



Figure 1

Figure 1 shows a sketch of a triangle ABC with $AB = 3x$ cm, $AC = 2x$ cm and angle $CAB = 60^\circ$

Given that the area of triangle ABC is $18\sqrt{3}$ cm²

(a) show that $x = 2\sqrt{3}$

(3)

(b) Hence find the exact length of BC , giving your answer as a simplified surd.

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(3)

$$\begin{aligned} \text{(a) Area of } \Delta &= \frac{1}{2} ab \sin c = \frac{1}{2} \times 2x \times 3x \times \sin 60^\circ \\ &= 3x^2 \left(\frac{\sqrt{3}}{2} \right) = 18\sqrt{3} \end{aligned}$$

\swarrow N.B!
 \uparrow given area

$$\Rightarrow 3x^2 = 36 \Rightarrow x^2 = 12$$

$$x = \sqrt{12} = \sqrt{4 \cdot 3} = \underline{\underline{2\sqrt{3}}} \text{ as required}$$

(b) Here we need the cosine rule. (cos 60° = 1/2)

$$BC^2 = (2x)^2 + (3x)^2 - 2(2x)(3x)\left(\frac{1}{2}\right)$$

$$= 4x^2 + 9x^2 - 6x^2$$

$$= 7x^2$$

$$= 7 \times 12 \text{ (from above)}$$

$$= 7 \times 4 \times 3$$

$$\text{So } BC = \sqrt{21 \times 4}$$

$$= \underline{\underline{2\sqrt{21} \text{ cm}}}$$