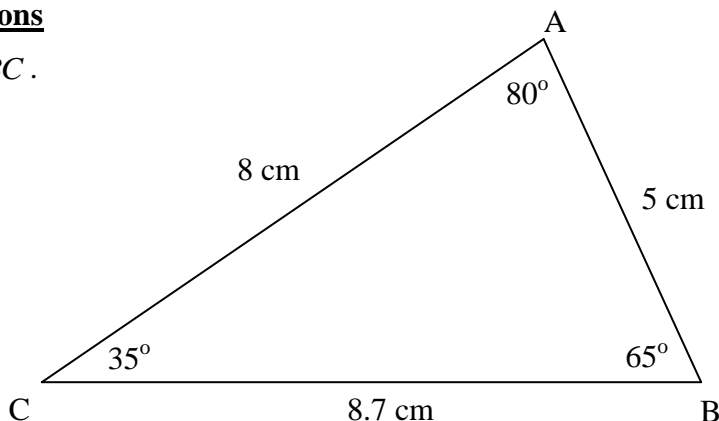


Investigations

Given $\triangle ABC$.



accurate to two decimal places

Complete the chart below:

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

What do you notice?

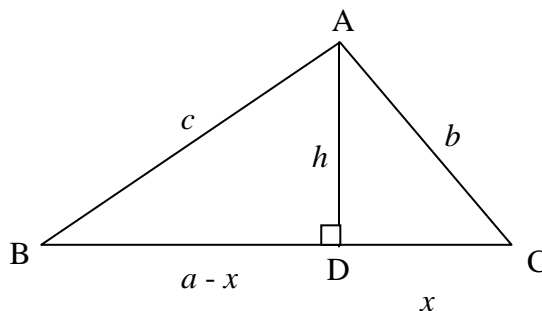
Non-right triangles

Trigonometric Ratios are no longer work for non-right triangles
Instead: Sine law and Cosine Law

Sine Law:

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

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



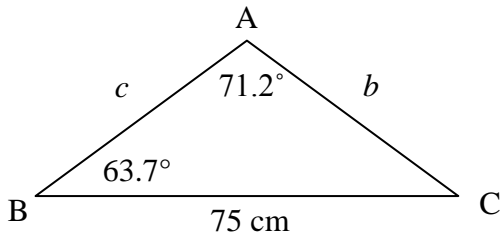
$\sin C = \frac{h}{b}$	$b \sin C = c \sin B$
$h = b \sin C$	$\frac{\sin B}{b} = \frac{\sin C}{c}$
$\sin B = \frac{h}{c}$	Similar idea for $\angle A$
$h = c \sin B$	

Sine Law

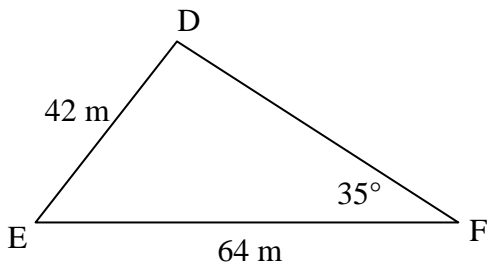
Date:

Example 1: Sine Law

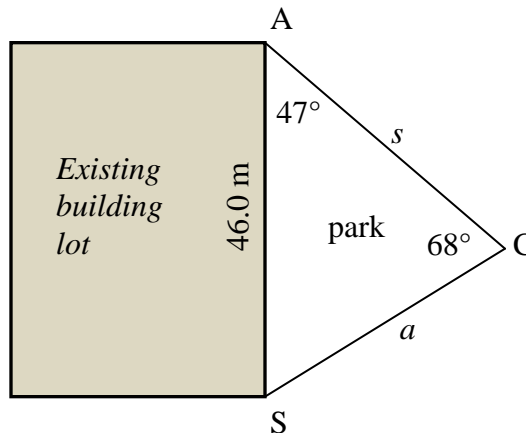
In $\triangle ABC$, $\angle A = 71.2^\circ$, $\angle B = 63.7^\circ$, and $a = 75$ cm. Solve the triangle.

**Example 2: Sine Law**

In $\triangle DEF$, $\angle F = 35^\circ$, $f = 42$ m, and $d = 64$ m. Solve the triangle.
(1 decimal place for side, nearest degree for angles)

**Example 3:**

The town surveyor has to stake the lot market for a new public park beside an existing building lot. The engineering department gave this sketch. How much chain-link fence will be needed to enclose the entire park?



Exercise

1. Complete the following for the **Law of Sines**.

$$\frac{a}{\sin \angle B} = \frac{\quad}{\quad} = \frac{\quad}{\quad}$$

$$\frac{\quad}{a} = \frac{\sin \angle B}{\quad} = \frac{\quad}{\quad}$$

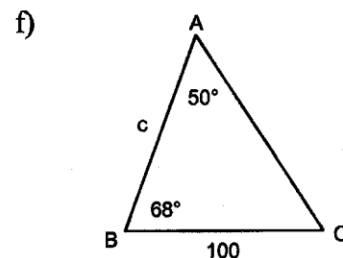
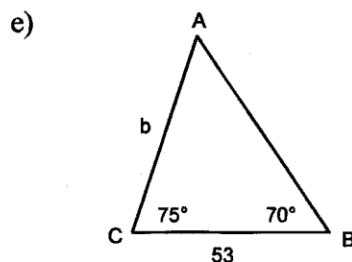
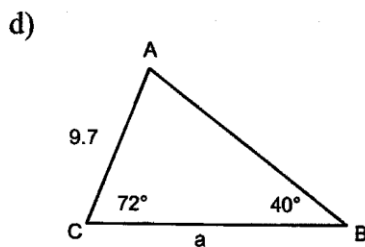
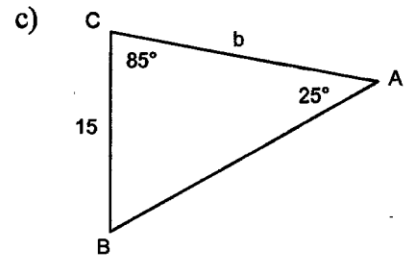
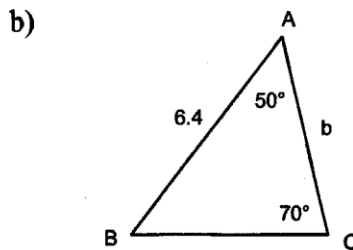
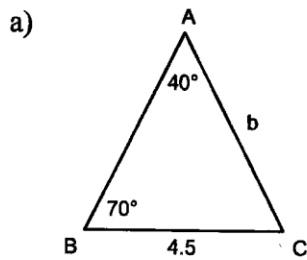
2. For each of the following triangles, determine the value of the stated unknown:

a) $\triangle ABC$, $\angle A = 65^\circ$, $\angle B = 40^\circ$, $a = 15$, $b = ???$

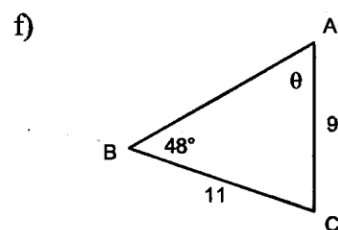
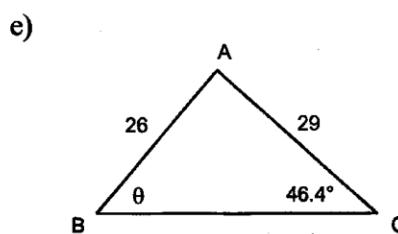
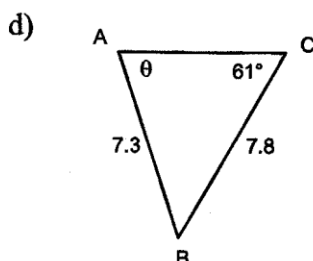
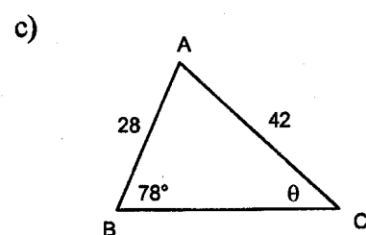
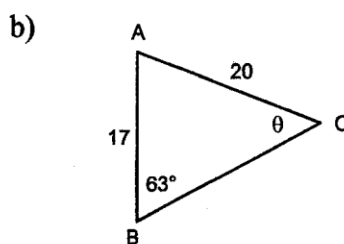
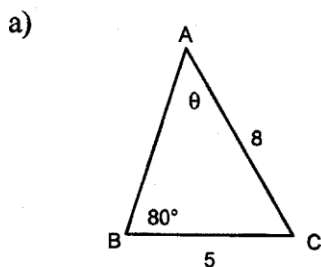
b) $\triangle ABC$, $\angle A = 38^\circ$, $\angle B = 77^\circ$, $b = 16.5$, $c = ???$

c) $\triangle PQR$, $\angle P = 65^\circ$, $p = 12$, $q = 11$, $\angle R = ???$

3. Determine the indicated length. Round to 1 decimal place.



4. Determine the indicated angle in each of the acute triangles below. Round to 1 decimal place.



Sine Law

Date:

5. Solve $\triangle ABC$ given that:

a) $\angle B = 42^\circ$; $\angle C = 72^\circ$; $a = 10.5$

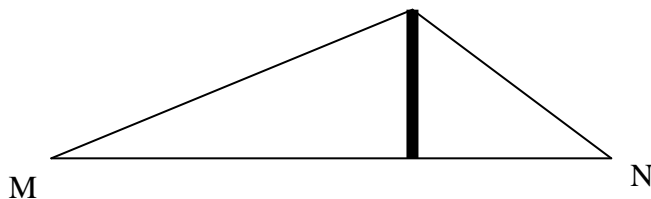
b) $\angle B = 48^\circ$; $\angle C = 63^\circ$; $c = 40$

c) $\angle B = 70^\circ$; $a = 5$; $b = 7$

d) $\angle B = 82^\circ$; $a = 100$; $b = 253$

6. Find the areas of each of the triangles in # 5 above.

7. Two supporting wires, as shown in the sketch, are 17.0 m and 10.0 m in length. They are attached to the top of a TV tower from the two points M and N. The angle of elevation for the longer wire is 28.1° . How far apart are the points M and N?



8. Bobby and Terry are 325 metres apart on level ground. A small plane is flying in the air and passes a point between the two people. At that instant, the angle of elevation of the plane from Bobby is 52° and from Terry is 36° . How far is each person from the plane, and what is the height of the plane?
9. Billy notices that the angle of elevation of a tower is 24° . He walks directly toward the tower for 50 metres and measures the angle of elevation. This time, Billy determines the angle to be 35° . How tall is the tower?

Answers

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

2a) 10.64 b) $c = 15.35$ c) $\angle R = 58.82^\circ$

3a) 6.6 b) 5.9 c) 33.4 d) 14.0 e) 86.8 f) 115.3

4a) 38.0° b) 49.2° c) 40.7° d) 69.2° e) 53.9° f) 65.3°

5a) 66° ; 7.7; 10.9 b) 69° ; 41.9; 33.4 c) 42.2° ; 67.8° ; 6.9 d) 23.0° ; 75.0° ; 246.7

6a) 38.4 b) 622.9 c) 16.2 d) 12216.5

7) $MN = 21$ m

8) Terry 256.3 m, Bobby 191.2 m, 150.7 m high

9) 61.13 m