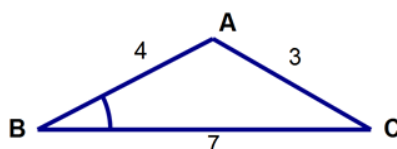
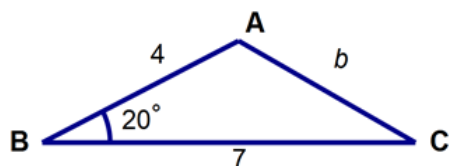


## 3.3

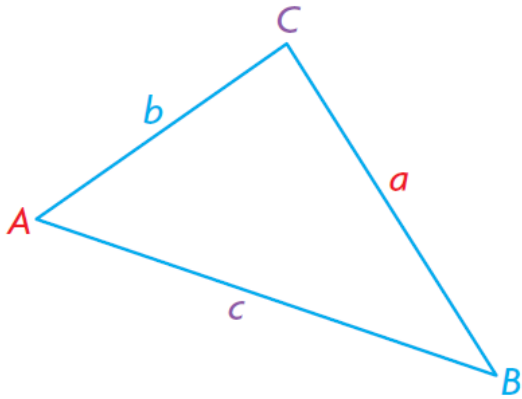
Proving and Applying  
the Cosine Law

The law of sines cannot always be used to determine missing angles or side lengths.

For example, consider the following triangles:



Since we can draw an altitude from any of the vertices the **law of cosines** can be written as:



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

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

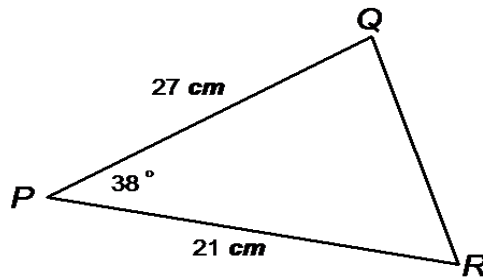
$$c^2 = a^2 + b^2 - 2ab \cos C$$

(missing side)<sup>2</sup> = (side 1)<sup>2</sup> + (side 2)<sup>2</sup> - 2(side 1)(side 2) (cos contained angle)

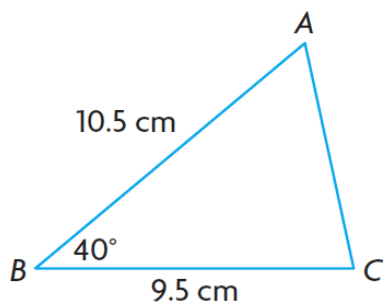
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### Use the Cosine law to find a missing length

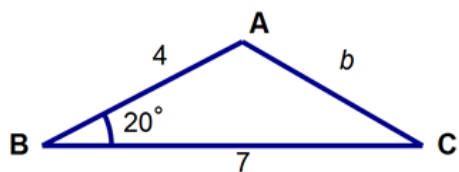
**Example :** Find the length of p in the diagram below:



Example : Find the length of AC in the diagram below:

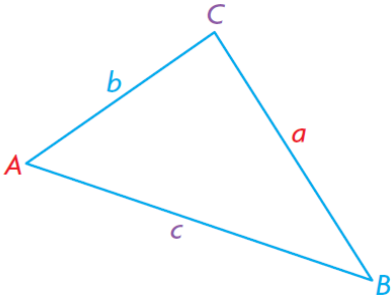


Example : Find the length of AC in the diagram below:



Use the Law of Cosines to find a missing angle.

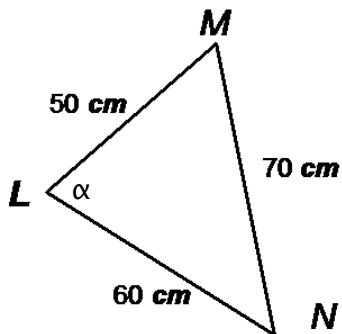
It is helpful to rearrange the formula as follows:



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

$$\cos A = \frac{b^2 + c^2 - a^2}{2bc}$$

**Example:** Determine the measure of  $\angle L$

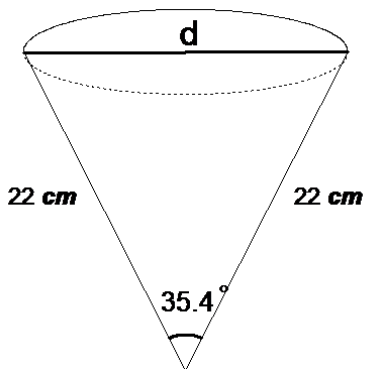


**Example:**

In  $\triangle ABC$   $a = 51$  cm,  $\angle B = 39^\circ$ , and  $c = 42$  cm.  
Solve the triangle. You must include a diagram in  
your solution.

**Example:**

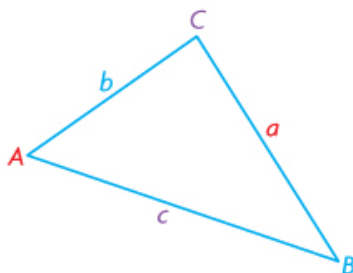
The angle of a cone is  $35.4^\circ$ . Find the diameter of the cone in the  
diagram.



## In Summary

### Key Idea

- The cosine law can be used to determine an unknown side length or angle measure in an acute triangle.



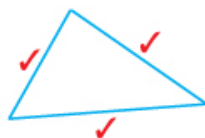
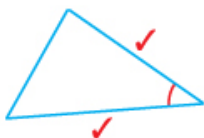
$$a^2 = b^2 + c^2 - 2bc \cos A$$

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

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

### Need to Know

- You can use the cosine law to solve a problem that can be modelled by an acute triangle when you know:
  - two sides and the contained angle.
  - all three sides.



- The contained angle is the angle between two known sides.
- When using the cosine law to determine an angle, you can:
  - substitute the known values first, then solve for the unknown angle.
  - rearrange the formula to solve for the cosine of the unknown angle, then substitute and evaluate.

Page 151 - 153 # 4 -10, 12, 13

## Attachments

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PM11-3s3.gsp

3s3e1 final.mp4

3s3e2 final.mp4