Math 20 – 2
Outcome: **Apply the Law of Sines to solve problems.**

SKILL: Cross Multiplying to solve.

$$\frac{x}{15} = \frac{10}{40}$$ $$\frac{12}{18} = \frac{8}{x}$$

Pythagoras and SOH CAH TOA can only be used on right triangles.

The Sine Law can be used on any triangle, to find a side or an angle.

The Sine Law in any ΔABC:

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

Steps to solving triangles using the Sine Law:

   I.   Name all three sides of the triangle by drawing arrows through the angles. The
        sides are named as lower case letters opposite the angle.
  II.   Put what you *know* in the formula.
 III.   Cross multiply. If you're looking for an angle, don't forget to sin^{-1} to find your
        answer.
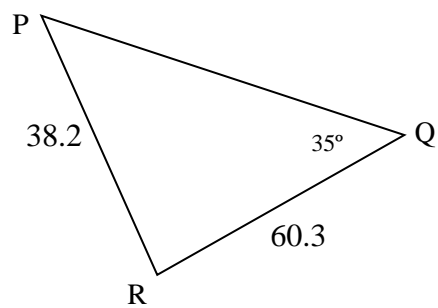
1. Find the missing side or angle indicated.

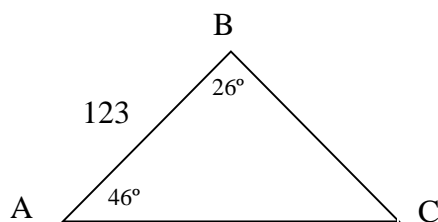   a) Determine the value of "b", rounded to nearest tenth.
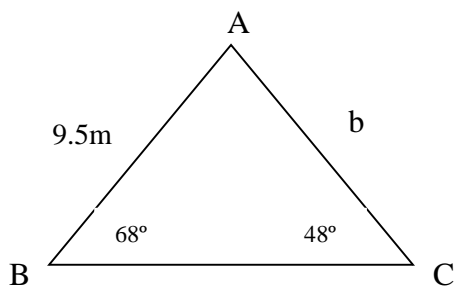
b) Find θ (theta), nearest degree.

D

68

E

θ

10.0 cm

12.0 cm

F
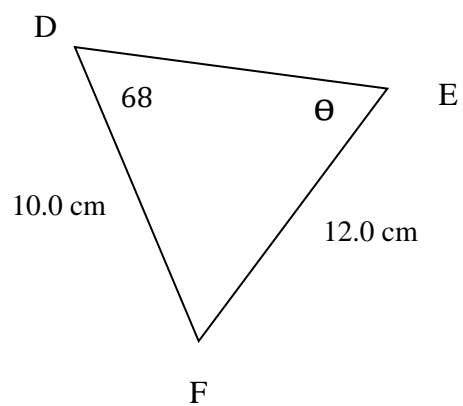
2. Solve the triangle.

P

38.2

35°

Q

60.3

R

3. Solve the triangle.

Outcome: **Apply the Law of Cosines to solve problems.**

What happens if you do NOT have a Right Triangle and do NOT have an angle and side opposite to cross multiply with Law of Sines?

The Cosine Law can be used on any triangle when the Sine Law cannot be used.
  *   It is used to find an angle in a triangle when you're only given three sides.
  *   It is used to find the side of a triangle when the known angle is between (subtended by) two known sides.
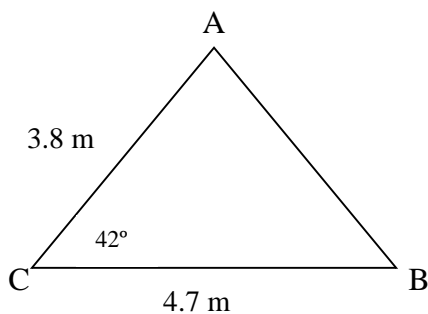
To find a side, use: To find an angle, use:

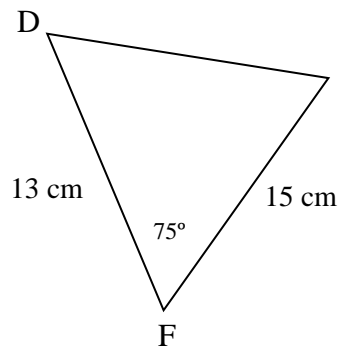$$c^2 = a^2 + b^2 - 2abCosC$$ $$CosC = \frac{a^2 + b^2 - c^2}{2ab}$$

1. Find the indicated side. $c^2 = a^2 + b^2 - 2abCosC$
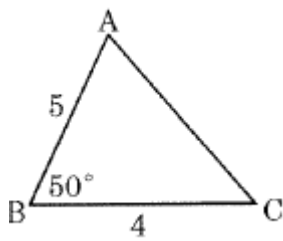   a) Calculate the length of side c to the nearest tenth of a metre.

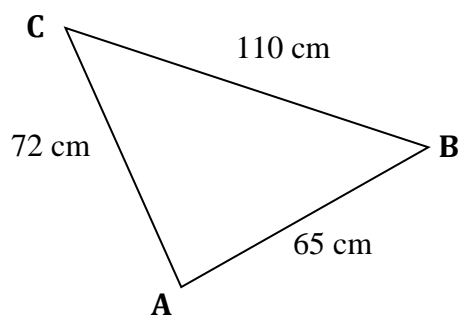b) Calculate the length of side f to the nearest centimeter.
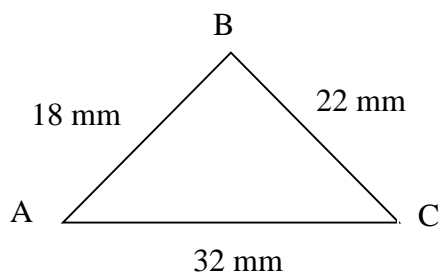
D

13 cm

75°

15 cm

F

c) Calculate the length of AC.

A

5

50°

B

4

C

2. Find the indicated angle. $CosC = \dfrac{a^2 + b^2 - c^2}{2ab}$

a) Find the measure of $\angle C$ to the nearest degree.

C

110 cm

72 cm

B

65 cm

A

b) Find the measure of the largest angle, rounded to the nearest degree.

B

18 mm   22 mm

A

32 mm

C

c) Calculate the measure of $\angle$ A to the nearest degree.
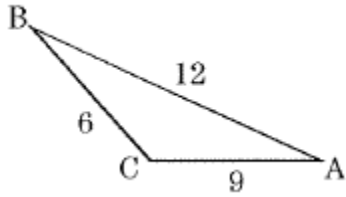
Law of Sines or Law of Cosines: What do I use?
- If you are able to cross multiply (know or can determine an angle and its opposite side) use the Law of Sines.
- If you have two sides and the included angle, use the Law of Cosines.
- If you have three sides and no angles, use the Law of Cosines.