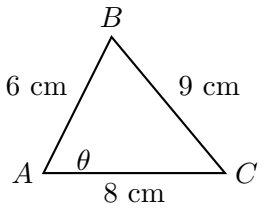
Cosine Rule — Finding Angles

Core Worksheet

Worked Examples & Guided Practice

I Do (Teacher Model) In triangle ABC, $AB = 6$ cm, $BC = 9$ cm, and $AC = 8$ cm. Calculate the size of angle BAC. Give your answer to 1 decimal place.



We Do (Guided Practice) In triangle PQR, $PQ = 11$ cm, $QR = 7$ cm, and $PR = 15$ cm. Calculate the size of the largest angle in the triangle to 1 decimal place.

You Do (Independent Practice) In triangle XYZ, $XY = 5$ cm, $YZ = 12$ cm, and $XZ = 13$ cm. Use the cosine rule to verify whether angle XYZ is a right angle.

Challenge (Extension) A rhombus $ABCD$ has side length 10 cm and a longer diagonal $AC = 16$ cm. Calculate the size of the obtuse interior angle of the rhombus to 1 d.p.

Practice Perfect Questions

Q1. In triangle ABC, $a = 7$ cm, $b = 5$ cm, and $c = 8$ cm. Calculate angle A to 1 d.p.

Q2. In triangle DEF, $DE = 9$ cm, $EF = 14$ cm, and $DF = 10$ cm. Calculate angle DEF to 1 d.p.

Q3. In triangle LMN, $LM = 12$ m, $MN = 18$ m, and $LN = 22$ m. Calculate angle LNM to 1 d.p.

Q4. Find the size of the smallest angle in a triangle with sides 6 cm, 9 cm, and 11 cm to 1 d.p.

Q5. A triangular frame has side lengths 1.5 m, 2.0 m, and 2.8 m. Calculate the largest interior angle to 1 d.p.

Q6. In triangle ABC, sides are x, $x + 2$, and $x + 4$. Given that the largest angle is $120°$, find the value of x.

Answers & Worked Solutions

Model Solutions

- **I Do:** $\cos A = \dfrac{b^2+c^2-a^2}{2bc} = \dfrac{8^2+6^2-9^2}{2(8)(6)} = \dfrac{64+36-81}{96} = \dfrac{19}{96} \approx 0.1979 \implies A = \cos^{-1}(0.1979) = 78.6°$
- **We Do:** Largest angle is opposite longest side $PR = 15$ cm (angle Q). $\cos Q = \dfrac{11^2+7^2-15^2}{2(11)(7)} = \dfrac{121+49-225}{154} = \dfrac{-55}{154} \approx -0.3571 \implies Q = 110.9°$
- **You Do:** $\cos Y = \dfrac{5^2+12^2-13^2}{2(5)(12)} = \dfrac{25+144-169}{120} = 0 \implies Y = \cos^{-1}(0) = 90°$ ■
- **Challenge:** In triangle ABC, sides are $10, 10, 16$. $\cos B = \dfrac{10^2+10^2-16^2}{2(10)(10)} = \dfrac{200-256}{200} = -0.28 \implies B = \cos^{-1}(-0.28) = 106.3°$

Practice Perfect Questions Solutions

Q1. $\cos A = \dfrac{5^2+8^2-7^2}{2(5)(8)} = \dfrac{40}{80} = 0.5 \implies A = 60.0°$

Q2. $\cos E = \dfrac{9^2+14^2-10^2}{2(9)(14)} = \dfrac{177}{252} \approx 0.7024 \implies E = 45.4°$

Q3. $\cos N = \dfrac{18^2+22^2-12^2}{2(18)(22)} = \dfrac{664}{792} \approx 0.8384 \implies N = 33.0°$

Q4. Smallest angle is opp side 6 cm. $\cos\theta = \dfrac{9^2+11^2-6^2}{2(9)(11)} = \dfrac{166}{198} \approx 0.8384 \implies \theta = 33.0°$

Q5. Largest angle is opp 2.8 m. $\cos\theta = \dfrac{1.5^2+2.0^2-2.8^2}{2(1.5)(2.0)} = \dfrac{-1.59}{6.0} = -0.265 \implies \theta = 105.4°$

Q6. $\cos(120°) = -0.5 \implies \dfrac{x^2+(x+2)^2-(x+4)^2}{2x(x+2)} = -0.5 \implies x^2-4x-12 = -(x^2+2x) \implies 2x^2-2x-12=0 \implies x^2-x-6=0 \implies (x-3)(x+2)=0 \implies x = 3$ cm