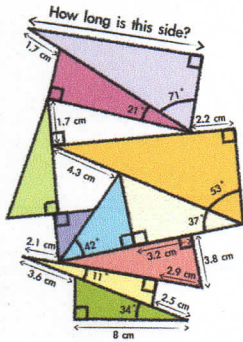


# Trig Review Reciprocals (Lesson).notebook

## UNIT #5: Trigonometry Trigonometry Review - Reciprocals

### Learning Goal:

I will learn how to find the unknown angles and/or sides of a right angle triangle using all six trigonometry ratios.



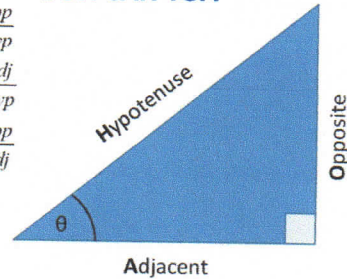
Recall the primary trig ratios:

**SOH CAH TOA**

$$\sin(\theta) = \frac{Opp}{Hyp}$$

$$\cos(\theta) = \frac{Adj}{Hyp}$$

$$\tan(\theta) = \frac{Opp}{Adj}$$



Only applies to right angled triangles!

### Reciprocal Trigonometric Ratios

#### Cosecant

$$\csc\theta = \frac{hyp}{opp}$$

$$= \frac{1}{\sin\theta}$$

reciprocal of sine

#### Secant

$$\sec\theta = \frac{hyp}{adj}$$

$$= \frac{1}{\cos\theta}$$

reciprocal of cosine

#### Cotangent

$$\cot\theta = \frac{adj}{opp}$$

$$= \frac{1}{\tan\theta}$$

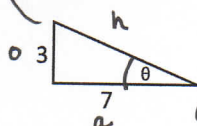
reciprocal of tangent

### Pythagorean

$$h^2 = 3^2 + 7^2$$

$$h = \sqrt{58}$$

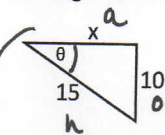
Example 1: Write the six exact trig ratios for this triangle.



$$\sin\theta = \frac{3}{\sqrt{58}} \quad \cos\theta = \frac{7}{\sqrt{58}} \quad \tan\theta = \frac{3}{7}$$

$$\csc\theta = \frac{\sqrt{58}}{3} \quad \sec\theta = \frac{\sqrt{58}}{7} \quad \cot\theta = \frac{7}{3}$$

Example 2: Find the length of the unknown side then state the 6 trigonometric ratios of each of the acute angles.



$$\sin\theta = \frac{10}{15} \quad \cos\theta = \frac{\sqrt{125}}{15} \quad \tan\theta = \frac{10}{\sqrt{125}}$$

$$\csc\theta = \frac{15}{10} \quad \sec\theta = \frac{15}{\sqrt{125}} \quad \cot\theta = \frac{\sqrt{125}}{10}$$

### Pythagorean

$$15^2 = 10^2 + x^2$$

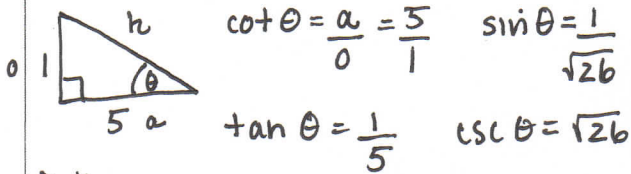
$$225 = 100 + x^2$$

$$125 = x^2$$

$$\sqrt{125} = x$$

# Trig Review Reciprocals (Lesson).notebook

**Example 3:** If  $\cot \theta = 5$  and  $\angle \theta$  is acute, make a diagram and find the 5 other trig ratios.



$$\cot \theta = \frac{a}{o} = \frac{5}{1} \quad \sin \theta = \frac{1}{\sqrt{26}}$$

$$\tan \theta = \frac{1}{5} \quad \csc \theta = \sqrt{26}$$

Pythag.

$$h^2 = 5^2 + 1^2$$

$$h^2 = 25 + 1$$

$$h = \sqrt{26}$$

$$\cos \theta = \frac{5}{\sqrt{26}}$$

$$\sec \theta = \frac{\sqrt{26}}{5}$$

**Example 4:** Find the following values using a calculator.

$$\text{a) } \cot 10^\circ = \frac{1}{\tan 10^\circ} = 5.6713$$

$$\text{b) } \sec 26.2^\circ = \frac{1}{\sin 26.2^\circ} = 2.2650$$

**Example 5:** Find the measure of the angle to the nearest tenth of a degree.

$$\text{a) } \csc \theta = 1.2345 = \sin^{-1} \left( \frac{1}{1.2345} \right) = 54^\circ$$

$$\text{b) } \cot \theta = 1.4523 = \tan^{-1} \left( \frac{1}{1.4523} \right) = 35^\circ$$

**Example 6:** Evaluate the following.

$$\text{a) } \cot^{-1} 1.3542 = \tan^{-1} \left( \frac{1}{1.3542} \right) = 36.4438$$

$$\text{b) } \sec^{-1} 2.3987 = \cos^{-1} \left( \frac{1}{2.3987} \right) = 65.3614$$

## UNIT 5: Trigonometry

### Trigonometry Review - Reciprocals

#### Learning Goal:

I will learn how to find the unknown angles and/or sides of a right angle triangle using all six trigonometry ratios.

#### Success Criteria:

To be successful, I must be able to...

- Identify the appropriate trig ratio (SOH CAH TOA) to calculate the unknown
- Use one of the six trig ratio to solve for an unknown side or angle

#### Practice Work

Exercise 9.1 and 9.3 on Worksheet