H.W

HERON'S FORMULA

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Exercise :- 12.1

Q1)

Let each side of the equilateral triangle be 'a'.

Semi perimeter of the triangle,

$$s = \frac{a+a+a}{2} = \frac{3a}{2}$$

Area of the triangle $= \sqrt{s(s-a)(s-b)(s-c)}$

$$= \sqrt{s(s-a)(s-b)(s-c)} = \sqrt{s(s-a)^3}$$

$$= \sqrt{\frac{3a}{2}\left(\frac{3a}{2}-a\right)^3}$$

$$= \sqrt{\frac{3a}{2} \times \left(\frac{a}{2}\right)^3}$$

$$= \sqrt{\frac{3a^4}{2^4}} = \frac{\sqrt{3}}{4} a^2$$

Now its perimeter is 180 cm.

$\therefore a+a+a = 180$ cm.

$\Rightarrow 3a = 180$ cm

$\Rightarrow a = \frac{180}{3} = 60$ cm

Thus area of the triangle $= \frac{\sqrt{3}}{4} a^2$

$$= \frac{\sqrt{3}}{4}(60)^2 \text{ cm}^2$$

$$= 900\sqrt{3} \text{ cm}^2.$$

Q2)

Q2) Let the sides of the triangular will be ;

$a = 122\,m$

$b = 120\,m$

$c = 22\,m$

Semi perimeter = $s = \frac{a+b+c}{2}$

$\left(\frac{122+120+22}{2}\right) m = \frac{264}{2} = 132\,m.$

The area of the triangular side wall ;

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

$= \sqrt{132\,(132-122)(132-120)(132-22)}\ m^2$

$= \sqrt{132 \times 10 \times 12 \times 110}\ m^2$

$= \sqrt{12 \times 11 \times 10 \times 12 \times 11 \times 10}\ m^2 = 1320\,m^2$

Rent for 1 year (i.e. 12 months) per m^2 = ₹ 5000

∴ Rent for 3 months per m^2 = $₹ 5000 \times \frac{3}{12}$

Rent for 3 months for $1320\,m^2$ = $5000 \times \frac{3}{12} \times 1320$

= 1650000 Rs.

Q3) Let the sides of the wall be,

$a = 15$ m

$b = 11$ m

$c = 6$ m.

Semi perimeter ;

$$S = \frac{a+b+c}{2} = \left(\frac{15+11+16}{2}\right) m = \frac{32}{2} = 16 \text{ m}$$

Now, Area of the triangular surface of the wall,

$$= \sqrt{S(S-a)(S-b)(S-c)}$$

$$= \sqrt{16(16-15)(16-11)(16-6)} \ m^2$$

$$= \sqrt{16 \times 1 \times 5 \times 10} \ m^2$$

$$= \sqrt{2 \times 2 \times 2 \times 2 \times 1 \times 5 \times 2 \times 5}$$

$$= 20\sqrt{2} \ m^2.$$

Q4) The sides of the Δ are :-

$a = 18$

$b = 10$

$c = x$.

Perimeter = 42 cm

$18 \text{ cm} + 10 \text{ cm} + x \text{ cm} = 42$

$x = 42 - 28 = 14 \text{ cm}$.

$x = 21 \text{ cm}$

Area of the triangle = $\sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{21(21-18)(21-10)(21-14)}\ cm^2$

$= \sqrt{21 \times 3 \times 11 \times 7}\ cm^2$

$= \sqrt{3 \times 7 \times 3 \times 11 \times 7} = 21\sqrt{11}\ cm^2$

25) Let the sides of the triangle be,

$a = 12x$

$b = 17x$

$c = 25x$

Perimeter = 540 cm

$12x + 17x + 25x = 540$ cm

$54x = 540$

$x = \frac{540}{54}$ 10 cm

$a = 12 \times 10 = 120$ cm

$b = 17 \times 10 = 170$ cm

$c = 25 \times 10 = 250$ cm

Semiperimeter = $\frac{540}{2} = 270$ cm

$= \sqrt{270(270-120)(270-170)(270-250)}\ cm^2$

$= \sqrt{270 \times 150 \times 100 \times 20}\ cm^2$

$= \sqrt{3^2 \times 3^2 \times 10^2 \times 10^2 \times 5^2 \times 2^2}$

$= 3 \times 3 \times 10 \times 10 \times 5 \times 2 = 9000\ cm^2$

Q6) Let the sides of the triangle be 'a' = 12 cm
'b' = 12 cm
'c' = x cm.

Perimeter of the triangle = 30 cm

$\therefore 12\text{ cm} + 12\text{ cm} + x\text{ cm} = 30$

$x = (30 - 24) = 6$

Semimeter $= \frac{30}{2} = 15$

$\Rightarrow$ Area of $\Delta = \sqrt{s(s-a)(s-b)(s-c)}$

$= \sqrt{15(15-12)(15-12)(15-6)}\ \text{cm}^2$

$= \sqrt{15 \times 3 \times 3 \times 9}$

$= \sqrt{3^2 \times 3^2 \times 3 \times 5}$

$= 3 \times 3 \times \sqrt{3 \times 5} = 9\sqrt{15}$

Q1)