The Sine Rule, Cosine Rule and Area of a Triangle

Geometry and measures · 6 questions · step-by-step answers at the end

Name: Date: Score: / 6

USEFUL EQUATIONS

$a/\sin A = b/\sin B = c/\sin C$ $a^2 = b^2 + c^2 - 2bc\cos A$ $\cos A = (b^2 + c^2 - a^2)/(2bc)$

Area $= (1/2)ab\sin C$

Questions

Show your working in the space under each question.

1. EASY Find the area of a triangle with sides 6 cm and 10 cm and an included angle of 150°.

2. EASY In a triangle A = 30°, B = 45° and a = 10 cm. Find b.

3. MEDIUM A triangle has sides 3, 5 and 7 cm. Find its largest angle.

4. MEDIUM In a triangle a = 8 cm, A = 50° and b = 6 cm. Find angle B.

5. HARD Two sides of 9 cm and 12 cm enclose an angle of 110°. Find the third side.

6. HARD A triangle with sides 8 cm and 10 cm has area 20 cm^2. Find the possible sizes of the angle between them.

Step-by-step answers

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1. (1/2)(6)(10) sin 150° = 30 × 0.5 = **15 cm²**.
2. b = 10 sin 45°/sin 30° = 10 × 0.7071/0.5 = **14.1 cm**.
3. Opposite the 7 cm side: cos C = (9 + 25 − 49)/(2 × 3 × 5) = −0.5, so C = **120°**.
4. sin B = 6 sin 50°/8 = 0.5745, so B = **35.1°** (the obtuse option, 144.9°, is impossible because 144.9 + 50 > 180).
5. c^2 = 81 + 144 − 216 cos 110° = 225 + 73.9 = 298.9, so c = **17.3 cm**.
6. (1/2)(8)(10) sin C = 20, so sin C = 0.5. C = **30° or 150°**.