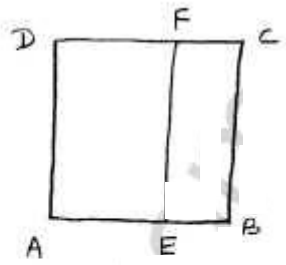
Perimeter and Area

1.

Given

ABCD is a square of side 24cm.

AE = 15cm.



(i) Perimeter of AEFD = 2(AE+AD)

= 2(15+24)

= 2(39)

Perimeter of AEFD = 78cm

Perimeter of EBCF = 2(EB+BC)

AB = AE+EB

24 = 15+EB

EB = 24-15

EB = 9cm

Perimeter of EBCF = 2(9+24)

= 2(33)

Perimeter of EBCF = 66cm.

Difference in perimeter = 78-66 = 12cm

∴ Perimeter of AEFD exceed the perimeter of EBCF by 12cm.

(ii) Area of AEFD (rectangle) = l x b

= AE x AD

= 15x24

Area of AEFD = 360 cm^2

Area of EBCF (rectangle) = l x b

= EB x BC

= 9 x 24

Area of EBCF = 216 cm^2

Difference in Area = 360 - 216

= 144 cm^2

Area of AEFD exceeds the Area of EBCF by 144 cm^2.

2.

Dimensions of rectangular park (l x b) = 180m x 120m

perimeter of park = 2(l+b)

= 2(180+120)

= 2(300)

Perimeter of park = 600m

Distance covered by Negma for five rounds around park

= 5 x 600

= 3000m

Speed of Negma = 7.5 K.m/hour

= $\frac{7500}{3600}$ m/sec

Time = $\frac{\text{Distance}}{\text{Speed}}$

= $\frac{3000}{7500} \times 3600$

Time = 1440 Sec = 24 min

3. Area of rectangular plot = $540 m^2$

Length of rectangular plot (l) = 27m.

Area of rectangle = $l \times b$

$540 = 27 \times b$

$\text{breadth} = \frac{540}{27}$

$\text{breadth} = 20m.$

Perimeter of rectangular plot = $2(l+b)$

$= 2(27+20)$

$= 2(47)$

Perimeter of rectangular plot $= 94m.$

4. Perimeter of rectangular plot = 151m

breadth (b) = 32m.

length (l) = ?

perimeter = $2(l+b)$

$151 = 2(l+32)$

$l+32 = \frac{151}{2}$

$l+32 = 75.5$

$l = 75.5 - 32$

$l = 43.5m.$

Area of rectangular plot = $l \times b$

$= 43.5 \times 32$

Area of rectangular plot = $1522.5 m^2$

5. Area of rectangular plot = 340 m²

breadth (b) = 17m

Area = l × b

340 = l × 17

$l = \frac{340}{17}$

$\boxed{l = 20m}$

Perimeter of rectangular plot = 2(l+b)

= 2(20+17)

= 2(37)

Perimeter of rectangular plot = 74m

cost for fencing = ₹ 5.70 /metre

Total cost of fence around the plot = 74 × 5.7

= ₹ 421.80

∴ Total cost of fencing = ₹ 421.80.

6. Let breadth of park = b

length of park = l = 90m

Side of Square park(s) = 60m

Area of square park = Area of rectangular park

$s^2 = l \times b$

$60^2 = 90 \times b$

$3600 = 90 \times b$

$b = \frac{3600}{90}$

$b = 40m$

∴ breadth of rectangular park = 40m.

7. When wire is in the shape of rectangle

length = l = 40cm

breadth b = 22cm

Perimeter (P) = $2(l+b)$

$= 2[40+22]$

$= 2(62)$

Perimeter (P) = 124cm

Area (A) = $l \times b$

$= 40 \times 22$

Area (A) = $880\ cm^2$

When wire in the shape of square

Perimeter of square = perimeter of rectangle

$$4S = 2P$$

$$4S = 124$$

$$S = \frac{124}{4}$$

$$S = 31\ cm$$

$\therefore$ Side of square = 31 cm

Area of square = S^2

$= 31^2$

Area of square = 961

Area of square > Area of rectangle

$\therefore$ Square occupies more Area than rectangle by $(961 - 880) = 81\ cm^2$

8.

Dimensions of wall (l x h) = 4.5m x 3.6m

Dimension of door (b x h) = 1m x 2m

Area of wall (A_1) = l x h

$= 4.5 \times 3.6$

Area of wall (A_1) = $16.2\ m^2$

Area of door (A_2) = b x h

$= 1 \times 2$

Area of door (A_2) = $2\ m^2$

Area for white washing = $A_1 - A_2$

= 16.2 − 2

Area for white washing = 14.2 m^2

Cost for white washing = ₹20/m^2

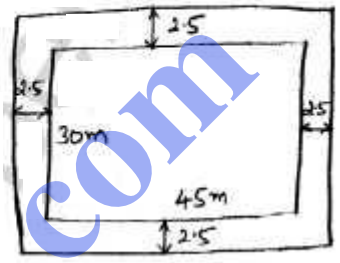
∴ Cost for white washing = 14.2 × 20

= ₹284

9.

Inner rectangle dimensions

$(l \times b)$ = 45 × 30 m^2



Outer rectangle dimensions

$(l \times b)$ = 45+2×2.5 × 30+2×2.5

= 45+5 × 30+5

= 50 × 35 m^2

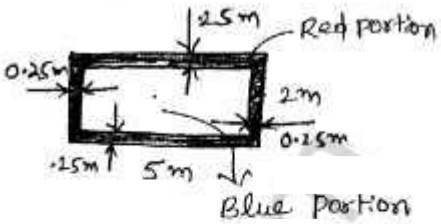
Path area = Outer rectangle area − Inner rectangle area

= 50×35 − (45×30)

= 1750 − 1350

Path area = 400 m^2

10. Carpet size (l×b) = 5m×2m (Outer) 8



Inner part of Carpet size

$= (5 - 2\times0.25) \times (2 - 2\times0.25)$

$= (5 - 0.5) \times (2 - 0.5)$

$= 4.5 \times 1.5 \ m^2$

Red portion Area = Outer part area − Inner part area

$= 5\times2 - (4.5\times1.5)$

$= 10 - 6.75$

Red Portion Area = $3.25 \ m^2$

Blue portion Area = $4.5 \times 1.5 = 6.75 \ m^2$

Ratio of Areas = $\frac{\text{Red portion area}}{\text{Blue portion area}}$

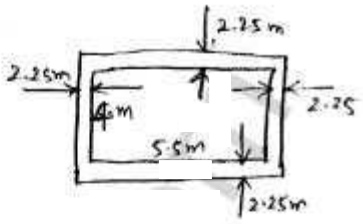
$= \frac{3.25}{6.75}$

Ratio of Areas = $\frac{13}{27}$

11. Width of Verandah = 2.25m

dimensions of room = 5.5m × 4m

(i)



outside rectangle dimension

$l = 5.5 + 2 \times 2.25 = 10m$

$b = 4 + 2 \times 2.25 = 8.5m$

Area of Verandah = Outside dimens Area − Inside Area

$10 \times 8.5 - (5.5 \times 4)$

$= 85 - 22$

Area of Verandah = $63 m^2$

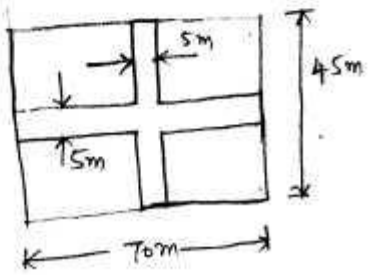
(ii) Cost of Cementing the floor of verandah = ₹200/m^2

Total cost of Cementing the floor of Verandah = 63×200

= ₹12600.

12. Given

Dimensions of park = 70m × 45m



length of path = $l + b - w$

$= 70 + 45 - 5$

$= 70 + 40$

length of path = 110m

Area of path = length of path × width of path.

Area of path = 110 × 5

Area of path = 550 m²

Rate of Constructing the road = ₹ 105/m²

Total Cost of Constructing the road = 550 × 105

= ₹ 57750

13. rectangular room dimensions = 10m × 7.5m

width of Carpet = 1.25m

Area of Room = l × b

10 × 7.5

Area of Room = 75 m²

length of Carpet = $\frac{\text{Area of Room}}{\text{width of Carpet}}$

= $\frac{75}{1.25}$

length of Carpet = 60 m.

Cost of Carpet = ₹ 250/m

Total Cost of Covering the floor with Carpet

= 250 × 60

= ₹ 30000

14.

Dimensions of rectangular Room = 6.5m x 5m

Dimensions of square tile = 25cm x 25cm

= 0.25m x 0.25m

Area of Room = $l \times b$

$= 6.5 \times 5$

Area of Room = $32.5\ m^2$

Area of tile = s^2

$= (0.25)^2$

Area of tile = $0.0625\ m^2$

No. of tiles required to cover the floor

$$= \frac{\text{Area of Room}}{\text{Area of tile}}$$

$$= \frac{32.5}{0.0625}$$

No. of tiles = 520

Cost of one tile = ₹ 9.40

Total cost of tiles = 9.4×520

Total cost of tiles = ₹ 4888

15.

Side of Square Shape room = 4.8m.

Perimeter of Square tile = 1.2m.

Side of Square tile = $4S = 1.2$

$$S = \frac{1.2}{4}$$

Side of Square tile = 0.3m.

Area of Square tile = S^2

$= (0.3)^2$

Area of Square tile = $0.09\ m^2$

Area of Square Shape room = $(4.8)^2$

$= 23.04\ m^2$

No. of tiles required to cover the floor

$$= \frac{\text{Area of square shape Room}}{\text{Area of tile}}$$

$$= \frac{23.04}{0.09}$$

No. of tiles required = 256

Cost of one tile = ₹27

Total Cost of tiles to Cover the Room = 27×256

= ₹ 6912

16. Width of rectangular plot land = 50m.

Total cost of fencing = ₹ 4680

Rate of cost of fencing = ₹ 18/m

Total length of fencing = $\frac{\text{Total cost}}{\text{Rate of cost}}$

$= \frac{4680}{18}$

Total length of fencing = 260m

Length of fencing = perimeter of rectangle

$260 = 2(l+b)$

$260 = 2(l+50)$

$l+50 = \frac{260}{2}$

$l+50 = 130$

$l = 130-50$

$l = 80m$

Length of plot = 80m

(ii)

Area of plot = $l \times b$

$= 80 \times 50$

Area of plot = $4000m^2$

Rate of cost for leveling = ₹ 7.6/m^2

Total cost of leveling = $4000 \times 7.6 =$ ₹ 30400

Exercise 16.2

(i) Area of parallelogram = $b \times h$

base (b) = 8cm

height (h) = 4.5cm

Area of parallelogram = 8×4.5

= 36 cm^2

(ii)

Base (b) = 2cm

Height (h) = 4.4cm

Area of parallelogram = $b \times h$

= 2×4.4

Area of parallelogram = 8.8 cm^2

(iii)

Base (b) = 2.5cm

Height (h) = 3.5cm

Area = $b \times h$

= 2.5×3.5

Area of = 8.75 cm^2

parallelogram.

2.

(i) Area of triangle $= \frac{1}{2} \times$ base $\times$ height

Base (b) = 6.4 cm

Height (h) = 6 cm

Area of triangle $= \frac{1}{2} \times 6.4 \times 6$

$= 6.4 \times 3$

Area of triangle = 19.2 cm^2

(ii)

Base (b) = 5 cm

Height (h) = 6 cm

Area of triangle $= \frac{1}{2} bh$

$= \frac{1}{2} \times 5 \times 6$

$= 5 \times 3$

Area of triangle = 15 cm^2

(iii)

Base (b) = 4.5 cm

Height (h) = 6 cm

Area of triangle $= \frac{1}{2} bh$

$= \frac{1}{2} \times 4.5 \times 6$

$= 4.5 \times 3$

Area of triangle = 13.5 cm^2

3.

i) 41 cm²

ii) 12.3 cm

iii) 10.3 cm

iv) 5.8 cm.

4.

i) 193.72 cm²

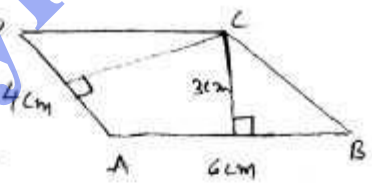
ii) ~~2.9 cm~~ 11.6 cm

iii) ~~8.875 cm~~ 15.5 cm

iv) 80 cm

5.

(i) Area of parallelogram



= base × height

base = 6cm, height = 3cm

Area of parallelogram = 6×3 = 18 cm² → ①

Consider

Base = 4cm, height = h

Area of parallelogram = 4×h → ②

① = ②

4×h = 18

$h = \frac{18}{4}$

$h = 4.5$ cm

6. Consider

Base (b) = 9cm, Height (h) = 6cm

Area of triangle = $\frac{1}{2}bh$

$= \frac{1}{2} \times 9 \times 6$

$= 9 \times 3$

Area of triangle $= 27 \text{ cm}^2$ —①

Consider

Base (b) = 7.5m, Height (h) = ?

Area of triangle $= \frac{1}{2} \times 7.5 \times h$ —②

① = ②

$\frac{1}{2} \times 7.5 \times h = 27$

$\frac{h}{2} = \frac{27}{7.5}$

$h = 7.2\text{m}$

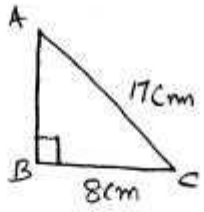
Height corresponding to the base 7.5m = 7.2m.

7.

Base = 8cm

Hypotenuse = 17cm

Height = h



$AC^2 = AB^2 + BC^2$ (Pythagorus Theorem)

$17^2 = h^2 + 8^2$

$h^2 = 289 - 64$

$h^2 = 225$

$h = \sqrt{225}$

$h = 15\text{cm}$

Height of Right angled triangle = 15cm.

Area of triangle $= \frac{1}{2}bh$

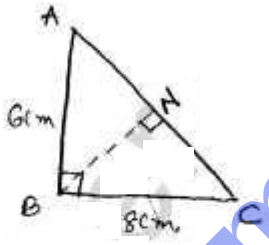
$= \frac{1}{2} \times 8 \times 15$

$= 4 \times 15$

Area of triangle $= 60 \text{ c.m}^2$

8. Given

(i) $\triangle ABC$ is Right angled triangle



$AC^2 = AB^2 + BC^2$

$AC^2 = 6^2 + 8^2$

$AC = \sqrt{36 + 64}$

$= \sqrt{100}$

$AC = 10 \text{ c.m.}$

(ii) Area of triangle $= \frac{1}{2}bh$

$= \frac{1}{2} \times 8 \times 6$

$= 8 \times 3$

Area of triangle $= 24 \text{ c.m}^2$. $\rightarrow$ (1)

Area of triangle $= \frac{1}{2} \times AC \times BN$

$= \frac{1}{2} \times 10 \times BN$ $\rightarrow$ (2)

(1) = (2)

$\frac{1}{2} \times 10 \times BN = 24$

$BN = \frac{48}{10}$

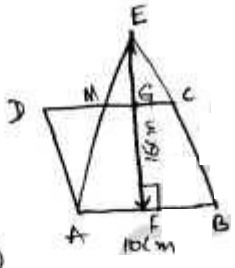
$BN = 4.8 \text{ cm}$

9. Given AB = 10cm

EF = 16cm

M is mid point of DC

$DM = MC = \frac{10}{2} = 5cm$



Area of $\triangle AEB$ = Area of 11^{sm} ABCD

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

$\frac{1}{2} \times AB \times EF = AB \times GF$

$\frac{1}{2} \times 10 \times 16 = 10 \times GF$

$GF = 8cm$

$\therefore EF = GF + EG$

$16 = 8 + EG$

$EG = 8cm$

Given Area of $\triangle AEB$ = Area 11^{sm} ABCD

$\therefore$ Area of $\triangle AMB$ is common in both $\triangle AEB$ & 11^{sm} ABCD

$\therefore$ Area of $\triangle ADM$ = Area of $\triangle MEC$

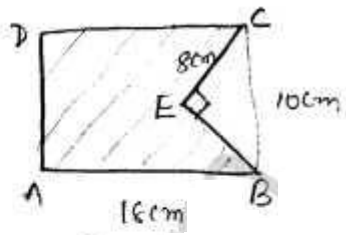
$= \frac{1}{2} \times MC \times EG$

$= \frac{1}{2} \times 5 \times 8$

$= 5 \times 4$

$\therefore$ Area of $\triangle ADM = 20 cm^2$

10. ABCD is a rectangle of size = 18cm × 10cm



$\angle E = 90°$

In $\triangle ECB$

$BC^2 = EC^2 + EB^2$ (∵ Pythagorous Theorem)

$10^2 = 8^2 + EB^2$

$EB^2 = 100 - 64$

$EB^2 = 36$

$EB = \sqrt{36}$

$EB = 6$ c.m

Area of Shaded Region = Area of □ABCD − Area of $\triangle ECB$

$= l \times b - \left(\frac{1}{2} bh\right)$

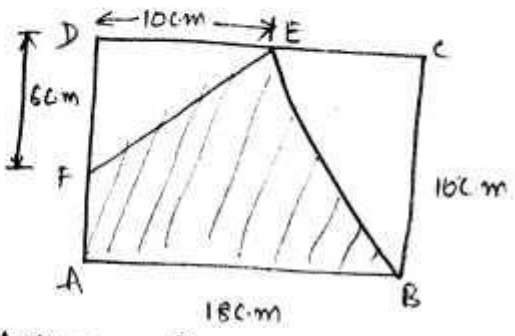
$= 18 \times 10 - \left(\frac{1}{2} \times 6 \times 8\right)$

$= 180 - 24$

Area of Shaded Region = 156 c.m^2

11.

(i)



Area of Shaded Region

= Area of □ABCD −

(Area of $\triangle$ECB + Area of DEF)

$= 18 \times 10 - \left(\frac{1}{2} \times 8\right.$

$= 18 \times 10 - \left(\frac{1}{2} \times 10 \times 8 + \frac{1}{2} \times 6 \times 10\right)$

$(\because DC = DE + EC)$

$18 = 10 + EC$

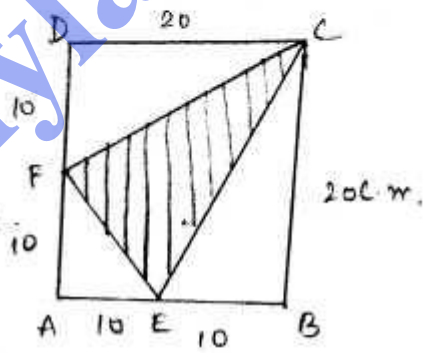
$EC = 8cm$

$= 180 - (40 + 30)$

$= 180 - 70$

Area of Shaded Region $= 110$ C.m^2

(ii)



Area of Shaded Region =

Area of $\square ABCD - [$Area of $\triangle AEF +$ Area of $\triangle ECB +$ Area of $\triangle DCF]$

$= 20 \times 20$

$= AB \times BC - \left[\frac{1}{2} \times AE \times AF + \frac{1}{2} \times EB \times BC + \frac{1}{2} \times DF \times DC\right]$

$= 20 \times 20 - \left[\frac{1}{2} \times 10 \times 10 + \frac{1}{2} \times 10 \times 20 + \frac{1}{2} \times 10 \times 20\right]$

$= 400 - [10 \times 5 + 10 \times 10 + 10 \times 10]$

$= 400 - [50 + 100 + 100]$

$= 400 - [250]$

Area of Shaded region $= 150 \text{ cm}^2$

Exercise 16.3

1.

(i) $r = 7$ c.m

Circumference of Circle $= 2\pi r$

$= 2 \times \frac{22}{7} \times 7$

Circumference of Circle $= 44$ c.m

(ii) $r = 21$ c.m

Circumference of Circle $= 2\pi r$

$= 2 \times \frac{22}{7} \times 21$

$= 2 \times 22 \times 3$

Circumference of Circle $= 132$ c.m

(iii) $r = 28$ m

Circumference of Circle $= 2\pi r$

$= 2 \times \frac{22}{7} \times 28$

$= 2 \times 22 \times 4$

Circumference of Circle $= 174$ m

(iv) $r = 3.5$ cm

Circumference of Circle $= 2\pi r$

$= 2 \times \frac{22}{7} \times 3.5$

Circumference of Circle $= 22$ c.m

2.

i. $r = 14\ mm.$

Area of Circle $= \pi r^2$

$= \frac{22}{7} \times 14 \times 14$

Area of Circle $= 616\ mm^2$

ii) $d = 49\ m. \Rightarrow r = \frac{d}{2}$

$r = \frac{49}{2} = 24.5\ m$

Area of Circle $= \pi r^2$

$= \frac{22}{7} \times 24.5 \times 24.5$

Area of Circle $= 1886.5\ m^2$

iii) diameter $(d) = 9.8\ m$

$r = \frac{d}{2}$

$r = \frac{9.8}{2}$

$r = 4.9\ m$

Area of circle $= \pi r^2$

$= \frac{22}{7} \times 4.9 \times 4.9$

Area of Circle $= 75.46\ m^2$

iv) $r = 5\ cm$

Area of Circle $= \pi r^2$

$= \frac{22}{7} \times 5 \times 5$

Area of Circle $= 78.57\ cm^2$

3. Given

Radius of Circle (r) = 20c.m

Circumference of Circle = $2\pi r$

$= 2 \times 3.14 \times 20$

Circumference of Circle = 125.6 C.m

Area of Circle = πr^2

$= 3.14 \times 20 \times 20$

Area of Circle = 1256 C.m²

4.

Radius of minute hand = 1.4m

distance Covered by minute hand tip in 1 Hour

= Circumference of Circle of Radius 1.4m

$= 2\pi r$

$= 2 \times \frac{22}{7} \times 1.4$

$= 8.8m$

5.

Diameter of garden = 21m

Radius (r) = $\frac{21}{2}$ = 10.5m

Circumference of garden = $2\pi r$

$= 2 \times \frac{22}{7} \times 10.5$

$= 66m$

Length of Rope = 66×2 = 132m (∵ For 2 rounds)

Rate of Cost of rope = ₹4/m

Total cost of rope = 4×132

= ₹528

∴ Cost of rope = ₹528

6. given

Circumference of circle exceeds diameter by 30 cm

$2\pi r = d + 30$

$2\pi r = 2r + 30$

$2\pi r - 2r = 30$

$2r(\pi - 1) = 30$

$2r\left(\frac{22}{7} - 1\right) = 30$

$2r\left(\frac{15}{7}\right) = 30$

$r = \frac{30 \times 7}{2 \times 15}$

$r = 7$ cm

∴ Radius of circle = 7 cm

7. Given Circumference of circle = 44cm

$$2\pi r = 44$$

$$\pi r = \frac{44}{2}$$

$$\pi r = 22$$

$$r = \frac{22}{\pi}$$

$$r = \frac{22}{\frac{22}{7}}$$

$$r = 7\text{cm}$$

diameter $= 2r = 2 \times 7 = 14\text{cm}$

8. Given Circumference of circle = 31.4cm

$$2\pi r = 31.4$$

$$r = \frac{31.4}{2 \times \pi}$$

$$= \frac{31.4}{2 \times 3.14}$$

$$\boxed{r = 5\text{cm}}$$

radius = 5cm

Area $= \pi r^2$

$= 3.14 \times 5^2$

Area $= 78.5\ \text{cm}^2$

9. Given

area of circle = 144π c.m^2

$\pi r^2 = 144\pi$

$r^2 = 144$

$r = \sqrt{144}$

$r = 12$ c.m

radius = 12 c.m

Circumference of Circle = $2\pi r$

$2 \times \pi \times 12$

$= 24\pi$ c.m

∴ Circumference of Circle = 24π c.m.

10.

diameter of a wheel = 56 cm

radius of wheel = $\frac{56}{2} = 28$ c.m

Circumference of wheel = $2\pi r$

$= 2 \times \frac{22}{7} \times 28$

Circumference of wheel = 176 c.m

No. of rotations = $\frac{\text{Distance covered by car}}{\text{Distance for one rotation}}$

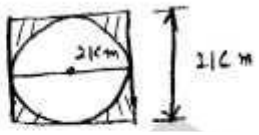
$= \frac{88 \times 10^3 \times 10^2}{176}$

No. of rotations = 45454.54 ≈ 45455

11. Given

Square with side = 21 c.m

Circle with maximum area @ diameter



$d = 21$ c.m

Shaded area = Square Area − Circle area

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

$= 441 - \frac{22}{7} \times \frac{441}{4}$

$= 441\left(1 - \frac{22}{28}\right)$

$= 441\left(\frac{6}{28}\right)$

Shaded area = 94.5 c.m²

12.

Side of equilateral triangle = 4.4 c.m

Perimeter of triangle = 3 × 4.4

= 13.2 c.m

∴ Perimeter of circle = perimeter of equilateral triangle

$2\pi r = 13.2$

$r = \frac{13.2}{2 \times 22} \times 7$

$r = 2.1$ c.m.

Radius of Circle = 2.1 c.m

Area of circle $= \pi r^2$

$= \frac{22}{7} \times (2.1)^2$

Area of circle $= 13.86 \text{ cm}^2$

13.

Wire is bent in the form of square of side $= 27.5$ cm

Perimeter of square = length of wire

Length of wire $= 4 \times 27.5$

Length of wire $= 110$ cm

Now same wire bent in the shape of circle

Length of wire = perimeter of circle

$110 = 2\pi r$

$r = \frac{110}{2 \times 22} \times 7$

$r = \frac{35}{2}$

$r = 17.5$ cm

Radius of circle $= 17.5$ cm

Area of circle $= \pi r^2$

$= \frac{22}{7} \times (17.5)^2$

Area of circle $= 962.5 \text{ cm}^2$

14. Wire is initially in the form of rectangle of length, breadth = 18.7 c.m / 14.3 c.m

∴ Length of wire = Perimeter of rectangle

$= 2(18.7+14.3)$

$= 2(33)$

Length of wire = 66 c.m

Now same wire is bent into circle

Length of wire = Perimeter of Circle

$66 = 2\pi r$

$r = \frac{66}{2\times 22} \times 7$

$r = \frac{21}{2}$

$r = 10.5$ c.m

Radius of circle = 10.5 c.m

Area of Circle = πr^2

$= \frac{22}{7} \times (10.5)^2$

Area of Circle = 346.5 $c.m^2$

15. Diameter of Circular park = 84 m.

Radius of Circular park = 42 m

Radius of outer circle = 42 + 3.5

= 45.5 m

∴ Area of Road = Outer Circle Area − Inner circle area

$= \pi (45.5)^2 - \pi (42)^2$

Area of Road = $962.5\ m^2$

Cost of Constructing the Road = ₹ 240/m^2

Cost of Constructing the Road = 962.5 × 240

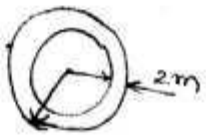
= ₹ 231000

16. Outer Circle Circumference = 44 m

$2\pi R = 44$

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

$\boxed{R = 7\ m}$



Outer Circle Radius = 7 m

Inner Circle radius = 7 − 2 = 5 m

Circumference of Inner Circle = $2\pi r = 2 \times \frac{22}{7} \times 5 = 31.42$ m

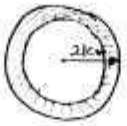
Area of Inner Circle = $\pi r^2 = \pi (5)^2$

= 78.57 m^2

17.

Area between the circles = $770 cm^2$

Radius of outer circle = 21cm



Area between the Circles = Outer Circle area − Inner Circle area

$$770 = \pi(21)^2 - \pi r^2$$

$$770 = \frac{22}{7}(441 - r^2)$$

$$\frac{770 \times 7}{22} = 441 - r^2$$

$$245 = 441 - r^2$$

$$r^2 = 441 - 245$$

$$r^2 = 196$$

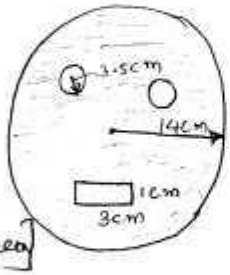
$$r = \sqrt{196}$$

$$r = 14 cm$$

Inner Circle radius = 14 c.m.

18.

Radius of Big Circle = 14 c.m



Shaded Region Area

= πR^2 − [Rectangle area + 2 × Circle area]

= $\pi(14)^2 - [3 \times 1 + \pi(3.5)^2]$

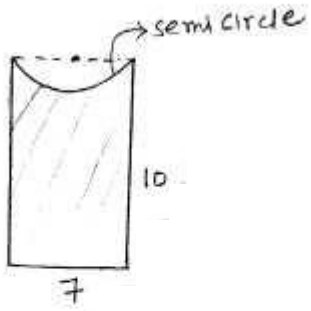
= $616 - [3 + 38.5]$

= $616 - 41.5$

= $574.5 c.m^2$ ∴ Shaded Region Area = $574.5 c.m^2$

19.

(i)



Length of boundary =

Semi-circle length + 10 + 7 + 10

$= \frac{2\pi r}{2} + 10 + 7 + 10$

$= \pi r + 10 + 7 + 10$

$= \frac{22}{7} \times \frac{7}{2} + 10 + 7 + 10$

$= 11 + 10 + 7 + 10$

$= 38 \text{ c.m}$

∴ Length of boundary = 38 c.m

(ii)

Area of Shaded Region = Rectangle Area − Semi Circle Area

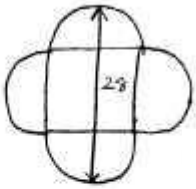
$= 10 \times 7 - \frac{\pi r^2}{2}$

$= 10 \times 7 - \frac{22}{7} \times \frac{7^2}{4 \times 2}$

$= 70 - 19.25$

Area of Shaded Region = 50.75 c.m^2

(ii) From the figure



Side of Square = 2 × radius of circle

$\therefore \quad r + 2r + r = 28$

$4r = 28$

$r = \frac{28}{4}$

$r = 7$ c.m

Radius of Semi circle = 7 c.m

Side of Square $= 2 \times 7 = 14$ c.m

Length of boundary = 4 × Perimeter of Semi circle

$= 4 \times \frac{2\pi r}{2}$

$= 4 \times \frac{2 \times 22 \times 7}{7 \times 2}$

Length of boundary = 88 c.m

Area of Shaded Region = 4 × Semi circle area + Square Area

$= 4 \times \frac{\pi \times 7^2}{2} + 14^2$

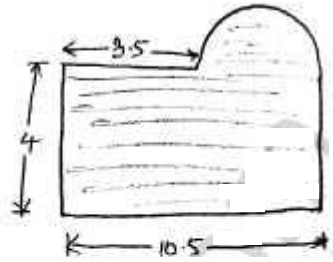
$= \frac{4 \times 22 \times 7^2}{7 \times 2} + 14^2$

$= 308 + 196$

Area of Shaded Region = 504 c.m^2

20.

From figure



Diameter of semi circle = 10.5 - 3.5

Diameter of Semi Circle = 7 c.m.

Radius of Semi Circle = 3.5 c.m

Length of boundary = 4 + 3.5 + Semi circle perimeter + 4 + 10.5

$= 7.5 + \frac{2\pi \times 3.5}{2} + 14.5$

$= 7.5 + \frac{22}{7} \times 3.5 + 14.5$

$= 7.5 + 11 + 14.5$

Length of boundary = 33 c.m

Area of Shaded Region = Rectangle Area + Semi Circle area

$= 4 \times 10.5 + \frac{\pi (3.5)^2}{2}$

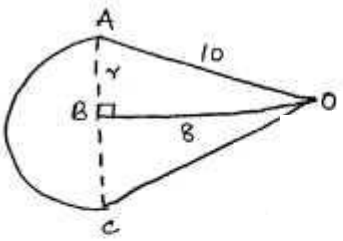
$= 42 + \frac{22}{7} \times \frac{(3.5)^2}{2}$

$= 42 + 19.25$

Area of Shaded Region = 61.25 c.m^2

(ii)

Consider ΔOAB



$OA^2 = OB^2 + AB^2$

$10^2 = r^2 + 8^2$

$r^2 = 100 - 64$

$r^2 = 36$

$r = \sqrt{36}$

$r = 6$ c.m.

Length of boundary = 10 + Semi circle length + 10

$= 10 + \frac{2\pi r^2}{2} + 10$

$= 10 + 2 \times \frac{22}{7} \times \frac{6}{2} + 10$

$= 10 + 18.857 + 10$

Length of boundary $= 38.857$ c.m

Area of Shaded Region = Area of ΔAOC + Area of Semi circle

$= \frac{1}{2} \times 2 \times r \times 8 + \frac{\pi r^2}{2}$

$= \frac{1}{2} \times 2 \times 6 \times 8 + \frac{22}{7} \times \frac{6^2}{2}$

$= 48 + 56.57$

Area of Shaded Region $= 104.57$ c.m^2