Sine rule and ambiguous cases

6 questions | 18 marks

Equivalent correct methods earn the corresponding marks.

1. A=30°, B=90°, a=6 cm. Find b. [3 marks]

$b = 6\sin 90^\circ / \sin 30^\circ = 12$.

Answer: 12 cm

2. A=45°, B=60°, a=10 cm. Find b exactly. [3 marks]

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

Answer: $5\sqrt{6}$ cm

3. A=30°, a=5 cm, b=12 cm. Decide how many triangles exist. [3 marks]

$\sin B = 12(1/2)/5 = 1.2 > 1$.

Answer: None.

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

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

Test 45° and 135°, then subtract each from 150°.

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

5. A=120°, a=10 cm, b=5 cm. Find B and C to one decimal place. [3 marks]

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

B≈25.6589°; its supplement is incompatible with A=120°.

C≈34.3411°.

Answer: B=25.7°, C=34.3°.

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

$b = 18\sin 65^\circ / \sin 40^\circ \approx 25.3793$.

65° exceeds 40°, so its opposite side is longer.

Answer: b≈25.4 m; b faces the larger angle.