Integrated Math 3
Unit 4: Trig. Representations and Modeling
4.0

Name: _____

Date:_____ Period:_____

Objective: To use basic right triangle trigonometry to find lengths of missing sides or missing angles.

Warm Up: What is SohCahToa, and how/why is it used?

Sine = $\frac{\text{opposite}}{\text{hypotenuse}}$ Cosine = $\frac{\text{adjacent}}{\text{hypotenuse}}$ Tangent = $\frac{\text{opposite}}{\text{adjacent}}$

It is used to solve for missing side/angle measures for right triangles.

Vocabulary:

Right Triangle: A three-sided polygon that has one right angle and sides that are classified as legs or the hypotenuse.

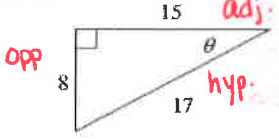
Sine (sin): $\frac{\text{opposite}}{\text{hypotenuse}}$ **Cosecant (csc):** $\frac{\text{hypotenuse}}{\text{opposite}}$

Cosine (cos): $\frac{\text{adjacent}}{\text{hypotenuse}}$ **Secant (sec):** $\frac{\text{hypotenuse}}{\text{adjacent}}$

Tangent (tan): $\frac{\text{opposite}}{\text{adjacent}}$ **Cotangent (cot):** $\frac{\text{adjacent}}{\text{opposite}}$

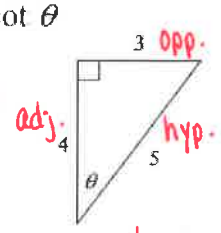
Example 1: Evaluate the trig functions based off of the given right triangles

A.) sec θ



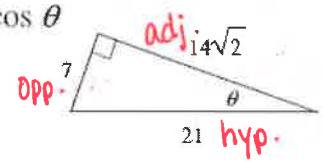
$\sec\theta = \frac{17}{15}$

B.) cot θ



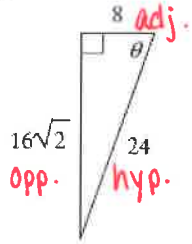
$\cot\theta = \frac{4}{3}$

C.) cos θ



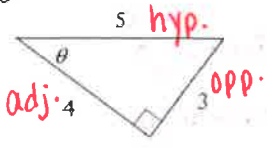
$\cos\theta = \frac{14\sqrt{2}}{21} = \frac{2\sqrt{2}}{3}$

D.) csc θ



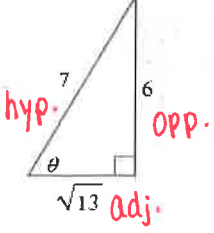
$\csc\theta = \frac{24}{16\sqrt{2}} = \frac{3}{2\sqrt{2}}$

E.) tan θ



$\tan\theta = \frac{3}{4}$

F.) sin θ

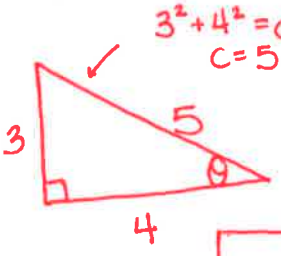


$\sin\theta = \frac{6}{7}$

★helps to draw a picture if not provided with one!

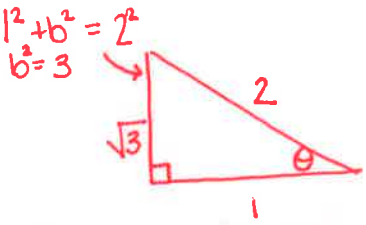
Example 2: Find the value of the trig function indicated.

A.) Find $\csc\theta$ if $\tan\theta = \frac{3}{4}$



$\csc\theta = \frac{5}{3}$

B.) Find $\cot\theta$ if $\sec\theta = 2/1$



$\cot\theta = \frac{1}{\sqrt{3}}$

Example 3: Use your calculator to evaluate the trig function. Round to four decimal places.

******Make sure that your calculator is set to DEGREES for this section.******

A.) $\sin 15°$ = 0.2588

B.) $\cos 40°$ = 0.7660

C.) $\tan 50°$ = 1.1918

D.) $\csc 20° = 1/\sin 20°$ = 2.9238

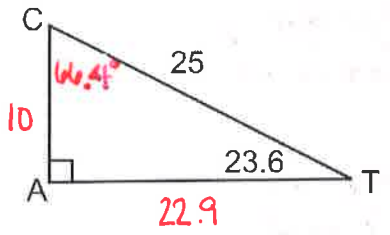
E.) $\sec 60° = 1/\cos 60°$ = 2

F.) $\cot 80° = 1/\tan 80°$ = 0.1763

Example 4:

A.) Find the missing sides and angles of Triangle ACT

$\angle C = 180° - 90° - 23.6° =$ 66.4°



$\overline{AC} = 25 \cdot \sin 23.6° = \frac{x}{25} \cdot 25$

$x = 10.0$

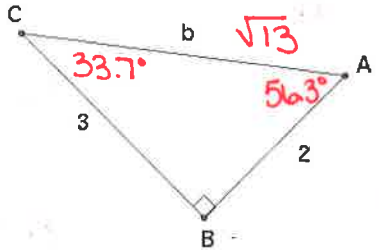
$\overline{AT} = 25 \cdot \cos 23.6 = \frac{x}{25} \cdot 25$

$x = 22.9$

B.) Find the missing sides and angles of Triangle ABC

$b = 3^2+2^2 = c^2$

$(\overline{AC}) =$ $c=\sqrt{13}$



$\angle A = \tan^{-1}\tan A = \tan^{-1}\frac{3}{2}$

$A = \tan^{-1}\left(\frac{3}{2}\right)$

$A = 56.3°$

$\angle C = \tan^{-1}\tan C = \tan^{-1}\frac{2}{3}$

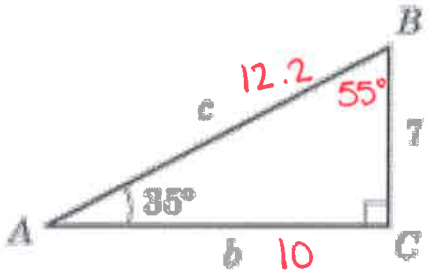
$C = \tan^{-1}\left(\frac{2}{3}\right)$

$C = 33.7°$

OR

$\angle C = 180° - 90° - 56.3° = 33.7°$

C.) Find the missing sides and angles of Triangle ABC



$\angle B = 180° - 90° - 35° = 55°$

$b(\overline{AC}) = b \cdot \tan 35° = \frac{7}{b} \cdot b$

$\frac{b\tan 35°}{\tan 35°} = \frac{7}{\tan 35°}$

$b = \frac{7}{\tan 35°}$

$\boxed{b = 10}$

$C(\overline{AB}) = c \cdot \sin 35° = \frac{7}{c} \cdot c$

$\frac{C\sin 35°}{\sin 35°} = \frac{7}{\sin 35°}$

$C = \frac{7}{\sin 35°}$

$\boxed{C = 12.2}$

Reflect:

How do you know when to use sin or $\sin^{-1}$?

Solving for a side measure

Solving for an angle measure