Cosine rule

6 questions | 16 marks

Equivalent correct methods earn the corresponding marks.

1. Sides 3 m and 5 m include 60°. Find the opposite side exactly. [2 marks]

$c^2 = 3^2 + 5^2 - 2(3)(5)\cos 60^\circ = 19.$

$c = \sqrt{19}$ m.

Answer: $\sqrt{19}$ m

2. A triangle has sides 7 cm, 8 cm and 9 cm. Find the angle opposite 9 cm to 0.1°. [3 marks]

$\cos C = \frac{49 + 64 - 81}{112} = \frac{2}{7}.$

$C = \cos^{-1}\left(\frac{2}{7}\right).$

Answer: 73.4°

3. Sides 10 m and 12 m include 120°. Find the third side to 0.1 m. [3 marks]

$c^2 = 100 + 144 - 240\cos 120^\circ = 364.$

$c = \sqrt{364}.$

Answer: 19.1 m

4. A triangle has sides 8 cm, 15 cm and 17 cm. Use the cosine rule to classify the angle opposite 17 cm. [3 marks]

$\cos C = \frac{64 + 225 - 289}{2 \cdot 8 \cdot 15} = 0.$

$C = 90^\circ.$

Answer: 90°; it is a right angle.

5. In triangle ABC, $b = 8$ cm, $c = 11$ cm and $A = 40^\circ$. Find a to 0.1 cm. [3 marks]

$a^2 = 8^2 + 11^2 - 2(8)(11)\cos 40^\circ.$

Take the positive square root.

Answer: 7.1 cm

6. You know all three sides but no angles. Which rule gives a starting angle, and why is the sine rule not a starting method? [2 marks]

The cosine rule can use three side lengths.

The sine rule needs at least one complete opposite pair.

Answer: Use the cosine rule; no opposite side-angle pair is known for the sine rule.