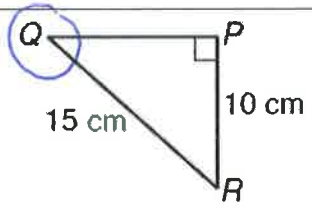
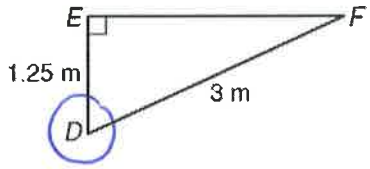
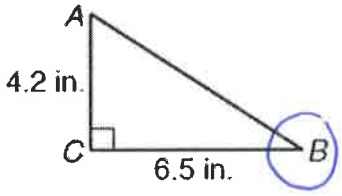
Geometry H
7.7 – Solving Right Triangles

Name: Key
Date: _____ Period: _____

LEARNING TARGETS

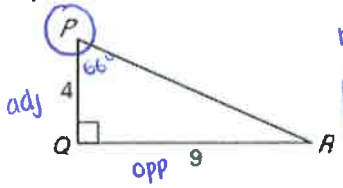
- I can use the inverse trigonometric ratios to find angle measures in right triangles.
- I can apply my knowledge of trigonometric ratios to solve right triangles.

If we know sine, cosine, or tangent ratio for an acute angle in a right triangle, we can use the ***inverse trigonometric function*** to find the measure of the angle.

Inverse Trigonometric Functions	
Symbols	**Examples**
Inverse Sine *If* $\sin A = x \Rightarrow m\angle A = \sin^{-1} x$	 $m\angle Q = \sin^{-1}\left(\frac{10}{15}\right)$ $m\angle Q \approx 41.8°$
Inverse Cosine *If* $\cos B = x \Rightarrow m\angle B = \cos^{-1} x$	 $m\angle D = \cos^{-1}\left(\frac{1.25}{3}\right)$ $m\angle D = 65.4°$
Inverse Tangent *If* $\tan C = x \Rightarrow m\angle C = \tan^{-1} x$	 $m\angle B = \tan^{-1}\left(\frac{4.2}{6.5}\right)$ $m\angle B \approx 32.9°$

Example 1: Use inverse tangent to find angle measure

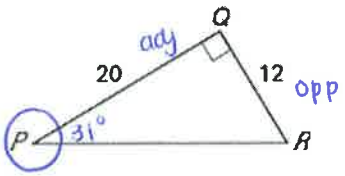
a) Find the measure of $\angle P$.



$m\angle P = \tan^{-1}\left(\frac{9}{4}\right)$

$m\angle P = 66°$

b)



$m\angle P = \tan^{-1}\left(\frac{12}{20}\right)$

$m\angle P = 31°$

Example 2: Use inverse sine and inverse cosine to find angle measures.

Let $\angle A$ and $\angle B$ be acute angles in a right triangle. Use a calculator to approximate the measure of $\angle A$ and $\angle B$ to the nearest tenth of a degree.

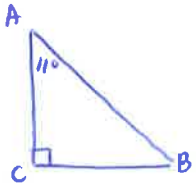
a) $\sin A = 0.19$

$m\angle A = \sin^{-1}(0.19)$

$m\angle A = 11°$

$m\angle B = 90 - 11$

$m\angle B = 79°$



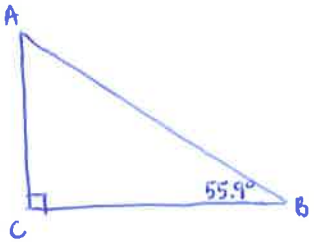
b) $\cos B = 0.56$

$m\angle B = \cos^{-1}(0.56)$

$m\angle B = 55.9°$

$m\angle A = 90 - 55.9$

$m\angle A = 34.1°$

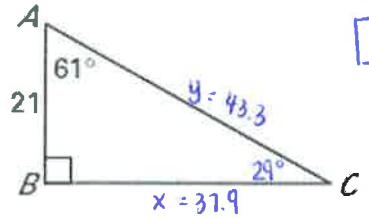


❖ When ***solving a right triangle***, your goal is to find the measures of all three angles and the lengths of all three sides.

Example 3: Solve a right triangle

Solve the right triangle. Round decimal answers to the nearest tenth.

a)



$m\angle C = 90 - 61$

$m\angle C = 29°$

$\frac{\tan 29}{1} = \frac{21}{x}$

$21 = x \tan 29$

$x = \frac{21}{\tan 29}$

$x \approx 37.9$

$BC = 37.9$

$\frac{\cos 61}{1} = \frac{21}{y}$

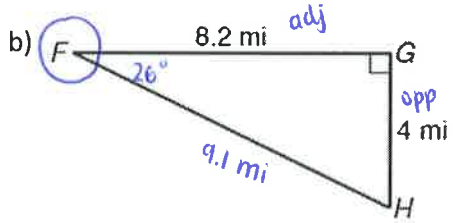
$21 = y \cos 61$

$y = \frac{21}{\cos 61}$

$y \approx 43.3$

$AC = 43.3$

b)



$8.2^2 + 4^2 = FH^2$

$67.24 + 16 = FH^2$

$83.24 = FH^2$

$FH = 9.1$ mi

$m\angle F = \tan^{-1}\left(\frac{4}{8.2}\right)$

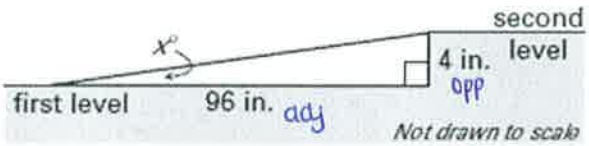
$m\angle F = 26°$

$m\angle H = 90 - 26$

$m\angle H = 64°$

Example 4: Solve a real-world problem

You are building a track for a model train. You want the track to incline from the first level to the second level, 4 inches higher, in 96 inches. Is the angle of elevation less than 3°?



$x = \tan^{-1}\left(\frac{4}{96}\right)$

$x = 2.4°$

Yes, it is less than 3°