RD SHARMA
Solutions
Class 8 Maths
Chapter 20
Ex 20.1

Q1: A flooring tile has the shape of a parallelogram whose base is 24 cm and the corresponding height is 10 cm. How many are such tiles required to cover a floor of area 1080 m^2?

Answer:

Given :

Base of a flooring tile that is in the shape of a parallelogram = b = 24 cm

Corresponding height = h = 10 cm.

Now, in a parallelogram : Area (A) = Base (b) × Height (h)

Therefore, Area of a tile = 24 cm × 10 cm = 240 cm^2

Now, observe that the area of the floor is 1080 m^2.

1080 m^2 = 1080 × 1m × 1m

= 1080 × 100 cm × 100 cm (Because 1 m = 100 cm)

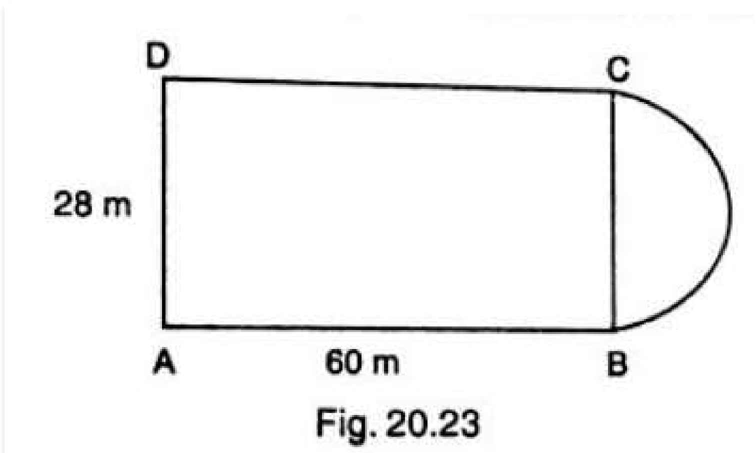
= 1080 × 100 × 100 × cm × cm

= 10800000 cm^2

Therefore, Number of required tiles = $\frac{10800000}{240}$ = 45000

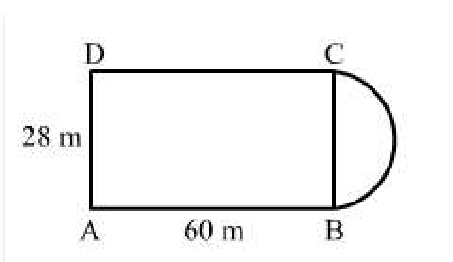
Hence, we need 45000 tiles to cover the floor.

2. A plot is in the form of a rectangle ABCD having semi-circle on BC as shown in Fig. 20.23. If AB = 60 m and BC = 28 m, find the area of the plot.



Answer :

The given figure has a rectangle with a semicircle on one of its sides:



Total area of the plot = Area of rectangle ABCD + Area of semicircle with radius (r = $\frac{28}{2}$ = 14m)

Therefore, Area of the rectangular plot with sides 60m and 28m =60 ×28 =1680 m^2 ……… (i)

And area of the semicircle with radius 14m = $\frac{1}{2}\pi \times (14)^2 = \frac{1}{2} \times \frac{22}{7} \times 14 \times 14 = 308$ m^2 …………… (ii)

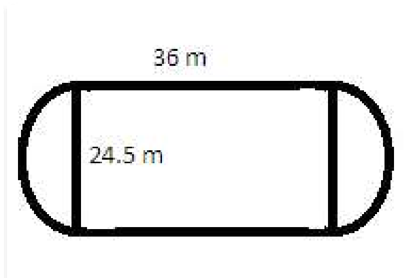
Total area of the plot =1680 + 308 =1088 m^2 ……… .(from (i) and (ii)).

3. A playground has the shape of a rectangle, with two semi-circles on its smaller sides as diameters, added to its outside. If the sides of the rectangle are 36 m and 24.5 m, find the area of the playground. (Take pi = 22 / 7).

Answer :

It is given that the playground is in the shape of a rectangle with two semicircle on its smaller sides.

Length of the rectangular portion is 36 m and its width is 24.5 m as shown in the figure below.



Thus, the area of the playground will be the sum of the area of a rectangle and the areas of the two semicircles with equal diameter 24.5 m.

Now, area of rectangle with length 36m and width 24.5m:

Area of rectangle = length x width

= 36m × 24. 5 m =882 m^2

Radius of the semicircle = r = $\frac{\text{diameter}}{2} = \frac{24.5}{2}$ = 12.25m

Therefore, Area of the semicircle = $\frac{1}{2}\pi r^2$

= ½ × 22/7 × $(12.25)^2$ = 235.8 m^2

Therefore, Area of the complete playground = area of the rectangular ground + 2 × area of a semicircle

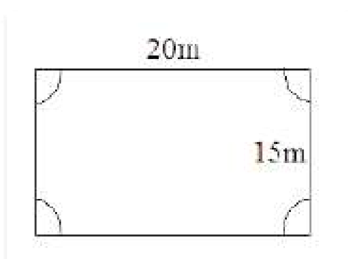
= 882 + 2 × 235.8 = 1353.6 m^2

4. A rectangular piece is 20 m long and 15 m wide. From its four corners, quadrants of radii 3.5 m have been cut. Find the area of the remaining part.

Answer :

It is given that the length of the rectangular piece is 20 m and its width is 15 m.

And, from each corner a quadrant each of radius 3.5 m has been cut out. A rough figure for this is given below :



Therefore, Area of the remaining part = Area of the rectangular piece — (4 × Area of a quadrant of radius 3.5m)

Now, area of the rectangular piece = 20 × 15 = 300 m^2

And, area of a quadrant with radius 3.5 m = $\frac{1}{4}\pi r^2 = \frac{1}{4} \times \frac{22}{7} \times 3.5^2$ = 9.625 m^2

Therefore, Area of the remaining part = 300 – (4 × 9.625) = 261.5 m^2

5. The inside perimeter of a running track (shown in Fig. 20.24) is 400 m. The length of each of the straight portion is 90 m and the ends are semi-circles. If the track is everywhere 14 m wide, find the area of the track. Also, find the length of the outer running track.

Answer:

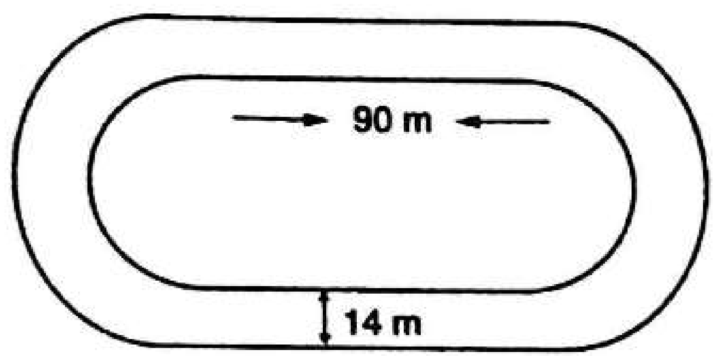


Fig. 20.24

It is given that the inside perimeter of the running track is 400m. It means the length of the inner track is 400 m.

Let r be the radius of the inner semicircles.

Observe : Perimeter of the inner track = Length of two straight portions of 90 m + Length of two semicircles 400

Therefore, 400 =(2 × 90) +(2 × Perimeter of a semicircle)

400 = 180 + (2 × 22/7 × r)

400 -180 = (44/7 × r)

44/7 × r = 220

r = $\frac{220 \times 7}{44}$ = 35 m

Therefore, Width of the inner track = 2r = 2 × 35 = 70 m

Since the track is 14 m wide at all places, so the width of the outer track : 70 + (2 × 14) = 98m

Radius of the outer track semicircles = 98/2 = 49 m

Area of the outer track = (Area of the rectangular portion with sides 90 m and 98 m) + (2 × Area of two semicircles with radius 49 m)

=(98 × 90) + (2 × ½ × 22/7 × 49^2)

= (8820) + (7546) = 16366 m^2

And, area of the inner track = (Area of the rectangular portion with sides 90 m and 70 m) + (2 × Area of the semicircle with radius 35 m)

= (70 × 90) + (2 × ½ × 22/7 × 35^2)

= (6300) + (3850)

=10150 m^2

Therefore, Area of the running track = Area of the outer track – Area of the inner track

= 16366 – 10150

= 6216 m^2

And, length of the outer track = (2 × length of the straight portion) + (2 ×perimeter of the semicircles with radius 49 m)

= (2 × 90) –(2 × 22/7 × 49)

= 180 +308 = 488 m

6. Find the area of Fig. 20.25, in square cm, correct to one place of decimal. (Take it = 22/7)

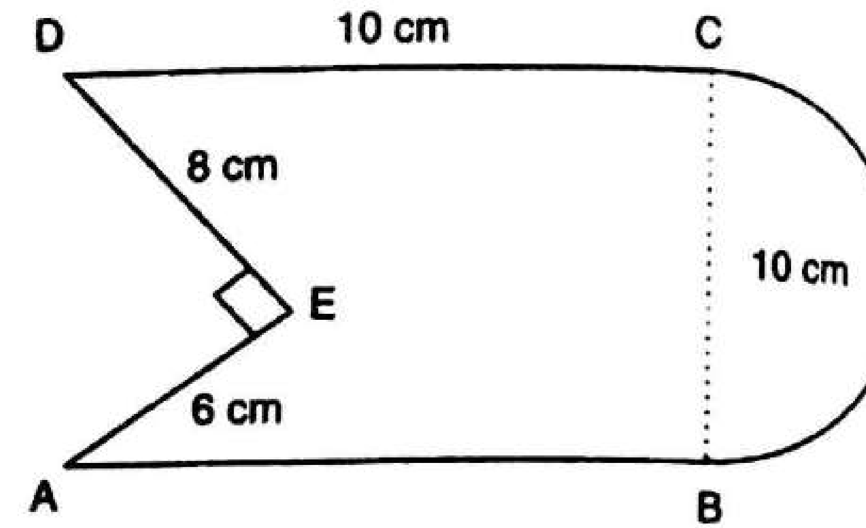
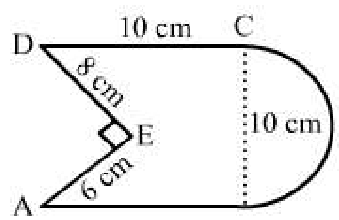


Fig. 20.25

Answer:

The given figure is:



Construction: Connect A to D.

Then, we have Area of the given figure = (Area of rectangle ABCD + Area of the semicircle) – (Area of triangle AED).

Therefore, Total area of the figure = (Area of rectangle with sides 10 cm and 10 cm) + (Area of semicircle with radius = 10/2 = 5 cm) – (Area of triangle AED with base 6 cm and height 8 cm)

$= (10 \times 10) + (1/2 \times 22/7 \times 5^2) - (1/2 \times 6 \times 8)$

$= 100 + 39.3 - 24 = 115.3\ cm^2$

7. The diameter of a wheel of a bus is 90 cm which makes 315 revolutions per minute. Determine its speed in kilometers per hour. [Use pi = 22 / 7].

Answer :

It is given that the diameter of the wheel is 90 cm.

Therefore, Radius of the circular wheel, r = 90/2 = 45 cm.

Therefore, Perimeter of the wheel = $2 \times \pi \times r$

$= 2 \times 22/7 \times 45$

= 282.857 cm

It means the wheel travels 282.857 cm in a revolution.

Now, it makes 315 revolutions per minute.

Therefore, Distance travelled by the wheel in one minute = 315 ×282.857 = 89100 cm

Therefore, Speed = 89100 cm per minute = $\frac{89100\ \text{cm}}{1\ \text{minute}}$

Now, we need to convert it into kilometers per hour.

Therefore, $\frac{89100 \text{ cm}}{1 \text{ minute}} = \frac{89100 \times \frac{1}{100000} \text{ kilometer}}{\frac{1}{60} \text{ hour}}$

$= \frac{891000}{100000} \times \frac{60}{1} \frac{\text{kilometer}}{\text{hour}}$ = 53.46 kilometers per hour.

8. The area of a rhombus is 240 cm^2 and one of the diagonal is 16 cm. Find another diagonal.

Answer :

Given :

Area of the rhombus = 240 cm

Length of one of its diagonals = 16 cm

We know that if the diagonals of a rhombus are d_1 and d_2, then the area of the rhombus is given by :

Area = $\frac{1}{2}(d_1 \times d_2)$

Putting the given values :

$240 = \frac{1}{2}(16 \times d_2)$

$240 \times 2 = 16 \times d_2$

This can be written as follows :

$16 \times d_2 = 480$

$d_2 = 480/16 = 30$ cm

Thus, the length of the other diagonal of the rhombus is 30 cm.

9. The diagonals of a rhombus are 7.5 cm and 12 cm. Find its area.

Answer :

Given :

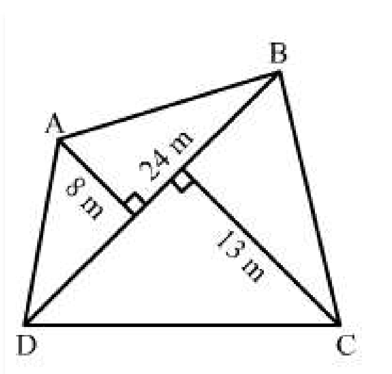
Lengths of the diagonals of a rhombus are 7.5 cm and 12 cm.

Now, we know : Area = $\frac{1}{2}(d_1 \times d_2)$

Area of rhombus = $\frac{1}{2}(7.5 \times 12)$ = 45 cm^2

10. The diagonal of a quadrilateral shaped field is 24 m and the perpendiculars dropped on it from the remaining opposite vertices are 8 m and 13 m. find the area of the field.

Answer:



Given :

Diagonal of a quadrilateral shaped field = 24 m

Perpendiculars dropped on it from the remaining opposite vertices are 8 m and 13 m.

Now, we know : Area = $\frac{1}{2} \times d \times (h_1 + h_2)$

Therefore, Area of the field = $\frac{1}{2} \times 24 \times (8 + 13)$

= 12 x 21 = 252 m^2

11. Find the area of a rhombus whose side is 6 cm and whose altitude is 4 cm. If one of its diagonals is 8 cm long, find the length of the other diagonal.

Answer :

Given :

Side of the rhombus = 6 cm

Altitude = 4 cm

One of the diagonals = 8 cm

Area of the rhombus = Side × Altitude = 6 × 4 = 24 cm^2

We know :

Area of rhombus = $\frac{1}{2}(d_1 \times d_2)$

Using (i) :

$24 = \frac{1}{2}(d_1 \times d_2)$

$24 = \frac{1}{2}(8 \times d_2)$

D_2 = 6 cm .

12. The floor of a building consists of 3000 tiles which are rhombus shaped and each of its diagonals are 45 cm and 30 cm in length. Find the total cost of polishing the floor, if the cost per m^2 is Rs 4.

Answer :

Given :

The floor consists of 3000 rhombus shaped tiles.

The lengths of the diagonals of each tile are 45 cm and 30 cm.

Area of a rhombus shaped the = $\frac{1}{2}(45 \times 30)$ = 675 cm^2

Therefore, Area of the complete floor = 3000 × 675 = 2025000 cm^2

Now, we need to convert this area into m^2 because the rate of polishing is given as per m^2.

Therefore, 2025000 cm^2 = 2025000 × cm × cm

= 2025000 × 1/100 m × 1/100 m

= 202.5 m^2

Now, the cost of polishing 1 m^2 is Rs 4.

Therefore, Total cost of polishing the complete floor = 202.5 × 4 = 810

Thus, the total cost of polishing the floor is Rs 810.

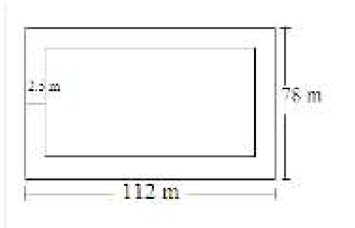
13. A rectangular grassy plot is 112 m long and 78 m broad. It has a gravel path 2.5 m wide all around it on the side. Find the area of the path and the cost of constructing it at Rs 4.50 per square meter.

Answer :

Given: The length of a rectangular grassy plot is 112 m and its width is 78 m.

Also, it has a gravel path of width 2.5 m around it on the sides

Its rough diagram is given below :



Length of the inner rectangular field = 112 – (2 × 2.5) = 107 m

The width of the inner rectangular field = 78 – (2 × 2.5) = 73 m

Area of the path = (Area of the rectangle with sides 112 m and 78 m) – (Area of the rectangle with sides 107 m and 73 m)

= (112 × 78) – (107 × 73)

= 8736 – 7811 = 925 m^2

Now, the cost of constructing the path is Rs 4.50 per square meter.

Cost of constructing the complete path = 925 × 4.50 = Rs 4162.5

Thus, the total cost of constructing the path is Rs 4162.5.

14. Find the area of a rhombus, each side of which measures 20 cm and one of whose diagonals is 24 cm.

Answer :

Given :

Side of the rhombus = 20 cm

Length of a diagonal = 24 cm

We know : If d_1 and d_2 are the lengths of the diagonals of the rhombus, then side of the rhombus $= \frac{1}{2}\sqrt{d_1^2 + d_2^2}$

So, using the given data to find the length of the other diagonal of the rhombus

$20 = \frac{1}{2}\sqrt{24^2 + d_2^2}$

$40 = \sqrt{24^2 + d_2^2}$

Squaring both sides to get rid of the square root sign :

$40^2 = 24^2 – d_2^2$

$d_2^2 = 1600 – 576 = 1024$

$d_2 = \sqrt{1024} = 32$ cm

Therefore, Area of the rhombus $= \frac{1}{2}(24 \times 32) = 384$ c m^2

15. The length of a side of a square field is 4 m. What will be the altitude of the rhombus, if the area of the rhombus is equal to the square field and one of its diagonal is 2 m?

Answer :

Given:

Length of the square field = 4 m

Area of the square field = 4 × 4 = 16 m2

Given: Area of the rhombus = Area of the square field

Length of one diagonal of the rhombus = 2 m

Side of the rhombus $= \frac{1}{2}\sqrt{d_1^2 + d_2^2}$

And, area of the rhombus $= \frac{1}{2} \times (d_1 \times d_2)$

Therefore, Area :

$16 = \frac{1}{2} \times (2 \times d_2)$

Now, we need to find the length of the side of the rhombus.

Therefore, Side of the rhombus = $\frac{1}{2}\sqrt{2^2 + 16^2} = \frac{1}{2}\sqrt{260} = \frac{1}{2}\sqrt{4 \times 65} = \frac{1}{2} \times 2\sqrt{65} = \sqrt{65}$

Also, we know: Area of the rhombus = Side × Altitude

Therefore, 16 = $\sqrt{65}$ × Altitude

Altitude= $\frac{16}{\sqrt{65}}$ m .

16. Find the area of the field in the form of a rhombus, if the length of each side be 14 on and the altitude is 16 cm.

Answer :

Given:

Length of each side of a field in the shape of a rhombus = 14 cm Altitude = 16 cm

Now, we know: Area of the rhombus = Side × Altitude

Therefore, Area of the field = 14 × 16 = 224 cm2

17. The cost of fencing a square field at 60 paise per meter is Rs 1200. Find the cost of reaping the field at the rate of 50 paise per 100 sq. metres.

Answer :

Given:

Cost of fencing 1 metre of a square field = 60 paise

And, the total cost of fencing the entire field = Rs 1200 = 1,20,000 paise

Perimeter of the square field = $\frac{120000}{60}$ = 2000 metres

Now, perimeter of a square = 4 × side

For the given square field :

4 × Side = 2000 m

Side = $\frac{2000}{4}$ = 500 metres

Therefore, Area of the square field = 500 × 500 = 250000 m^2

Again, given: Cost of reaping per 100 m^2 = 50 paise

Therefore, Cost of reaping per 1 m^2 = $\frac{50}{100}$ paise

Therefore, Cost of reaping 250000 m^2 = $\frac{50}{100}$ × 250000 = 125000 paise .

Thus, the total cost of reaping the complete square field is 125000 paise, i.e. RS. 1250.

18. In exchange of a square plot one of whose sides is 84 m, a man wants to buy a rectangular plot 144 m long and of the same area as of the square plot. Find the width of the rectangular plot.

Answer :

Given:

Side of the square plot = 84 m

Now, the man wants to exchange it with a rectangular plot of the same area with length 144.

Area of the square plot = 84 × 84 = 7056 m^2

Therefore, Area of the rectangular plot = Length × Width

7056 = 144 × Width

Width = 7056/144 = 49 m

Hence, the width of the rectangular plot is 49 m.

19. The area of a rhombus is 84 m^2. If its perimeter is 40 m, then find its altitude.

Answer :

Given:

Area of the rhombus = 84 m^2

Perimeter = 40 m

Now, we know: Perimeter of the rhombus = 4 × Side

40 = 4 × Side

Side = 40/4 = 10 m

Again, we know: Area of the rhombus = Side × Altitude

84 = 10 × Altitude

Altitude = 84/10 = 8.4 m

Hence, the altitude of the rhombus is 8.4 m.

20. A garden is in the form of a rhombus whose side is 30 meters and the corresponding altitude is 16 m. Find the cost of leveling the garden at the rate of Rs 2 per m^2

Answer :

Given:

Side of the rhombus-shaped garden = 30 m

Altitude = 16 m

Now, area of a rhombus = side × Altitude

Area of the given garden = 30 × 16 = 480 m^2

Also, it is given that the rate of leveling the garden is Rs 2 per 1m^2.

Therefore, Total cost of levelling the complete garden of area 480 m^2 = 480 × 2 = Rs 960.

21. A field in the form of a rhombus has each side of length 64 m and altitude 16 m. What is the side of a square field which has the same area as that of a rhombus?

Answer :

Given:

Each side of a rhombus-shaped field = 64 m

Altitude =16 m

We know: Area of rhombus = Side × Altitude

Therefore, Area of the field = 64 × 16 = 1024 m^2

Given: Area of the square field = Area of the rhombus

We know: Area of a square = $(\text{Side})^2$

Therefore, 1024 = $(\text{Side})^2$

Side = $\sqrt{1024}$ = 32 m

Thus, the side of the square field is 32 m.

22. The area a rhombus is equal to the area of a triangle whose base and the corresponding altitudes are 24.8 cm and 16.5 cm respectively. If one of the diagonals of the rhombus is 22 cm, find the length of the other diagonal.

Answer :

Given:

Area of the rhombus = Area of the triangle with base 24.8 cm and altitude 16.5 cm

Area of the triangle = 1/2 × base × altitude =1/2 × 24.8 × 16.5 = 204.6 cm^2

Therefore, Area of the rhombus = 204.6 cm2