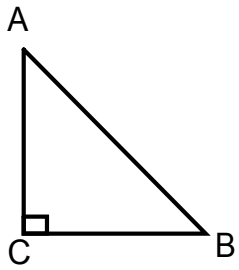
CHAPTER 3

Acute TriangleTrigonometry

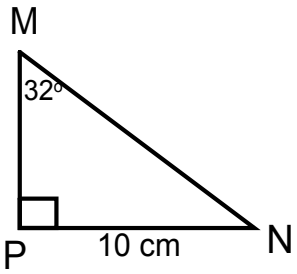
3.1 Exploring Side–Angle Relationships in Acute Triangles

Review Math 1201:

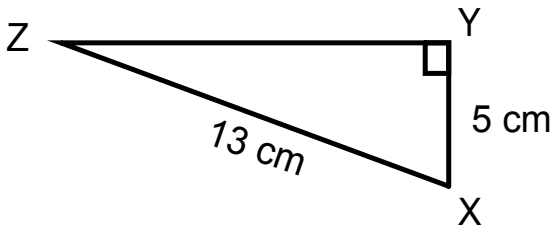
Given a right triangle, what are the primary trigonometric ratios for $\angle A$?



Example 1: For the triangle below, determine the length of $\overline{MN}$ to one decimal place.



Example 2: For the triangle below, determine the measure of ∠x to the nearest degree.



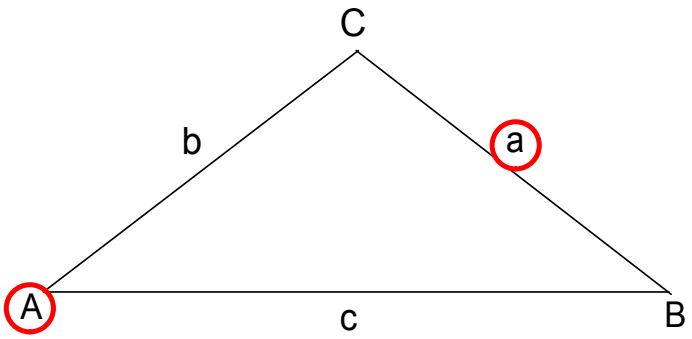
Note:

Ensure your calculator is in degree mode.

Investigate:

You will need a protractor, ruler and scientific calculator.

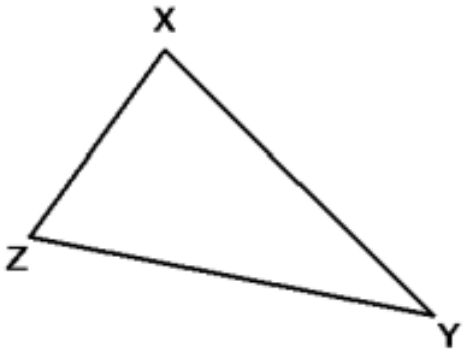
Reminder:



Note:
Upper case letters represent vertices and lower case letters represent the side lengths!

Note:
Greek letters can also used to represent angles: α, β, θ

For the triangle below, use a ruler and a protractor to complete the table below.



	Measure		Measure		Calculate
$\angle X$		$side\ x$		$\frac{x}{\sin X}$	
$\angle Y$		$side\ y$		$\frac{y}{\sin Y}$	
$\angle Z$		$side\ z$		$\frac{z}{\sin Z}$	

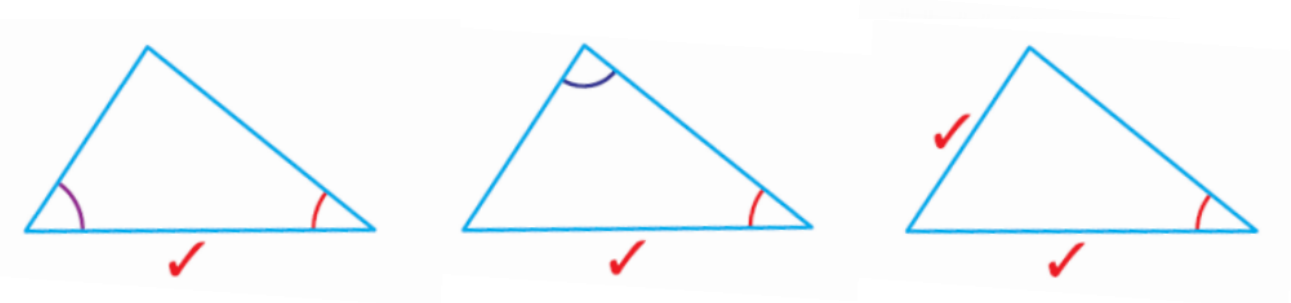
What do you notice about the ratios?

Sine Law $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$ or $\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

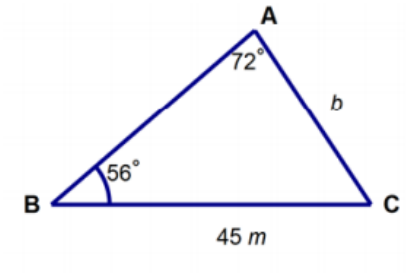
This law enables us to determine the missing sides and angles in a triangle (not restricted to right triangles).

The Sine Law is used to find the missing side or angle in a triangle if the following information is known:

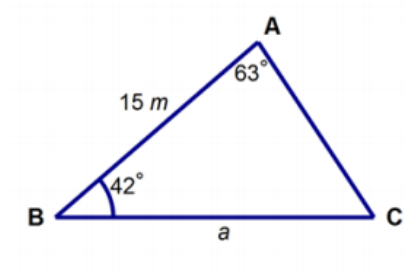
- two angles and an included side (ASA)
- two angles and a non-included side (AAS)
- two sides and a non-included angle (SSA)



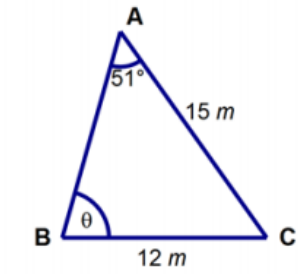
Example 1:



Example 2:

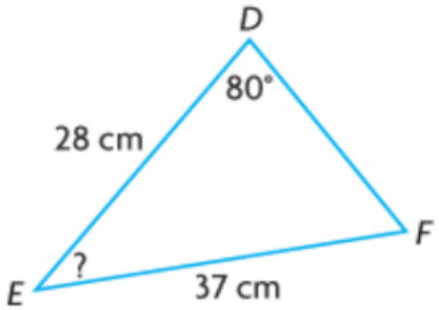


Example 3:



Example 4:

Determine the measure of $\angle E$ in the acute triangle.



Solution:

In Summary

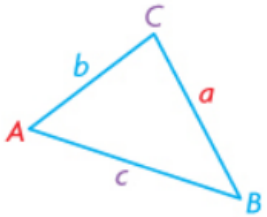
Key Idea

- The ratios of $\frac{\text{length of opposite side}}{\sin(\text{angle})}$ are equivalent for all three side–angle pairs in an acute triangle.

Need to Know

- In an acute triangle, $\triangle ABC$,

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



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