = 308 m
2 × πr = 308 m
2 × 227 × r = 308 m
r = 308×72×22
r = 49 m
Radius of the lawn = 49 m

Question 5.
Four circles are drawn side by side in a line and enclosed by a rectangle as shown below.
If the radius of each of the circles is 3 cm, then calculate:

(i) The area of the rectangle.
(ii) The area of each circle.
(iii) The shaded area inside the rectangle.

Solution:
Given radius of a circle r = 3 cm
Diameter of the circle = 2r = 2 × 3 = 6 cm
Breadth of the rectangle = Diamter of the circle
B = 6cm
Length of the rectangle L = 4 × diameter of a circle
L = 4 × 6
L = 24cm

(i) Area of the rectangle = L × B sq. units
= 24 × 6 cm^2
Area of the rectangle = 144 cm^2

(ii) Area of the circle = πr^2 sq. units
= 227 × 3 × 3 cm^2
= 1987 cm^2
= 28.28 cm^2

(iii) Area of the shaded area = Area of the rectangle – Area of the 4 circles
= 144 – (4 × 1987) cm^2 = 144 – 7927 cm^2
= 144 – 113.14 cm^2 = 30.85 cm^2

Challenge Problems

Question 6.
A circular path has to be constructed around a circular lawn. If the outer and inner circumferences of the path are 88 cm and 44 cm respectively, find the width and area of the path.

Solution:
Outer circumference of the circular lawn = 88 cm
$2\pi R$ = 88 cm
Inner circumference of the lawn $2\pi r$ = 44 cm
$2\pi R - 2\pi r$ = 88 – 44
2 × 227 (R – r) = 44
(R – r) = 44×72×22

Outer radius – Inner radius = 7 cm
∴ Width of the lawn = 7 cm
Also $2\pi R + 2\pi r = 88 + 44$
$2\pi (R + r) = 132$
$\pi (R + r) = 1322 = 66$ cm
Area of the path = $\pi R^2 - \pi r^2$ sq. units
$= \pi (R + r) (R - r) = 66 \times 7$
Area of the path = $462 cm^2$

Question 7.
A cow is tethered with a rope of length 35 m at the centre of the rectangular field of length 76 m and breadth 60 m. Find the area of the land that the cow cannot graze?

Solution:
Length of the field l = 76 m
Breadth of the field b = 60m
Area of the field A = l × b sq. units = $76 \times 60 m^2$
Area of the field A = $4560 m^2$
Length of the rope = 35m
Radius of the land that the cow can graze = 35m
Area of the land tha the cow can graze = circle of radius 35 m = πr^2 sq.units
$\pi \times 35 \times 35 m^2 = 227 \times 35 \times 35 m^2$
$= 3850 m^2$
Area of the land the cow cannot graze = Area of the field – Area that the cow can graze
$= 4560 - 3860 m^2 = 710 m^2$
Area of the land that the cow cannot graze = $710 m^2$

Question 8.
A path 5 m wide runs along the inside of the rectangular field. The length of the rectangular field is three times the breadth.of the field. If the area of the path is 500 m2 then find the length and breadth of the field.

Solution:
Let the length of the rectangular field = 'L' m
Breadth of the rectangular field = = 'B' m
Area of the rectangular field = (L × B) m^2
Also given length = 3 × Breadth
L = 3B
Width of the path (W) = 5m
Lenth of the inner rectangle = L – 2W = l – 2(5)
= 3B – 10m
Breadth of the inner rectangle = B – 2W

$= B - 2(5)$
$= B - 10$ m
Area of the inner rectangle $= (3B - 10)(B - 10)$
$= 3B^2 - 10B - 30B + 100$
Area of the path = Area of outer rectangle
– Area of inner rectangle
$= (L \times B) - (3B^2 - 10B - 30B + 100)$
$3B \times B - (3B^2 - 40B + 100)$
$= 3B^2 - 3B^2 + 40B - 100$
Area of the path $= 40B - 100$
Given area of the path $= 500\ m^2$
$40B - 100 = 500$
$40B = 500 + 100 = 600$
$B = 60040$
$B = 15m$
Length of the field = 45 m; Breadth of the field = 15 m

Question 9.
A circular path has to be constructed around a circular ground. 1f the areas of the outer and inner circles are 1386 m2 and 616 m2 respectively, find the width and area of the path.

Solution:
Area of the outer circle $= 1386\ m^2$
$\pi R^2 = 1386m^2$
Area of the inner circle $= 616\ m^2$
$\pi r^2 = 616m^2$
Area of the path = Area of outer circle – Area of the inner circle
$1386\ m^2 - 616\ m^2$
Area of the path $= 770m^2$
Also $\pi R^2 = 1386$
$R^2 = 1386 \times 722$
$R^2 = 63 \times 7$
$R^2 = 9 \times 7 \times 7$
$R^2 = 32 \times 72$
$R = 3 \times 7$
Outer Radius R = 21 m
Again $\pi r^2 = 616$
$227 \times r^2 = 616$
$r^2 = 28 \times 7$
$r^2 = 4 \times 7 \times 7$
$r^2 = 22 \times 72$
$r = 2 \times 7$
Inner radius r = 14m

Width of the path = Outer radius – Inner radius = 21 – 14
Width of the path = 7m

Question 10.
A goat is tethered with a rope of length 45 m at the centre of the circular grass land whose radius is 52 m. Find the area of the grass land that the goat cannot graze.

Solution:
Length of the rope = 45 m = Radius of the inner circle
∴ Area of the circular area that the goat graze = πr^2 sq. units
= $227 \times 45 \times 45$ m^2 = 6364.28 m^2
Radius of the gross land = 52 m
Area of the grass land = $227 \times 52 \times 52$ = 8,498.28 m^2
Area that the goat cannot graze
= Area of the outer circle – Area of the inner circle
= 8498.28 – 6364.28 = 2134 m^2
Area of the goat cannot grass = 2134 m^2

Question 11.
A strip of 4 cm wide is cut and removed from all the sides of the rectangular cardboard with dimensions 30 cm × 20 cm. Find the area of the removed portion and area of the remaining cardboard.

Solution:
Area of the outer rectangular cardboard
= L × B sq.units = 30×20 cm^2 = 600 cm^2
Width of the stip = 4 cm
Length of the inner rectangle = L – 2W
l = 30 – 2(4) = 30 – 8
l = 22cm
Breadth of the inner rectangle B = 2W = 20 – 2(4) = 20 – 8
b = 12cm
Area of the inner rectangle = l × b sq.units = 22×12 cm^2 = 264 cm^2
Area of the remaining cardboard = 264 cm^2
Area of the removed portion = Area of outer rectangle
– Area of the inner rectangle
= 600 – 264 cm^2
Area of the removed portion = 336 cm^2

Question 12.
A rectangular field is of dimension 20 m × 15 m. Two paths run parallel to the sides of the rectangle through the centre of the field. The width of the longer path is 2m and that of the shorter path is 1 m. Find (i) the area of the paths

(ii) the area of the remaining portion of the field (iii) the cost of constructing the roads at the rate of ₹ 10 per sq.m.

Solution:

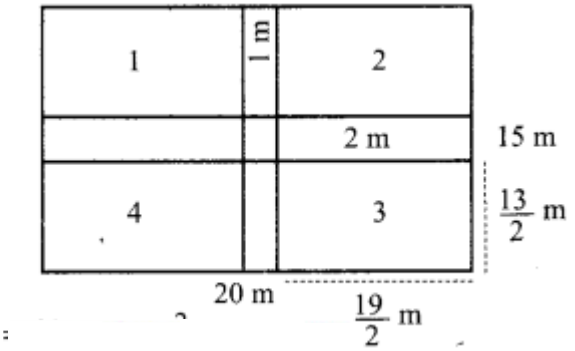
Length of the rectangular field L = 20 m

Breadth B = 15m

Area = L × B

20 × 15 m^2

Area of outer rectangle = 300 m^2



Area of inner small rectangle = 192 × 132 = 61.75 cm^2

(i) Area of the path = Area of the outer rectangle

– Area of 4 inner small rectangles

= 300 – 4(61.75) = 300 – 247 = 53 m^2

Area of the paths = 53 m^2

(ii) Area of the remaining portion of the field

= Area of the outer rectangle – Area of the paths

= 300 – 53 m^2 = 247 m^2

Area of the remaining portion = 247 m^2

(iii) Cost of constructing 1 m^2 road = ₹10

∴ Cost of constructing 53 m^2 road = ₹10 × 53 = ₹530

∴ Cost of constructing road = ₹530