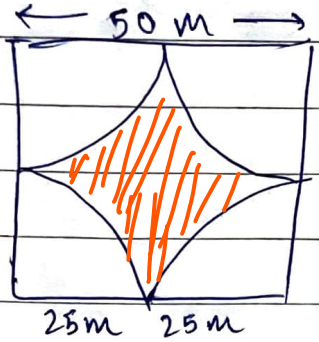
Ch-13

Exercise 13.4

Q.6



Side of square = 50 m

r of quadrant = $\frac{50}{2}$ = 25 m

Area left ungrazed = ar (square) − 4 ar (quadrant)

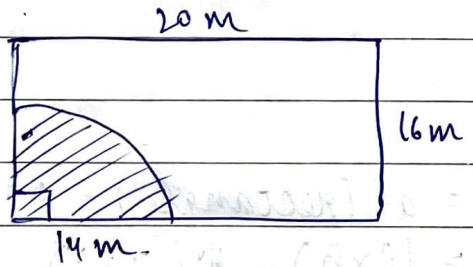
$= (s \times s) - 4\left(\frac{\pi r^2}{4}\right)$

$= (50 \times 50) - \left(\frac{22}{7} \times 25 \times 25\right)$

$= 2500 - 1964.28$

$= \boxed{535.72 \text{ m}^2}$

Q.7



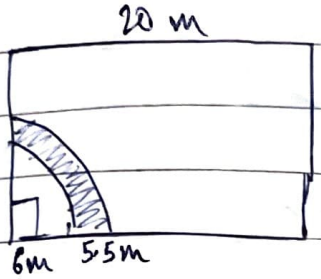
As all angles of rectangle are right angles,

∴ Required area = Quadrant

$= \frac{\pi r^2}{4} = \frac{1}{4} \times \frac{22}{7} \times 14 \times 14$

$= \boxed{154 \text{ cm}^2}$

Q.8



Required area = ar(new area) − ar(old area)

$$= \frac{\pi R^2}{4} - \frac{\pi r^2}{4}$$

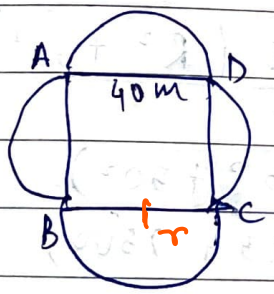
$$= \frac{\pi}{4}(R^2 - r^2) = \frac{\pi}{4}\left[(6+5.5)^2 - 6^2\right]$$

$$= \frac{1}{4_2} \times \frac{22}{7} (11.5+6)(11.5-6)$$

$$= \frac{11}{14} \times 17.5 \times 5.5$$

$$= \boxed{75.625 \text{ m}^2}$$

Q.9



Side of square tank = Diameter of plot = 40m

r of semicircle = $\frac{40}{2} = 20$ m

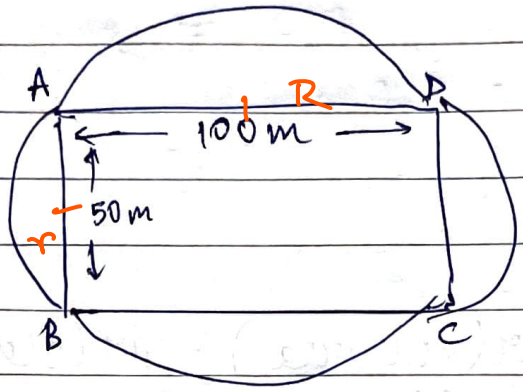
Area of 4 plots = $2\cancel{4} \times \frac{\pi r^2}{2} = 2 \times \frac{3.14}{\cancel{7}} \times 20 \times 20$

$= 2512 \text{ m}^2$

Cost of turfing @ ₹1.25/m² = 2512 × 1.25

$= \boxed{₹3140}$

Q.10



$l = 100\ m$

$b = 50\ m$

R of bigger flower bed $= \frac{100}{2} = 50\ m$

r of smaller flower bed $= \frac{50}{2} = 25\ m$

Area of all flower beds $= 2\ [ar(\text{big bed}) + ar(\text{small bed})]$

$$= 2\left[\frac{\pi R^2}{2} + \frac{\pi r^2}{2}\right]$$

$$= \frac{2}{2} \times \frac{1}{2} \times \pi\left(R^2 + r^2\right)$$

$$= 3.14\ (25^2 + 50^2)$$

$$= 3.14\ (625 + 2500)$$

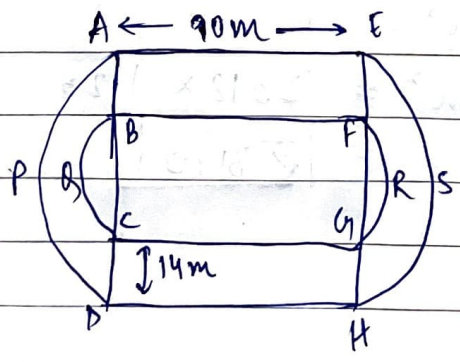
$$= 3.14 \times 3125$$

$$= \boxed{9812.5\ m^2}$$

Cost of levelling @ ₹0.60/m^2 $= 9812.5 \times 0.60$

$$= \boxed{₹\ 5887.50}$$

Q.11



r of inner semicircle = r
r of outer semi circle = R
Width of track = 14 m
Length of straight portion = 90m

ATQ,
Inside perimeter of track = 400m

$BF + FRG + GC + CQB = 400$

$90 + \pi r + 90 + \pi r = 400$

$2\pi r = 400 - 180$

$r = \frac{220 \times 7}{2 \times 22}$

$r = 35$ m

$R = 35 + 14$
$= 49$ m

Area of track = 2 [ar(rectangle) + ar(big semicircle) − ar (small semicircle)]

$= 2\left[(90 \times 14) + \left(\frac{1}{2} \times \frac{22}{7} \times 49 \times 49\right) - \left(\frac{1}{2} \times \frac{22}{7} \times 35 \times 35\right)\right]$

$= 2[1260 + 3773 - 1925]$

$= 2(3108) = \boxed{6216 \text{ m}^2}$

Length of outer running track = AE + APD + DH + HSE

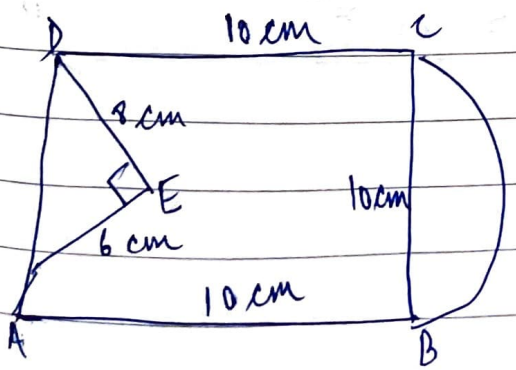
$= 90 + \pi R + 90 + \pi R$

$= 180 + \left(2 \times \frac{22}{7} \times 49\right)$

$= 180 + 308$

$= \boxed{488 \text{ m}}$

Q.12



Area of figure = [Area of square + area of semi-circle] - Area of Δ

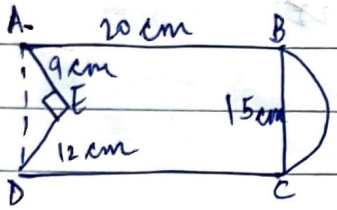
$= (10 \times 10) + \left(\frac{1}{2} \times \frac{22}{7} \times 5 \times 5\right) - \left(\frac{1}{2} \times \frac{3}{6} \times 8\right)$

$= 100 + \frac{275}{7} - 24$

$= \frac{700 + 275 - 168}{7} = \frac{807}{7}$

$= \boxed{115.3 \text{ cm}^2}$ ✓

Q.13



In right Δ AED,

$AD^2 = AE^2 + ED^2$

$AD^2 = 9^2 + 12^2$

$AD^2 = 81 + 144$

$AD = \sqrt{225}$

$AD = 15 \text{ cm}$ ✓

Area of figure = [Area of rectangle + Area of semi-circle] - Area of Δ

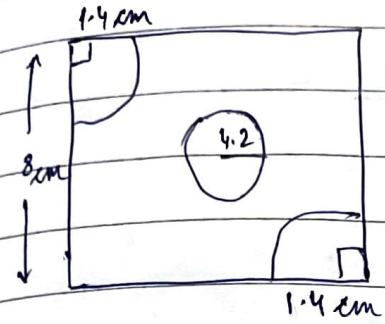
$= (20 \times 15) + \left(\frac{1}{2} \times \frac{22}{7} \times \frac{15}{2} \times \frac{15}{2}\right) - \left(\frac{1}{2} \times 9 \times 12\right)$

$= (300 + 88.39) - 54$

$= 388.39 - 54$

$= \boxed{334.39 \text{ cm}^2}$ ✓

Q.14



Side of square = 8 cm

r of quadrant = 1.4 cm

R of centre circle = 4.2 cm

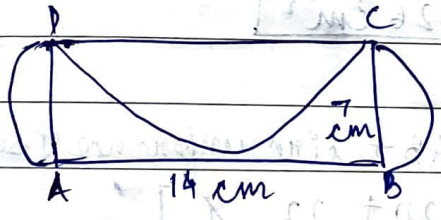
Area of figure = Area of square − [Area of circle + 2(Area of quadrant)]

$= (8\times8) - \left[\left(\frac{22}{7}\times 4.2\times 4.2\right) + 2\left(\frac{1}{4}\times\frac{22}{7}\times 1.4\times 1.4\right)\right]$

$= 64 - [55.44 + 3.08]$

$= 64 - 58.52 = \boxed{5.48\ cm^2}$

Q.15



$l = 14$ cm

$b = 7$ cm

r of small semicircle $= \frac{7}{2}$

r of big semicircle $= \frac{14}{2} = 7$

Area of figure = ar(rectangle) + 2[ar(small semicircle)] − ar(big semicircle)

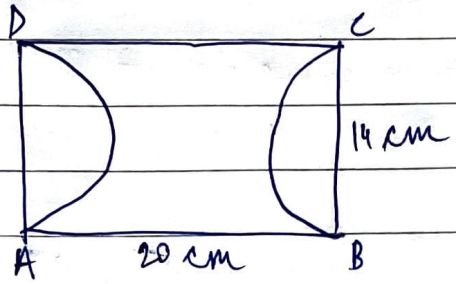
$= (14\times7) + 2\left(\frac{1}{2}\times\frac{22}{7}\times\frac{7}{2}\times\frac{7}{2}\right) - \left(\frac{22}{7}\times\frac{7}{2}\times7\right)$

$= (98 + 38.5) - 77 = 136.5 - 77 = \boxed{59.5\ cm^2}$

Ch-13

Exercise 13.4

Q. 16



AB = 20 cm

BC = 14 cm

r of semicircle = $\frac{14}{2} = 7$

(i) Area of shaded region = ar(rectangle) − 2 ar(semicircle)

$= (20 \times 14) - \left(2 \times \frac{1}{2} \times \frac{22}{7} \times 7 \times 7\right)$

$= 280 - 154$

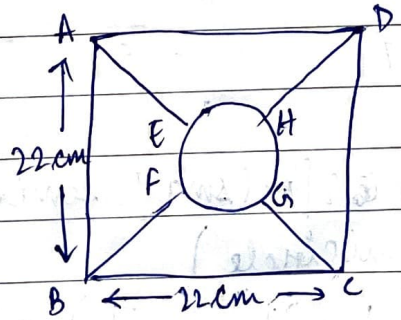
$= \boxed{126\ cm^2}$

(ii) Length of boundary = 2 [AB + circumference of semicircle]

$= 2\left[20 + \frac{22}{7} \times 7\right]$

$= 2(42) = \boxed{84\ cm}$

Q. 17



Area of circle = $\frac{1}{5}$ (Area of square)

$$\pi r^2 = \frac{1}{5}(22 \times 22)$$

$$r^2 = \frac{1 \times 22 \times 22 \times 7}{5 \times 22}$$

$$r = \sqrt{30.8}$$

$$r = 5.55 \text{ cm}$$

(i) Circumference of circle $= 2\pi r$

$$= 2 \times \frac{22}{7} \times 5.55$$

$$= \boxed{34.88 \text{ cm}}$$

(ii) In right $\triangle ABC$,

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

$AC^2 = 22^2 + 22^2$

$AC^2 = 2 \times 22^2$

$AC = \sqrt{2 \times 22^2}$

$AC = 22\sqrt{2}$ cm

Since, diagonals bisect each other.

$AO = \frac{1}{2} AC$

$= \frac{11 \cancel{22}\sqrt{2}}{\cancel{2}} = 11\sqrt{2}$ cm

$AE = BF = OA - OE$

$= 11\sqrt{2} - 5.55 = 15.51 - 5.55$

$= 9.96$ cm

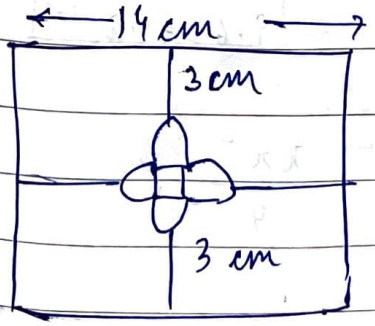
$EF = \frac{\text{Circumference}}{4} = \frac{34.88}{4} = 8.72$ cm

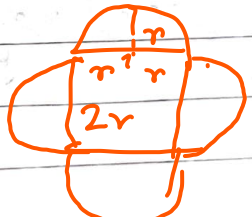
$\therefore$ Perimeter of ABEF $= AB + AE + EF + BF$

$= 22 + 9.96 + 9.96 + 8.72$

$= \boxed{50.64 \text{ cm}}$

Q.18





Side of square = 14 cm

Let the radius of semicircle be r.

Side of inner square = $2r$

ATQ,

$$3 + r + 2r + r + 3 = 14$$

$$6 + 4r = 14$$

$$4r = 14 - 6$$

$$r = \frac{8}{4}^{2}$$

$$r = 2 \text{ cm}$$

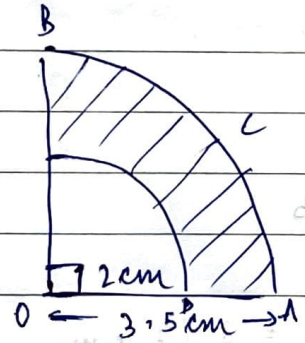
Area of required region = Area(square) − [4 ar(semicircle) + ar(inner square)]

$$= (14 \times 14) - \left[\left(4 \times \frac{1}{2} \times 3.14 \times 2 \times 2\right) + (4 \times 4)\right]$$

$$= 196 - [25.12 + 6]$$

$$= 196 - 41.12 = \boxed{154.88 \text{ cm}^2}$$

Q.19



$r = 2 \text{ cm}$

$R = 3.5 \text{ cm}$

(i) Area of quadrant $OACB = \frac{\pi R^2}{4} = \frac{1}{4} \times \frac{22}{7} \times 3.5 \times 3.5$

$$= \frac{38.5}{4} = \boxed{9.625 \text{ cm}^2}$$

(ii) Area of shaded region = $\frac{\pi R^2}{4} - \frac{\pi r^2}{4}$

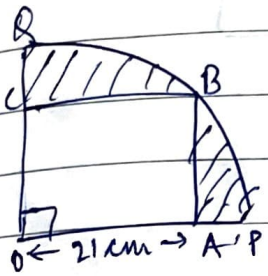
$$= \frac{\pi}{4}(R^2 - r^2)$$

$$= \frac{1}{4_2} \times \frac{22}{7}(3.5 + 2)(3.5 - 2)$$

$$= \frac{11 \times 5.5 \times 1.5}{14} = \frac{90.75}{14}$$

$$= \boxed{6.482 \text{ cm}^2}$$

Q.20



Side of square = 21 cm

Diagonal = $\sqrt{2}$ (side)

$= 21\sqrt{2}$ cm

Diagonal of square = r of quadrant.

Area of shaded region = Area of quadrant − Area of square

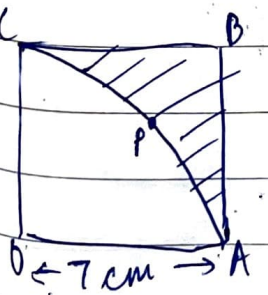
$$= \frac{\pi r^2}{4} - (s \times s)$$

$$= \left(\frac{1}{4} \times \frac{22}{7} \times 21\sqrt{2} \times 21\sqrt{2}\right) - (21 \times 21)$$

$$= \left(\frac{4851}{7}\right) - (441) = 693 - 441$$

$$= \boxed{252 \text{ cm}^2}$$

Q.21



Side of square = r of quadrant = 7 cm

Area of shaded region = Area of square − Area of quadrant

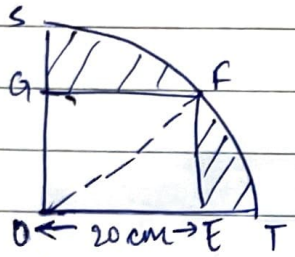
$= (s \times s) - \left(\frac{\pi r^2}{4}\right)$

$= (7 \times 7) - \left(\frac{1}{4_2} \times \frac{22}{7} \times 7 \times 7\right)$

$= 49 - \frac{77}{2} = 49 - 38.5$

$= \boxed{10.5 \text{ cm}^2}$

Q.22



Side of square = 20 cm

Diagonal = $\sqrt{2}$ (side)

$= 20\sqrt{2}$ cm

= r of quadrant

Area of shaded region = ar (quadrant) − ar (square)

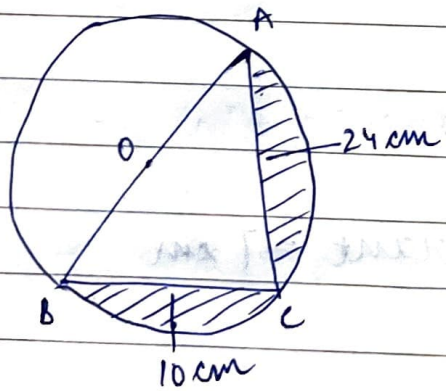
$= \left(\frac{\pi r^2}{4}\right) - (s \times s)$

$= \left(\frac{1}{4} \times \frac{22}{7} \times 20\sqrt{2} \times 20\sqrt{2}\right) - (20 \times 20)$

$= \frac{4400}{7} - 400 = 628.5 - 400$

$= \boxed{228.5 \text{ cm}^2}$

Q.23



$AC = 24$ cm

$BC = 10$ cm

AB is the diameter.

$\angle ACB = 90°$ (Angle inscribed in a semicircle.

In right ΔACB,

$AB^2 = AC^2 + BC^2$ [Pythagoras theorem]

$AB^2 = 24^2 + 10^2$

$AB^2 = 576 + 100$

$AB = \sqrt{676}$

$AB = 26$ cm

$r = \frac{26}{2} = 13$ cm

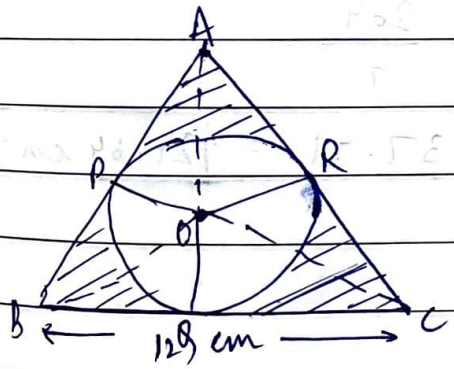
Area of shaded region = ar(semicircle) − ar(Δ)

$= \left(\frac{1}{2} \times \pi r^2\right) - \left(\frac{1}{2} \times b \times h\right)$

$= \left(\frac{1}{2} \times \frac{3.14}{} \times 13 \times 13\right) - \left(\frac{1}{2} \times 24 \times 10\right)$

$= 265.33 - 120 = \boxed{145.33 \text{ cm}^2}$

Q. 24



Side of equilateral $\Delta = 12$ cm

$OP = OQ = OR = r$ of circle

$AB = BC = AC =$ tangents to the circle

$\therefore \angle OPA = \angle OQB = \angle ORC = 90°$ (Tangent is perpendicular to the radius through the point of contact)

ATQ,

Area of ΔABC = ar(ΔOAB) + ar(ΔOBC) + ar(ΔOCA)

$$\frac{\sqrt{3}}{4}(\text{Side})^2 = \left(\frac{1}{2} \times OP \times AB\right) + \left(\frac{1}{2} \times OQ \times BC\right) + \left(\frac{1}{2} \times OR \times AC\right)$$

$$\frac{\sqrt{3}}{4}(12)^2 = \left(\frac{1}{2} \times r \times 12^6\right) + \left(\frac{1}{2} \times r \times 12^6\right) + \left(\frac{1}{2} \times r \times 12^6\right)$$

$$\frac{\sqrt{3}}{4} \times 144^{36} = 3(6r)$$

$$36\sqrt{3} = 18r$$

$$r = \frac{236\sqrt{3}}{18}$$

$$\boxed{r = 2\sqrt{3}}$$ ✓

Area of shaded region = ar(ABC) − ar(circle)

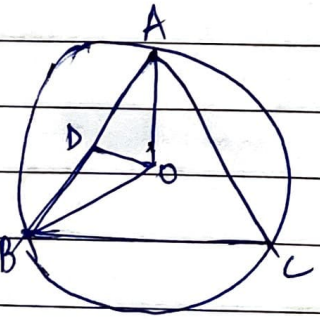
$$= \left[\frac{\sqrt{3}}{4}(\text{side})^2\right] - (\pi r^2)$$

$$= \left(\frac{\sqrt{3}}{4} \times 12^3 \times 12\right) - \left(\frac{22}{7} \times 2\sqrt{3} \times 2\sqrt{3}\right)$$

$$= 36\sqrt{3} - \frac{264}{7}$$

$$= 62.35 - 37.71 = \boxed{24.64\ cm^2}$$ ✓

Q. 25



Cons. – Join OA & OB & draw perpendicular bisector OD to AB.

Sol. – Side of equilateral Δ = 6 cm

As equal chords subtend equal angles at the centre,

$\therefore \angle AOB = \angle BOC = \angle AOC = \frac{360^\circ}{3} = 120^\circ$

$\therefore \angle BOD = \frac{120^\circ}{2} = 60^\circ$ ✓

In $\triangle BOD$,

$\sin 60^\circ = \frac{BD}{OB}$

$\frac{\sqrt{3}}{2} = \frac{3}{r}$

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

$r = 2\sqrt{3}$ cm ✓

Area of shaded region = ar (circle) − ar ($\triangle$)

$= \pi r^2 - \frac{\sqrt{3}}{4} (\text{side})^2$

$= \left(3.14 \times 2\sqrt{3} \times 2\sqrt{3}\right) - \left(\frac{\sqrt{3}}{4} \times 6 \times 6\right)$

$= (3.14 \times 12) - (9 \times 1.732)$

$= 37.68 - 15.588$

$= \boxed{22.092 \text{ cm}^2}$ ✓