Trigonometry

Part 1: Applies Only to Right Triangles

Triangle ABC: A, B (right angle), C with 30° at C; side AB = 5.9, side BC = 3.4

Triangle DEF: D, E (right angle), F with 30° at F; side DE = 8.3, side EF = 4.8
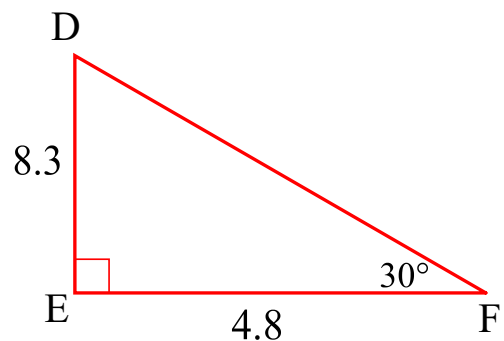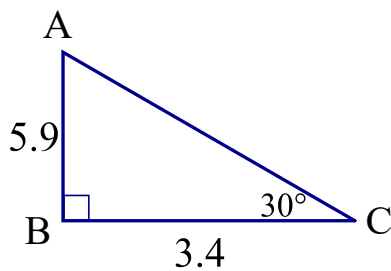
$\triangle ABC \sim \triangle DEF$, which means their corresponding sides are proportional. We know that any ratios created with corresponding sides from two similar right triangles will always be equal.

A

B C

hypotenuse

opposite

θ
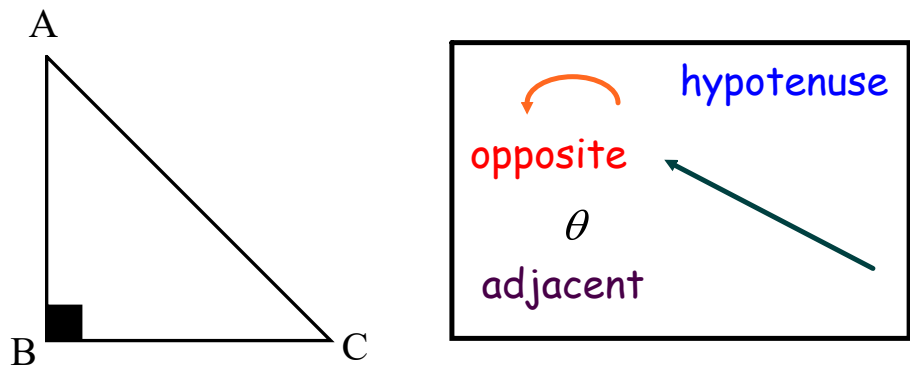
adjacent

There are three main trigonometric ratios; they are:

$$\text{Sine } \theta = \frac{opposite}{hypotenuse}$$

$$\text{Cosine } \theta = \frac{adjacent}{hypotenuse}$$

$$\text{Tangent } \theta = \frac{opposite}{adjacent}$$

For $\triangle ABC$, determine the following ratios.

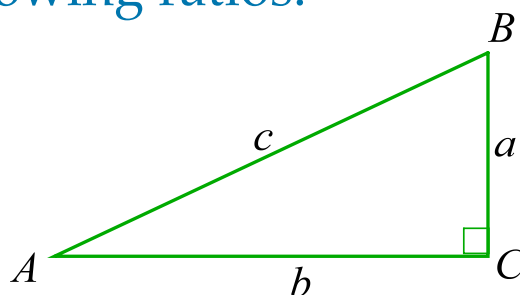$\sin A =$ $\cos B =$

$\tan B =$ $\sin B =$
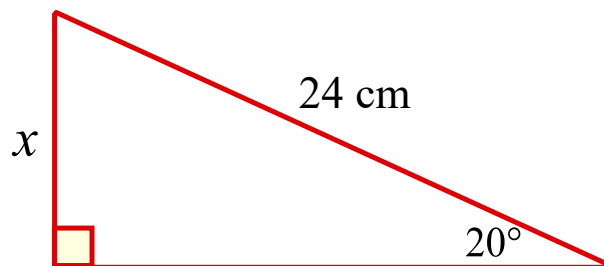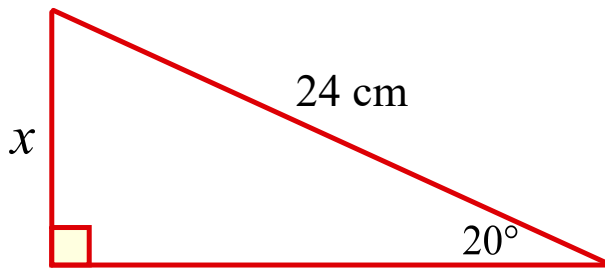
$\cos A =$ $\tan A =$

<u>Trigonometry</u>

Finding Missing Sides (given a side and an angle)

Example:

- With respect to the angle, determine which side you're given and which side you want.
- Determine which trig ratio uses these sides.
- Fill in the ratio with the given information, then calculate the length of the missing side.

24 cm

x

20°

Given side: _____

Wanted side: _____

Trig ratio: _____
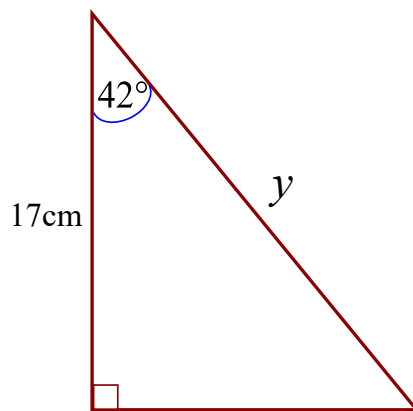
$$\sin 20° = \frac{x}{24}$$

$$24 \cdot \sin 20° = x$$

$$8.21 = x$$

$$x = 8.21 \ cm$$

Example:
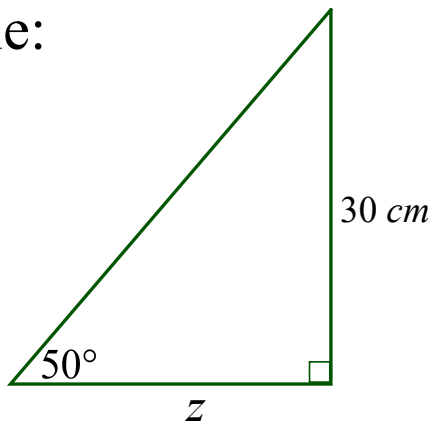

Given side: _____

Wanted side: _____

Trig ratio: _____

$$\cos 42° = \frac{17}{y}$$

$$y \cos 42° = 17$$

$$y = \frac{17}{\cos 42°}$$

$$y = 22.88 cm$$

Example:

Given side: _____

Wanted side: _____
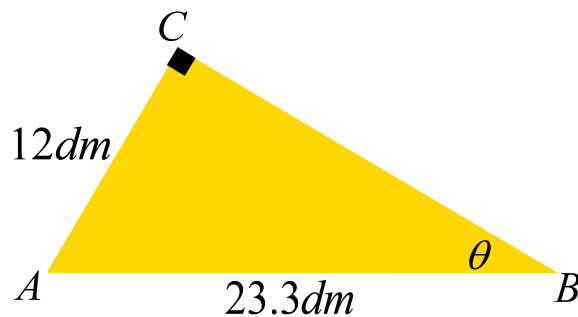
Trig ratio: _____

$$\tan 50° = \frac{30}{z}$$

$$z = \frac{30}{\tan 50°}$$

$$z = 25.17 cm$$

Trigonometry

Finding Missing Angles (given at least two sides)

Example:

- Locate the angle; determine, with respect to that angle, which sides you're given .
- Determine which trig ratio uses these sides.
- Set up the trig ratio, substituting the values in the appropriate places.
- Solve for the missing angle using arccos, arcsin, or arctan ($\cos^{-1}$, $\sin^{-1}$ or $\tan^{-1}$ on the calculator).
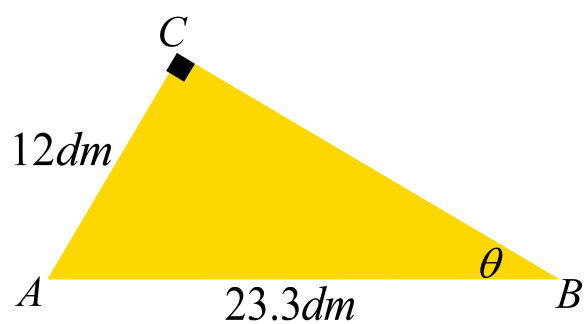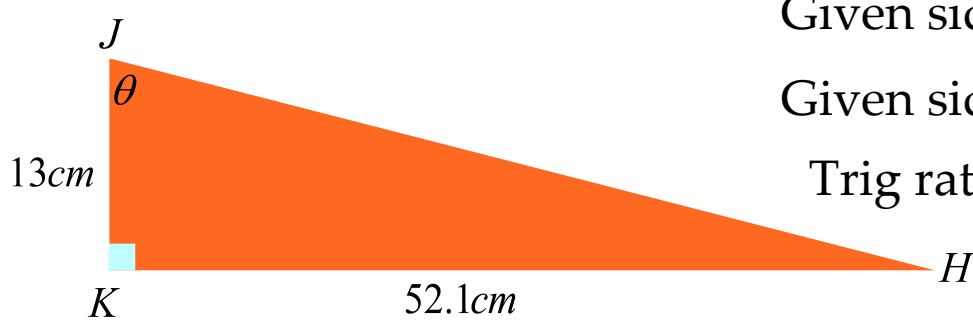
Wanted angle: _____

Given side: _____

Given side: _____

Trig ratio: _____

Example:

J

θ

13cm

K   52.1cm   H

Wanted angle: _____

Given side: _____

Given side: _____

Trig ratio: _____

Example: *Solve* the following triangle.