

Exercise 17A

Question 20: Perimeter of an isosceles triangle = 42 cm

(i) Let each side be a cm, then base = $\frac{3}{2}$ a cm

perimeter = (2a + b) cm

$$= \left(2a + \frac{3}{2}a\right) \text{cm} = 42 \text{ cm}$$
$$= \frac{7a}{2} = 42 \Rightarrow a = \frac{42 \times 2}{7} = 12 \text{ cm}$$

Hence each side = 12 cm and Base = $\frac{3}{2}$ x 12 = 18 cm

(ii) Area of triangle =
$$\frac{1}{4}$$
b $\sqrt{4a^2 - b^2}$ sq. unit
= $\frac{1}{4}$ × $18\sqrt{4 \times 12^2 - 18^2}$ cm²
= $\frac{1}{4}$ × 18 × $\sqrt{576 - 324}$ cm²
= $\frac{1}{4}$ × 18 × $\sqrt{252}$ cm²

Area =
$$\frac{1}{4} \times 18 \times 15.87 \text{ cm}^2 = 71.42 \text{ cm}^2$$

(iii) Height of the triangle =
$$\frac{\sqrt{4a^2 - b^2}}{2}$$
 units
= $\left(\frac{\sqrt{4 \times 12 \times 12 - 18 \times 18}}{2}\right)$ cm
= $\frac{\sqrt{576 - 324}}{2}$ cm = $\frac{15.87}{2}$ = 7.94 cm

Question 21:

Let the height be h cm, then a = (h + 2) cm and b = 12 cm

$$\frac{1}{2} \times 12 \times h = \frac{1}{4} \times 12 \times \sqrt{4(h+2)^2 - 144}$$

$$6h = 6\sqrt{(h+2)^2 - 36}$$

$$h = \sqrt{(h+2)^2 - 36}$$

Squaring both sides,

$$h^2 = (h + 2)^2 - 36$$

 $h^2 = h^2 + 4 + 4h - 36$
 $-4h = -32 \Rightarrow h = 8cm$

Therefore, a = h + 2 = (8 + 2)cm = 10 cm

Area of isosceles triangle =
$$\frac{1}{4}b \times \sqrt{4a^2 - b^2}$$

= $\frac{1}{4} \times 12 \times \sqrt{4 \times (10)^2 - (12)^2}$
= $3\sqrt{400 - 144} = 3 \times \sqrt{256}$
= $3 \times 16 = 48$ cm²

Hence, area of the triangle = 48 cm^2 .

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