# Sine rule and ambiguous cases

6 questions | 18 marks

Equivalent correct methods earn the corresponding marks.

**1.** $A = 30^\circ$, $B = 90^\circ$, $a = 6$ cm. Find $b$. [3 marks]

$b = \frac{6\sin 90^\circ}{\sin 30^\circ} = 12$.

**Answer:** 12 cm

**2.** $A = 45^\circ$, $B = 60^\circ$, $a = 10$ cm. Find $b$ exactly. [3 marks]

$b = \frac{10(\frac{\sqrt{3}}{2})}{\frac{\sqrt{2}}{2}} = 5\sqrt{6}$.

**Answer:** $5\sqrt{6}$ cm

**3.** $A = 30^\circ$, $a = 5$ cm, $b = 12$ cm. Decide how many triangles exist. [3 marks]

$\sin B = \frac{12(\frac{1}{2})}{5} = 1.2 > 1$.

**Answer:** None.

**4.** Given $A = 30^\circ$, $a = 5$ cm, $b = 5\sqrt{2}$ cm, find all possible $B$,$C$ pairs. [3 marks]

$\sin B = \frac{\sqrt{2}}{2}$.

Test $45^\circ$ and $135^\circ$, then subtract each from $150^\circ$.

**Answer:** $(45^\circ, 105^\circ)$ or $(135^\circ, 15^\circ)$

**5.** $A = 120^\circ$, $a = 10$ cm, $b = 5$ cm. Find $B$ and $C$ to one decimal place. [3 marks]

$\sin B = \frac{\sqrt{3}}{4}$.

$B \approx 25.6589^\circ$; its supplement is incompatible with $A = 120^\circ$.

$C \approx 34.3411^\circ$.

**Answer:** $B = 25.7^\circ$, $C = 34.3^\circ$.

**6.** A survey triangle has $A = 40^\circ$, $B = 65^\circ$ and $a = 18$ m. Find $b$ to one decimal place and explain why $b > a$. [3 marks]

$b = \frac{18\sin 65^\circ}{\sin 40^\circ} \approx 25.3793$.

$65^\circ$ exceeds $40^\circ$, so its opposite side is longer.

**Answer:** $b \approx 25.4$ m; $b$ faces the larger angle.