

7th Mensuration Test Paper – 02

3. A room is 8.5 m long, 6.5 m broad and 3.4 m high. It has two doors, each measuring 1.5m by 1m, and two windows, each measuring 2 m by 1m. Find the cost of painting its four walls at Rs 4.60 per sq m.

3. Area of 4 wall = $2(l+b) \times h$
 $= 2(8.5 + 6.5) \times 3.4$
 $= 2 \times 15 \times 3.4$
 $= 30 \times 3.4$
 $= 102 \text{ m}^2$

Area of two door = $2(1.5 \times 1)$
 $= 3 \times 1 = 3 \text{ m}^2$

Area of two window = $2(2 \times 1)$
 $= 4 \times 1 = 4 \text{ m}^2$

Area of remaining portion = $102 - (3 + 4)$
 $= 102 - 7$
 $= 95 \text{ m}^2$

Cost of painting of four wall = 4.60×95
 $= 437.00 \text{ Rs}$

4. The length and breadth of a rectangular land are in the ratio 2: 3 if the total cost of fencing it at Rs 7.50 per m is Rs 3000 find the length and breadth.

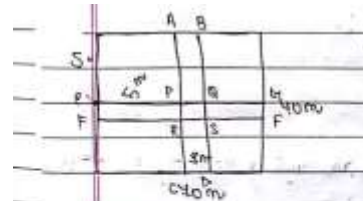
4. Let the ratio be $2x$
 $P = \frac{\text{Total cost}}{\text{Rate}}$

$2(3x+2x) = \frac{3000}{7.5} = 40$

$10x = 40$
 $x = 40/10$
 $x = 4$

Hence length = $2x = 2 \times 4 = 8 \text{ m}$
 Breadth = $3x = 3 \times 4 = 12 \text{ m}$ Ans

5. A rectangular lawn 70m by 50m has two roads, each 5m wide, running through its middle one parallel to its length and the other parallel to its breadth. Find the cost of constructing the road at Rs 20 per meter?

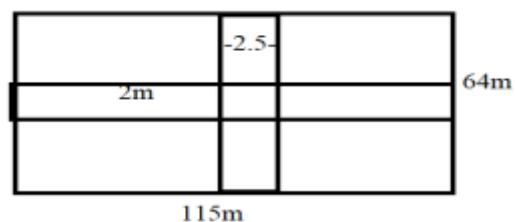


Area parallel to its length = $70 \times 5 = 350 \text{ m}^2$
 Area " " " breadth = $50 \times 5 = 250 \text{ m}^2$
 Area of cross section = $5 \times 5 = 25 \text{ m}^2$

Area of ABCD + Area of EFGH - Area of PQRS
 $350 + 250 - 25$
 $600 - 25$
 575 m^2

Cost of gravelling = 575×20
 $= 11500 \text{ Rs}$

6. A 115m Long and 64m broad lawn has two roads, at right angles, one 2m running parallel to its length and other 2.5m running parallel breadth. Find the cost of gravelling the road at 4.60per meter.



Area of road Parallel to length = $115 \times 2 = 230 \text{ m}^2$
 Area of road Parallel to breadth = $64 \times 2.5 = 160 \text{ m}^2$
 Area Of cross section of two road = $2 \times 2.5 = 5 \text{ m}^2$
 Area of cross roads = $230 + 160 - 5 = 390 - 5 = 385$
 Cost of gravelling cross road of at 60 per $\text{m}^2 = 385 \times 4.60 = \text{Rs.}1771$

7. Find the length of the altitude of an equilateral triangle of side 24 cm.

the length of the altitude of an equilateral triangle =

$$\frac{\sqrt{3}}{2} a = \frac{\sqrt{3}}{2} \times 24 = 12\sqrt{3} \text{ cm}$$

8. The area of an equilateral triangle is $16\sqrt{3} \text{ cm}^2$. Find the length of each side.

Ara of equilateral triangle = $\frac{\sqrt{3}}{4} a^2 = 16\sqrt{3}$

$$\Rightarrow a^2 = \frac{16\sqrt{3} \times 4}{\sqrt{3}} = 64 \Rightarrow a = \sqrt{64} = 8$$

9. The base of an isosceles A is 48cm. and one of its equal side 30cm. Find area of triangle

9. Base of triangle $\Delta = 48 \text{ cm}$ and two sides are $= 30$ and 30

$$\text{semi side} = \frac{30+30+48}{2} = \frac{108}{2} = 54 \text{ cm}$$

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

$$= \sqrt{54(54-30)(54-30)(54-48)}$$

$$= \sqrt{54 \times 24 \times 24 \times 6}$$

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

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

$$= 486 \text{ Area}$$

10. The side of a triangle are 42 cm, 34cm, and 20cm. Calculate the area and the length of the altitude on the longest side.

10. semi side = $\frac{42+34+20}{2} = \frac{96}{2} = 48 \text{ cm}$

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

$$= \sqrt{48(48-42)(48-34)(48-20)}$$

$$= \sqrt{48 \times 6 \times 14 \times 28}$$

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

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

$$= 936$$

Now Area = $\frac{1}{2} \times b \times h$

$$336 = \frac{1}{2} \times 42 \times h$$

$$\frac{16}{336 \times 2} = h$$

$$\frac{16}{21} = h$$

11. The area of a triangle is 48 cm². If a side and the corresponding altitude are in the ratio 3:2, find their lengths.

11. Area of triangle = 48 cm^2

Height = $3x$

Base = $2x$

$$\text{Area of } \Delta = \frac{1}{2} \times b \times h$$

$$48 = \frac{1}{2} \times 3x \times 2x$$

$$48 = \frac{1}{2} \times 6x^2$$

$$48 \times 2 = 6x^2$$

$$\frac{48 \times 2}{6} = x^2$$

$$\frac{16}{1} = x^2$$

$$\sqrt{16} = x$$

$$4 = x$$

Hence: Height of $\Delta = 3 \times 4 = 12 \text{ cm}$ Area

Base of $\Delta = 2 \times 4 = 8 \text{ cm}$ Area

12. A person walks at 3 km/hr. How long will he take to go round a square ground 5 times, the area of which being 2025 m²?

12. Area of square = a^2

$$2025 = a^2$$

$$\sqrt{2025} = a$$

$$45 = a$$

P of square = 4×45

$$= 180 \text{ m}$$

He runs 5 times around it = $180 \times 5 = 0.9 \text{ km}$

$$r = \frac{0.1400 \text{ km}}{2 \text{ km/h} \times 10} = \frac{3 \times 10^6}{10} = 18 \text{ min}$$

$$r = 18 \text{ min. Ans.}$$

13. The area of a square plot is 1764 m². Find the length of its one side and one diagonal

13. Area of sq = a²
 1764 = a²
 $\sqrt{1764} = a$
 42 = a
 One side = 42 Ans
 Area Diagonal = $\frac{1}{2} \times d^2$
 $1764 \times 2 = d^2$
 3528 = d²
 $42 \times 42 \times 2 = d$
 $42\sqrt{2} = d$
 One diagonal = $42\sqrt{2}$ Ans

14. If the area of a circle is 78.5 cm², find its circumference. (Take $\pi = 3.14$)

14. Area of circle = πr^2
 78.5 = $3.14 \times r^2$
 $\frac{78.5 \times 100}{3.14} = r^2$
 $\frac{7850}{3.14} = r^2$
 $\frac{2500}{1} = r^2$
 $r^2 = 25 = r^2$
 $\sqrt{25} = r$
 5 = r
 Circumference of circle = $2\pi r$
 = $2 \times 3.14 \times 5$
 = $2 \times 3.14 \times 5$
 = 10×3.14
 = 31.4 Ans.

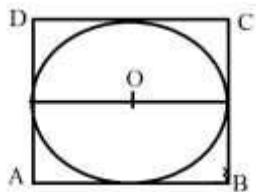
15. Find the circumference of the circle whose area is 16 times the area of the circle with diameter 7 cm.

15. Diameter = 7 cm and Radius = $\frac{7}{2}$
 Area of circle = 16 × Area of original circle
 $\pi r^2 = 16 \times \pi r^2$
 $r^2 = 16 \times \frac{7^2}{4}$
 $r = \sqrt{\left(\frac{7}{2}\right)^2 \times 16}$
 $r = \frac{7 \times 4}{2}$
 $r = 14$
 Hence, C of circle = $2\pi r$
 = $2 \times 22 \times 14$
 = 88 cm. Ans.

16. Find the circumference of the circle whose area is equal to the sum of the areas of three circles with radius 2 cm, 3 cm and 6 cm.

16. Area of circle = πr^2
 $\pi r^2 + \pi r^2 + \pi r^2 = \pi r^2$
 $\pi(2^2 + 3^2 + 6^2) = \pi r^2$
 $4 + 9 + 36 = r^2$
 $49 = r^2$
 $\sqrt{49} = r$
 $7 = r$
 C of circle = $2\pi r$
 = $2 \times 22 \times 7$
 = 44 cm. Ans.

17. From a square cardboard, a circle of biggest area was cut out. If the area of the circle is 154 cm^2 , calculate the original area of the cardboard.



$$\text{Area of circle} = \pi r^2 = 154 \text{ cm}^2 \Rightarrow \frac{22}{7} \times r^2 = 154$$

$$\Rightarrow \frac{154 \times 7}{22} = 49 \Rightarrow r = \sqrt{49} = 7 \text{ cm}$$

$$\text{Side of square} = \text{Diameter of circle} = 2 \times 7 = 14 \text{ cm}$$

$$\text{The original area of the cardboard} = 14 \times 14 = 196 \text{ cm}^2$$

18. A bucket is raised from a well by means of a rope which is wound round a wheel of diameter 77 cm. Give the bucket ascents in 1 minute 28 seconds with a uniform speed of 1.1 m/sec. calculate the number of revolution the wheel makes in raising the bucket.

$$\text{Diameter of wheel} = 77 \text{ cm}$$

$$\text{Circumference of wheel} = \pi d$$

$$\Rightarrow \frac{22}{7} \times 77 = 242 \text{ cm} = 2.42 \text{ m}$$

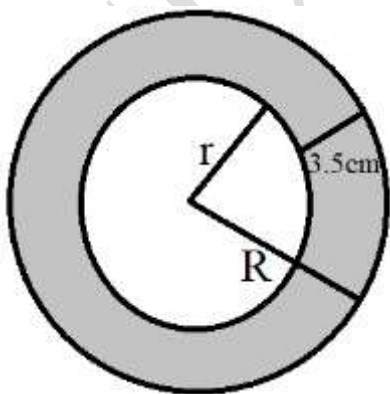
$$\Rightarrow \text{Rate of pulling rope} = 1.1 \text{ m/s}$$

$$\Rightarrow \text{Time} = 1 \text{ min } 28 \text{ sec} = 88 \text{ sec.}$$

$$\Rightarrow \text{Length of rope pulled in 88 sec} = 1.1 \times 88 = 96.8 \text{ m}$$

$$\Rightarrow \text{the number of revolution the wheel} = \frac{96.8}{2.42} = 40$$

19. A road 3.5 m wide surrounds a circular park whose circumference is 44 m. find the cost of paving road at the rate of Rs. 60 per square meter.



$$\text{circumference of circular park} = 2\pi r = 44 \text{ m}$$

$$2 \times \frac{22}{7} \times r = 88 \Rightarrow r = \frac{44 \times 7}{2 \times 22} = 7 \text{ cm}$$

Thickness of road = 3.5 m wide surrounds

$$R = r + 3.5 = 14 + 3.5 = 10.5 \text{ cm}$$

$$\text{Area of the road} = \pi R^2 - \pi r^2 = \frac{22}{7} (10.5^2 - 7^2)$$

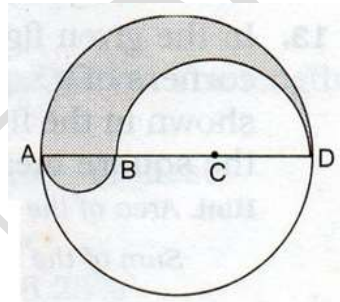
$$= \frac{22}{7} \times (110.25 - 49) = \frac{22}{7} \times 61.5 = 192.5 \text{ m}^2$$

Cost of paving the road = Rs. 50 per sq m

Total cost of paving the road = 192.5×50

Total cost = Rs. 9625

20. ABCD is a diameter of a circle of radius 6 cm such that $AB = BC = CD$. Semicircles are drawn on AB and BD as diameters, as shown in the given figure. Find the area of the shaded region.



ABCD is a diameter of a circle of radius 6 cm

$$\Rightarrow D = 6 \times 2 = 12 \text{ cm}$$

$$\text{Given, } AB = BC = CD = \frac{12}{3} = 4$$

$$\text{Area of semicircle with diameter AB} = \pi \left(\frac{AB}{2}\right)^2$$

$$= \pi \left(\frac{4}{2}\right)^2 = 4\pi$$

$$\text{Area of semicircle with diameter AD} = \pi \left(\frac{AD}{2}\right)^2$$

$$= \pi \left(\frac{12}{2}\right)^2 = 36\pi$$

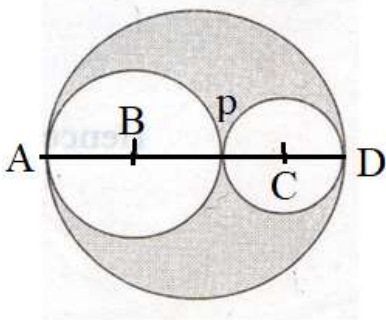
$$\text{Area of semicircle with diameter BD} = \pi \left(\frac{AB}{2}\right)^2$$

$$= \pi \left(\frac{8}{2}\right)^2 = 16\pi$$

The area of the shaded region = $36\pi + 4\pi -$

$$16\pi = 24\pi \text{ cm}^2$$

21. In the given figure, a circle of diameter 21 cm is given. Inside this circle, two circles with diameters $\frac{2}{3}$ and $\frac{1}{3}$ of the diameter of the big circle have. Find the area of shaded region.



Diameter of circle = AD = 21 cm

Diameters AP = $21 \times \frac{2}{3} = 14$ cm

Diameters DP = $21 \times \frac{1}{3} = 7$ cm

Area of circle with diameter 21 cm

$$= \pi \left(\frac{21}{2}\right)^2 = \frac{441\pi}{4}$$

Area of circle with diameter 14 cm

$$= \pi \left(\frac{14}{2}\right)^2 = \frac{196\pi}{4}$$

Area of circle with diameter 7 cm

$$= \pi \left(\frac{7}{2}\right)^2 = \frac{49\pi}{4}$$

the area of shaded region

$$= \frac{441\pi}{4} - \left(\frac{196\pi}{4} - \frac{49\pi}{4}\right)$$

$$= \frac{441\pi - 245\pi}{4} = \frac{196\pi}{4}$$

$$= 49\pi = 49 \times \frac{22}{7} = 7 \times 22 = 154 \text{ cm}^2$$

22. The diameter of the wheel of a car is 77 cm. How many revolutions will it make to travel 121 km?

Diameter of the wheel of a car = 77

circumference of the wheel of a car =

$$\pi d = 22/7 \times 77 = 22 \times 11$$

$$= 242 \text{ cm} = 2.42 \text{ m}$$

Total distance = 121 km = 121000m

$$\text{No. of revolutions} = \frac{121000}{2.42} = 50,000$$

23. A road which is 7 m wide surrounds a circular park whose circumference is 352 m. Find the area of road.

Solution:

We have:

Circumference of the circular park

$$= 2\pi r = 352 \text{ m}$$

$$\Rightarrow 2\pi r = 352$$

$$\Rightarrow 2 \times 22 \times r = 352$$

$$\Rightarrow r = 56 \text{ m.}$$

Radius of the path including the 7 m wide road = $(r + 7) = 56 + 7 = 63$ m.

\therefore Area of the road:

$$= \pi \times (63)^2 - \pi \times (56)^2$$

$$= 22 \times 63 \times 63 - 22 \times 56 \times 56$$

$$= 22 [9 \times 63 - 8 \times 56]$$

$$= 22 [567 - 448]$$

$$= 2618 \text{ m}^2$$

\therefore Area of the road = 2618 m²