Basic Trigonometric Functions:

$$\sin A = \frac{opposite\ side}{Hypotenuse\ side} = \frac{a}{c} \qquad \sin B = \frac{opposite\ side}{Hypotenuse\ side} = \frac{b}{c}$$

$$\cos A = \frac{adjacent\ side}{Hypotenuse\ side} = \frac{b}{c} \qquad \cos B = \frac{adjacent\ side}{Hypotenuse\ side} = \frac{a}{c}$$

$$\tan A = \frac{opposite\ side}{adjacent\ side} = \frac{a}{b} \qquad \tan B = \frac{opposite\ side}{adjacent\ side} = \frac{b}{a}$$
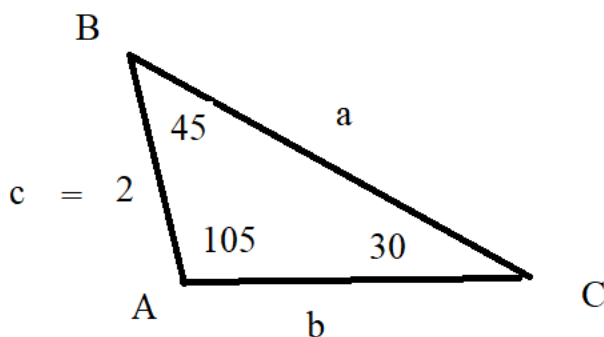
LAW of SINES:
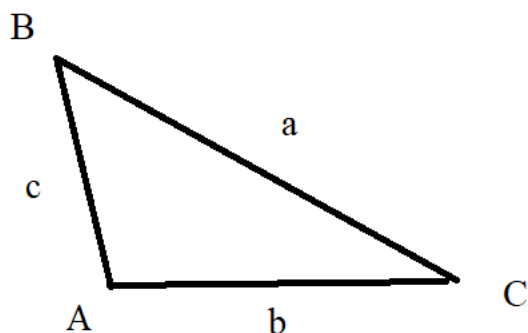
$$\frac{Sin\ A}{a} = \frac{Sin\ B}{b} = \frac{Sin\ C}{c}$$

You can use proportional reasoning to solve problems (Cross products are equal to each other).

Solve for 'a' and 'b':

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

$$\frac{Sin\ 105}{a} = \frac{Sin\ 30}{2}$$

Cross multiply:

$$\frac{Sin\ 105}{a} \quad \frac{Sin\ 30}{2}$$

(Sin 30)(a) = (Sin 105)(2)

Now divide both sides of the equation by Sin 30 to solve for 'a'

$$a = \frac{(Sin\ 105)(2)}{Sin\ 30}$$

You will need to use the calculator to enter these multiplications and divisions.

Enter on the calculator the following (you will get a long decimal answer that will need to be rounded off): ((sin 105) x 2) ÷ sin 30 = 3.863703305 rounded to the nearest tenth = 3.9

<mark>a ≈ 3.9</mark>

Solve for 'b'

$$\frac{Sin\ B}{b} = \frac{Sin\ C}{c}$$

$$\frac{Sin\ 45}{b} = \frac{Sin\ 30}{2}$$

Cross multiply:

$$\frac{Sin\ 45}{a} \diagdown \frac{Sin\ 30}{2}$$

(Sin 30)(a) = (Sin 105)(2)

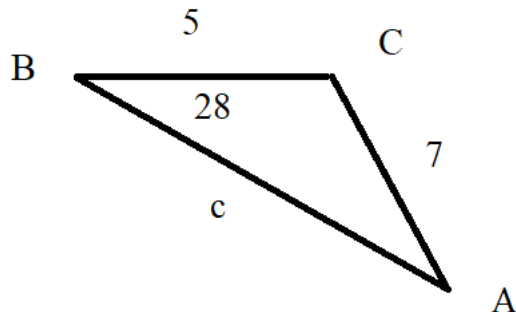Now divide both sides of the equation by Sin 30 to solve for 'b'

$$b = \frac{(Sin\ 45)(2)}{Sin\ 30}$$

You will need to use the calculator to enter these multiplications and divisions.

Enter on the calculator the following (you will get a long decimal answer that will need to be rounded off): ((sin 45) x 2) ÷ sin 30 = 2.828427125 rounded to the nearest tenth = 2.8.

<mark>b ≈ 2.8</mark>

Find the m∠A = ?

$$\frac{Sin\ A}{a} = \frac{Sin\ B}{b}$$

$$\frac{Sin\ A}{5} = \frac{Sin\ 28}{7}$$

Cross multiply

$$\frac{Sin\ A}{5} \diagdown \frac{Sin\ 28}{7}$$

(Sin 28) x (5) = (Sin A) x (7)

Now divide both sides of the equation by 7 to solve for 'm∠A'

$$Sin\ A = \frac{(Sin\ 28)(5)}{7}$$

You will need to use the calculator to enter these multiplications and divisions.

Enter on the calculator the following (you will get a long decimal answer that will need to be rounded off): ((sin 28) x 5) ÷ 7 = 0.33533683.... now you need to convert this to and angle.

Look for the key that shows Sin^{-1} You will need to press the 2nd key then press the Sin⁻¹ key you should get an answer of 19.59302173 rounded to the nearest degree = 20. ==The m∠A ≈ 20⁰==
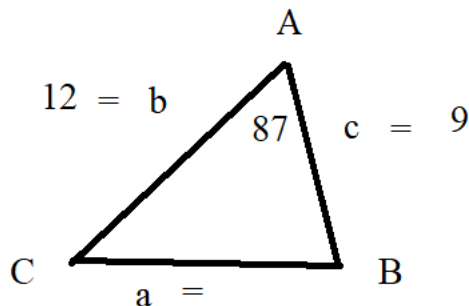
LAW of COSINES:

$a^2 = b^2 + c^2 - 2bc\ Cos\ A$

$b^2 = a^2 + c^2 - 2ac\ Cos\ B$

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

Find a = ?

$a^2 = b^2 + c^2 - 2bc\ Cos\ A$

$a^2 = 12^2 + 9^2 - (2)(12)(9)(\cos 87)$

$a^2 = 144 + 81 - (24)(9)(\cos 87)$
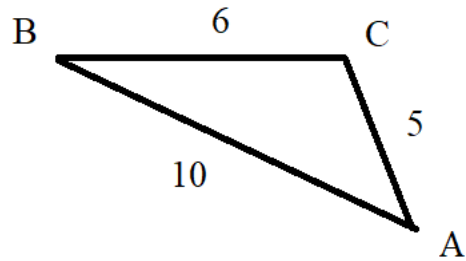
$a^2 = 225 - (216\ )(\cos 87)$

$a^2 = 225 - 11.30456655...$

$a^2 = 213.6954335...$

now square root both sides of the equation

$$\sqrt{a^2} = \sqrt{213.6954335}$$

$$a = 14.61832526...\quad \text{==a ≈ 14.6==}$$

Find the m∠B = ?

$$b^2 = a^2 + c^2 - 2ac \cos B$$

$$25 = 36 + 100 - 2 \cdot 6 \cdot 10 \cdot \cos B$$

$$25 = 136 - 12 \cdot 10 \cdot \cos B$$

$$25 = 136 - 120 \cdot \cos B$$

Now subtract 136 from both sides of the equation $25 - 136 = -120 \cdot \cos B$ which will give you: $-111 = -120 \cdot \cos B$

Next divide both sides of the equation by -120

$-111 \div -120 = \cos B$ which is: $0.925 = \cos B$

now you need to convert this to and angle. Look for the key that shows $\cos^{-1}$ You will need to press the 2nd key then press the $\cos^{-1}$ key you should get an answer of 22.33164501…rounded to the nearest degree = 22 therefore the m∠B = 22°