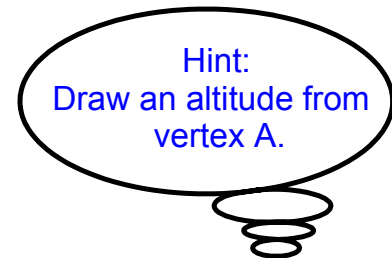
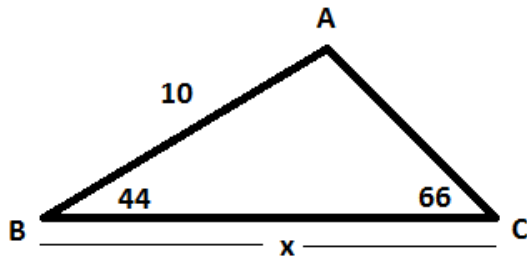


2.3 The Sine Law

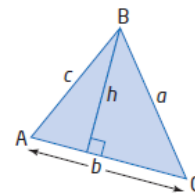
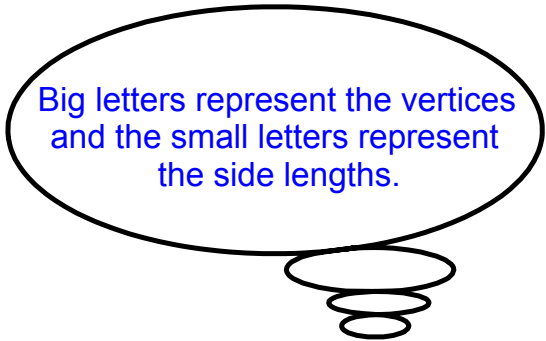
Ex. Find the value of x in the diagram below.



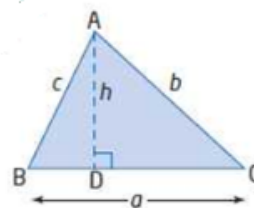
There are more efficient methods to solving this problem.

Solving problems involving trigonometry is limited to right triangles.

We will now look at **oblique** triangles - triangles that do not contain a right angle.



Proof for Sine Law:



The SINE law is a proportion that compares the ratios of each side of a triangle to its included angle.

The Sine Law

The **sine law** is a relationship between the sides and angles in any triangle. Let $\triangle ABC$ be any triangle, where a , b , and c represent the measures of the sides opposite $\angle A$, $\angle B$, and $\angle C$, respectively. Then,

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

or

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

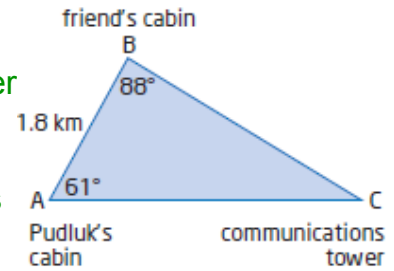
The Sine Law is used to find the missing side or angle in a triangle if the following information is known:

- i) two angles and an included side (ASA)
- ii) two angles and a non-included side (AAS)
- iii) two sides and a non-included angle (SSA) - the ambiguous case

Example 1

Determine an Unknown Side Length

Pudluk's family and his friend own cabins on the Kalit River in Nunavut. Pudluk and his friend wish to determine the distance from Pudluk's cabin to the store on the edge of town. They know that the distance between their cabins is 1.8 km. Using a transit, they estimate the measures of the angles between their cabins and the communications tower near the store, as shown in the diagram. Determine the distance from Pudluk's cabin to the store, to the nearest tenth of a kilometre.



Example: In triangle PQR find the value of q if $\angle R = 83^\circ$, $\angle Q = 40^\circ$ and $r = 25$.

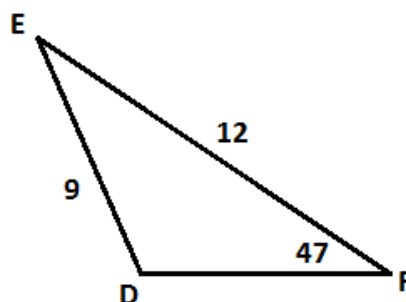
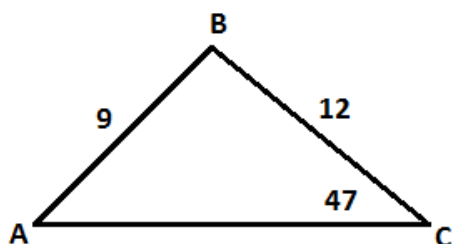
Assign p. 108-113 questions 1(ac), 2(b), 3(a), 4(ac), 5(bc), 10

Turn over

Ambiguous Case

You are given two sides and a non-included angle (SSA)

For example:



Can result in zero,
one, or two
solutions.

Example 3

Use the Sine Law in an Ambiguous Case

In $\triangle ABC$, $\angle A = 30^\circ$, $a = 24$ cm, and $b = 42$ cm. Determine the measures of the other side and angles. Round your answers to the nearest unit.

*

Example

Determine an Unknown Angle Measure

In $\triangle PQR$, $\angle P = 36^\circ$, $p = 24.8$ m, and $q = 23.4$ m. Determine the measure of $\angle R$, to the nearest degree.

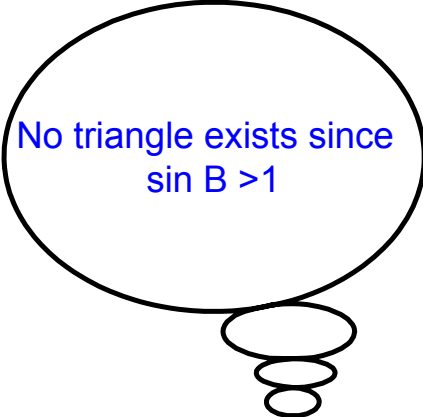
Example

In $\triangle ABC$, $\angle A = 145^\circ$, $a = 18$ cm, and $b = 10$ cm.

Determine the measures of the other side and angles.
Round your answer to the nearest unit.

*

If in a triangle you are given angle $A = 30^\circ$, $b = 10$, and $a = 4$, what do you notice?



No triangle exists since
 $\sin B > 1$

Example 5

In $\triangle ABC$, $\angle A = 39^\circ$, $a = 14$ cm, and $b = 10$ cm. Determine the measures of the other side and angles. Express your answers to the nearest unit.

Key Ideas Summary p. 107

Assign p. 108-113 questions 6(ab), 8(ab), 11, 19,