

What's Going On?

Checking In

Minds on

The Cosine Law

Action!

The Cosine Law for Angles

Consolidation

Using the Cosine Law

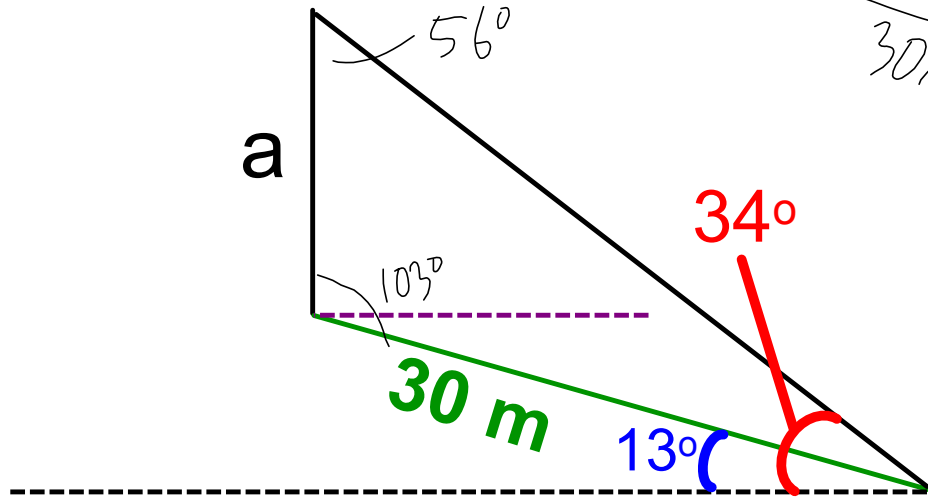
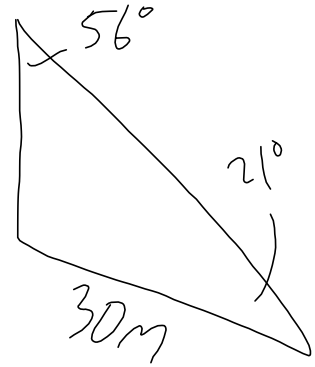
Learning Goal - I will be able to use The Cosine Law to solve for sides and angles in non-right triangles.

Checking In

F.F.M.

Determine the measure of side a.

*Note: side a is a vertical line.

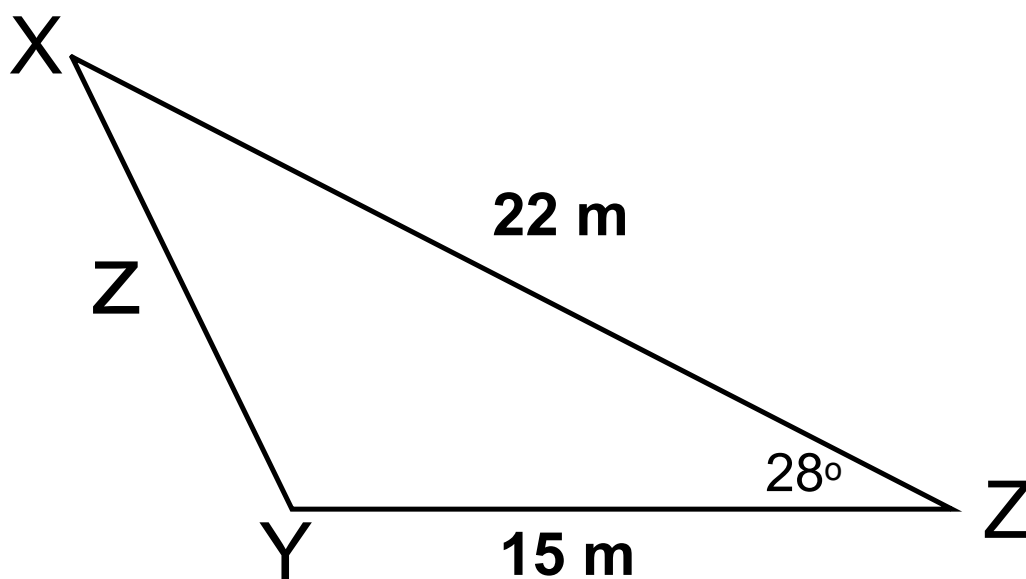


$$\frac{a}{\sin 21} = \frac{30}{\sin 96}$$

$$a = \frac{30 \times \sin 21}{\sin 96}$$

$$a \doteq 13\text{ m}$$

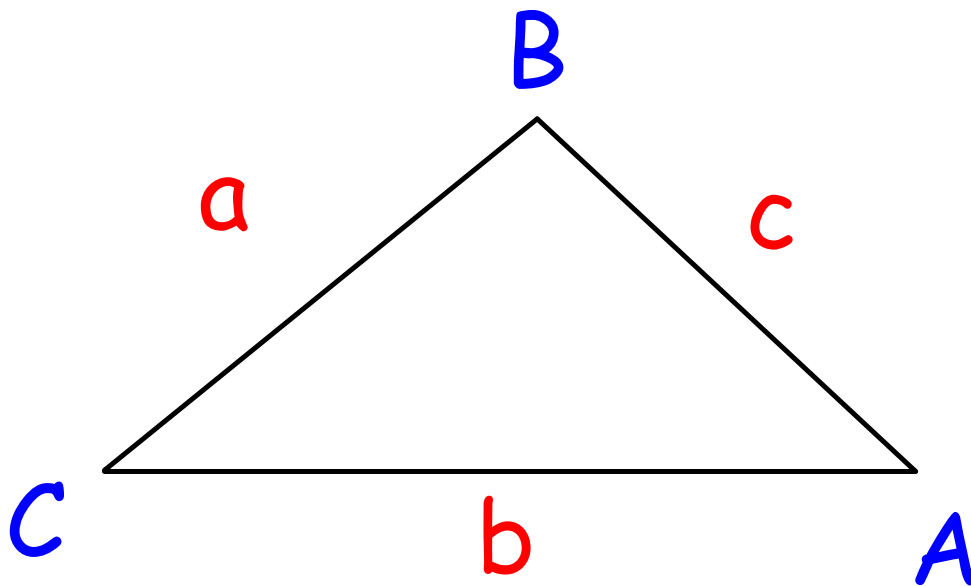
Determine the measure of side z.



$$\frac{z}{\sin 28^\circ} = \frac{22}{\sin Y} = \frac{15}{\sin X}$$

Minds on

The Cosine Law

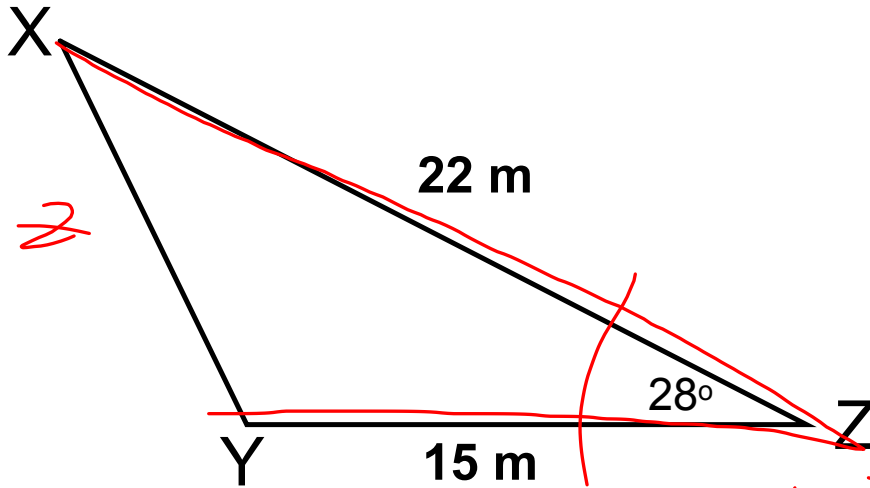


$$c^2 = a^2 + b^2 - 2ab \times \cos C$$

We use the Cosine Law when we

1. Have two sides and the angle between
 - To find the other side
2. Have all three sides
 - To find any angle (rearrange!)

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



$$z^2 = 22^2 + 15^2 - 2(22)(15) \times \cos 28^\circ$$

$$z^2 = 484 + 225 - 562.7$$

$$\sqrt{z^2} = \sqrt{126.3}$$

$$z = 11.2 \text{ m}$$

Action!

The Cosine Law for Angles

Rearrange to solve for angle C

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

$$\frac{c^2 - a^2 - b^2}{-2ab} = \frac{-2ab \cos C}{-2ab}$$

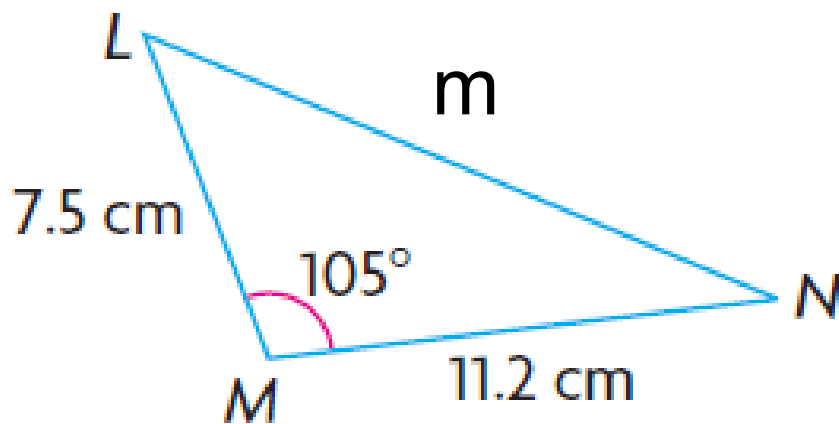
$$\cos C = \frac{c^2 - a^2 - b^2}{-2ab}$$

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

$$C = \cos^{-1} \left(\frac{a^2 + b^2 - c^2}{2ab} \right)$$

Consolidation

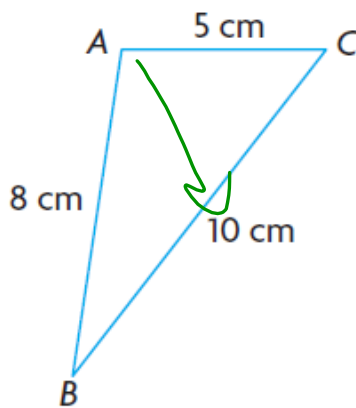
Using the Cosine Law



$$\begin{aligned}m^2 &= 7.5^2 + 11.2^2 - 2(7.5)(11.2)\cos 105^\circ \\m^2 &= 56.25 + 125.44 - (168)(-0.2596) \\m^2 &= 141.69 + 43.48 \\m^2 &= 225.17 \\m &= 15.0 \text{ cm}\end{aligned}$$

Consolidation

Using the Cosine Law



Find angle A

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

$$10^2 = 5^2 + 8^2 - 2(5)(8) \times \cos A$$

$$100 = \cancel{25} + \cancel{64} - 80 \cos A$$

-25 -64 -25 -64

$$\frac{11}{-80} = \frac{-80 \cos A}{-80}$$

$$\cos A = -0.1375$$

$$A = \cos^{-1}(0.1375)$$

$$A = 94^\circ$$