KEY

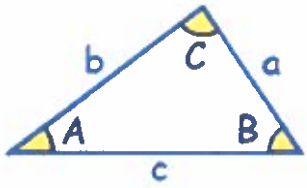
Math 20-2

L50 – Cosine Law

Key Ideas

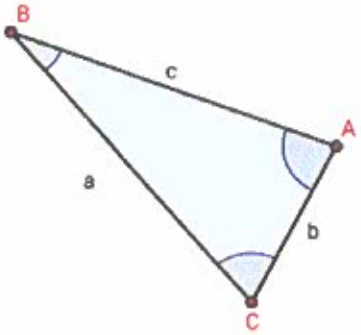
Sine Law:

$$\frac{SinA}{a} = \frac{Sin\,B}{b} = \frac{Sin\,C}{c} \quad \text{or} \quad \frac{a}{Sin\,A} = \frac{b}{Sin\,B} = \frac{c}{Sin\,C}$$



Cosine Law:

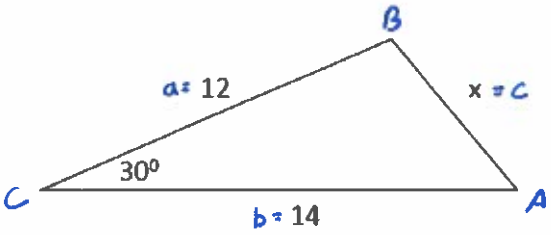
Law of Cosines



$$a^2 = b^2 + c^2 - 2bcCosA$$
$$b^2 = a^2 + c^2 - 2acCosB$$
$$c^2 = a^2 + b^2 - 2abCosC$$

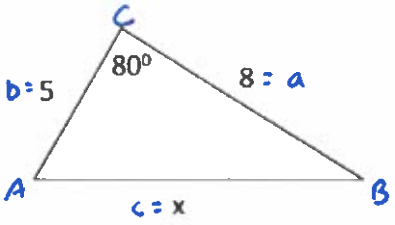
Part 1 – Solving for a Side

Q1: Solve for *x*.



$c^2 = a^2 + b^2 - 2abCosC$
$c^2 = 12^2 + 14^2 - 2(12)(14)\cos 30°$
$c^2 = 144 + 196 - 290.98$
$c^2 = 49.0$
$\boxed{c = 7.0}$

Q2: Solve for *x*.



$c^2 = a^2 + b^2 - 2abCosC$
$c^2 = 8^2 + 5^2 - 2(8)(5)\cos 80$
$c^2 = 64 + 25 - 13.89$
$c^2 = 75.1$
$\boxed{c = 8.7}$

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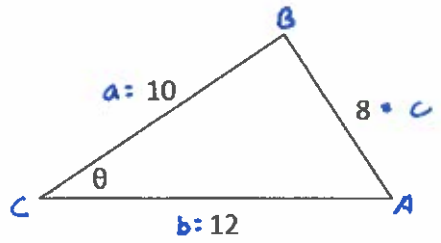
Part 2 – Solving for an Angle

Q3: Solve for θ.



$c^2 = a^2 + b^2 - 2ab\cos C$

$8^2 = 10^2 + 12^2 - 2(10)(12)\cos C$

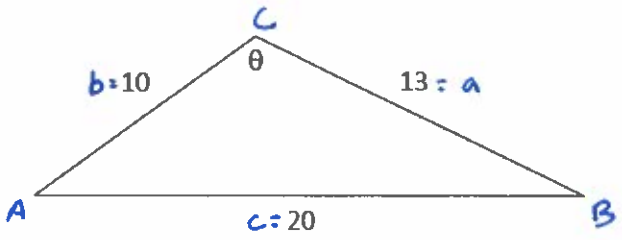
$-180 = -240\cos C$

$0.75 = \cos C$

$\angle C = 41.4°$

$\boxed{\theta = 41.4°}$

Q4: Solve for θ.



$c^2 = a^2 + b^2 - 2ab\cos C$

$20^2 = 13^2 + 10^2 - 2(13)(10)\cos\theta$

$400 = 169 + 100 - 260\cos\theta$

$131 = -260\cos\theta$

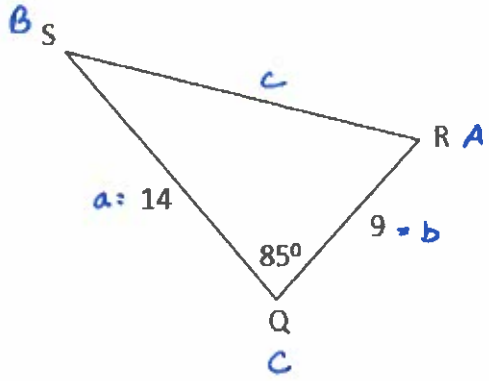
$-0.5038 = \cos\theta$

$\theta = \cos^{-1}(-0.5038)$

$\boxed{\theta = 120.3°}$

Part 3 – Solving a Triangle (Cosine Law, then Sine Law)

Q5: Solve the triangle.



$c^2 = a^2 + b^2 - 2ab\cos C$

$c^2 = 14^2 + 9^2 - 2(14)(9)\cos 85$

$c^2 = 196 + 81 - 21.96$

$c^2 = 255.04$

$\boxed{c = 16.0}$

$\frac{\sin C}{c} = \frac{\sin A}{a}$

$\frac{\sin 85}{16.0} = \frac{\sin A}{14}$

$\boxed{\angle A = 60.7°} \rightarrow \boxed{\angle R = 60.7°}$

$\angle A + \angle B + \angle C = 180°$

$\boxed{\angle B = 34.3°} \rightarrow \boxed{\angle S = 34.3°}$