# Cosine rule

6 questions | 15 marks

Equivalent correct methods earn the corresponding marks.

**1.** Two sides are 8 m and 11 m and their included angle is 50°. Find the third side to one decimal place. [2 marks]

$c^2=8^2+11^2-2\times8\times11\cos50°$.

Take the positive square root.

**Answer:** 8.5 m

**2.** Find the angle opposite 13 in a triangle with sides 9, 10 and 13. Round to one decimal place. [2 marks]

$\cos C=(81+100-169)/(2\times9\times10)$.

$C=\cos^{-1}(12/180)$.

**Answer:** 86.2°

**3.** Sides of 12 cm and 17 cm enclose 40°. Find the opposite side to one decimal place. [2 marks]

$c^2=144+289-408\cos40°$.

Take the positive square root.

**Answer:** 11.0 cm

**4.** Use cosine rule to show that sides 8, 15 and 17 form a right triangle. [3 marks]

$\cos C = (64+225-289)/(2\times 8\times 15) = 0$.

Thus $C = 90°$.

**Answer:** The angle opposite 17 is 90°.

**5.** Could sides 4 cm, 5 cm and 12 cm form a triangle? Explain before calculating an angle. [3 marks]

$4+5=9<12$.

The two shorter sides cannot close a triangle around the longest side.

**Answer:** No.

**6.** For $a=6$, $b=9$, $C=110°$, a student adds $2ab\cos C$ instead of subtracting it. Correct the rule and find c. [3 marks]

Cosine rule subtracts $2ab\cos C$.

$\cos 110°$ is negative, so subtracting this term increases $c^2$.

**Answer:** $c^2 = 117 - 108\cos 110°$; $c \approx 12.4$ units.