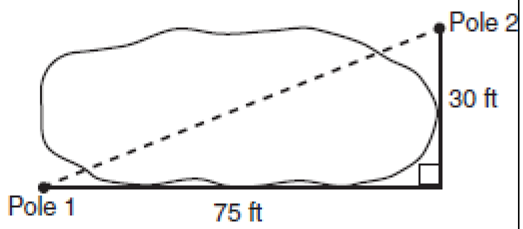
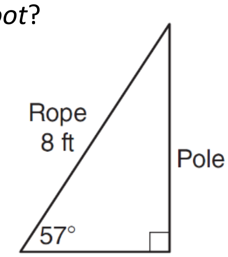
Name: _______________________________ Date: __________________

UNIT 6 **LESSON 2**

AIM: HOW DO WE FIND RATIOS USING SOHCAHTOA?

Do Now:

1.) What is the distance between the two poles, to the *n nearest foot*? 1) 105 2) 81 3) 69 4) 45  	2.) An 8-foot rope is tied from the top of a pole to a stake in the ground, as shown in the diagram below. If the rope forms a 57° angle with the ground, what is the height of the pole, to the *nearest tenth of a foot*? 1) 4.4 2) 6.7 3) 9.5 4) 12.3 

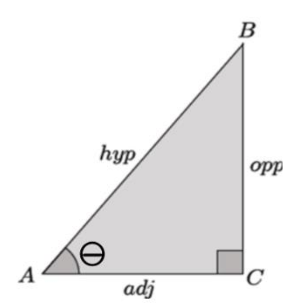
- What is the difference between the information given in the *Do Now* problems?

- What is the problem with solving #2 based on what we know so far?

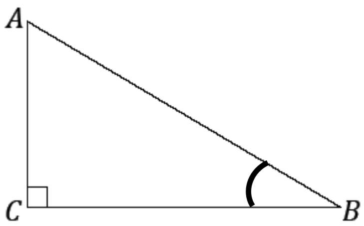
…Therefore, we need a new method to find missing sides of right triangles!

TRIGONOMETRIC RATIOS
S $\frac{O}{H}$ C $\frac{A}{H}$ T $\frac{O}{A}$

sine of θ	**cosine** of θ	**tangent** of θ
$\sin\theta =$ ________	$\cos\theta =$ ________	$\tan\theta =$ ________

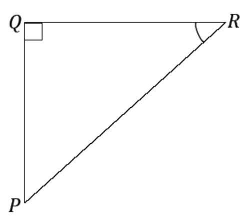


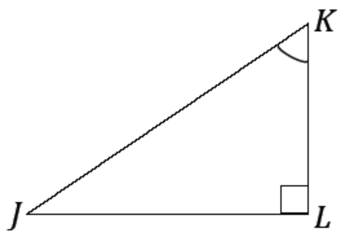
____________________ is a branch of mathematics that studies the relationships between sides and angles in triangles.
___________, _______________ and _______________ are 3 ratios that remain true when comparing an ____________ angle of right triangle to its corresponding side lengths.

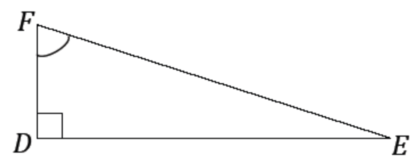


TERM	DEFINITION
	The side of a right triangle **opposite** the **right angle.**
	The side of a right triangle **opposite** the **marked acute angle**.
	The side of a right triangle NEXT to the **marked acute angle.**

Example 1: For each triangle, label the appropriate sides as hypotenuse, opposite, and adjacent with respect to the marked acute angle.

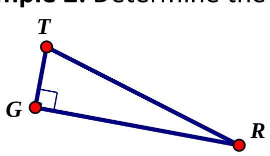






Example 2: Determine the correct side based on the reference angle.

a)



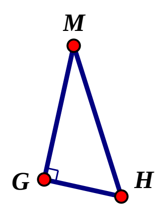
Reference ∠R

Opposite Side __________

Adjacent Side __________

Hypotenuse __________

b)



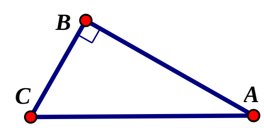
Reference ∠M

Opposite Side __________

Adjacent Side __________

Hypotenuse __________

c)

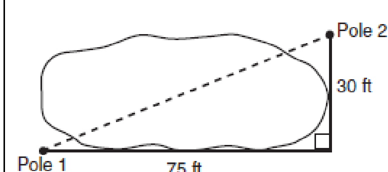
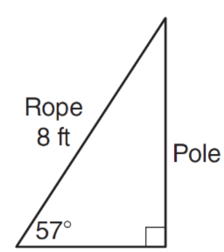


Reference ∠C

Opposite Side __________

Adjacent Side __________

Hypotenuse __________

WHEN **DO WE USE THE PYTHAGOREAN THEOREM?**	• We use the Pythagorean Theorem to find missing ________________ in __________ triangles. • When we are given two _____________ of a right triangle.	
WHEN **DO WE USE SOH-CAH-TOA?**	• When we are trying to find a missing ______________ or ___________ of a __________ triangle. • When we are given one __________ and one _____________ of a right triangle.	

HOW DO WE WRITE TRIGONOMETRIC RATIOS?

Ratios WITHOUT Side Lengths

Example 1: Given a ΔPQR with a right angle at Q, write down each of the following ratios using the side names.

(a) $\sin P = \_\_\_\_$ (b) $\cos P = \_\_\_\_$ (c) $\tan P = \_\_\_\_$

(d) $\sin R = \_\_\_\_$ (e) $\cos R = \_\_\_\_$ (f) $\tan R = \_\_\_\_$

Example 2: Given a ΔXYZ with $m\angle Z = 90^o$, write down each of the following ratios using the side names.

(a) $\sin X = \_\_\_\_$ (b) $\cos X = \_\_\_\_$ (c) $\tan X = \_\_\_\_$

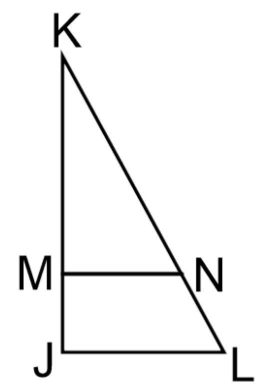
(d) $\sin Y = \_\_\_\_$ (e) $\cos Y = \_\_\_\_$ (f) $\tan Y = \_\_\_\_$

Example 3: Using the diagram of right triangle KJL with $m\angle J = 90^o$ and $\overline{MN} \parallel \overline{JL}$, complete the following ratios.

a) $\cos K = \_\_\_\_ = \_\_\_\_$

b) $\sin K = \_\_\_\_ = \_\_\_\_$

c) $\tan K = \_\_\_\_ = \_\_\_\_$

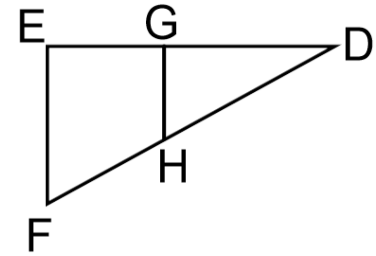


Example 4: Using the diagram of right triangle DEF with $m\angle E = 90^o$ and $\overline{GH} \parallel \overline{EF}$, complete the following ratios.

a) $\cos D = \_\_\_\_ = \_\_\_\_$

b) $\sin D = \_\_\_\_ = \_\_\_\_$

c) $\tan D = \_\_\_\_ = \_\_\_\_$



Ratios WITH Side Lengths

Example 1: Given a ΔABC with $m\angle A = 90^o$, $AB = 8$ and $BC = 17$, write down each of the following ratios as fractions using the side lengths.

(b) $\sin B =$ (c) $\cos B =$ (d) $\tan B =$

(e) $\sin C =$ (f) $\cos C =$ (g) $\tan C =$

Example 2: Given a ΔDEF with $m\angle D = 90^o$, $m\angle D = 90^o$ $DE = 14$ and $DF = 48$, write down each of the following ratios as fractions using the side lengths..

(a) $\sin E = \_\_\_\_$ (b) $\cos E = \_\_\_\_$ (c) $\tan E = \_\_\_\_$

(d) $\sin F = \_\_\_\_$ (e) $\cos F = \_\_\_\_$ (f) $\tan F = \_\_\_\_$

Example 3: Given a ΔJKL with $m\angle K = 90^o$, and $\tan J = \frac{6}{8}$, write down each of the following ratios as fractions using the side lengths.

(a) $\sin J = \_\_\_\_$ (b) $\cos J = \_\_\_\_$ (c) $\tan J = \_\_\_\_$

(d) $\sin L = \_\_\_\_$ (e) $\cos L = \_\_\_\_$ (f) $\tan L = \_\_\_\_$

Example 4: Given a ΔXYZ with $m\angle Y = 90^o$ and $\sin X = \frac{16}{34}$, write down each of the following ratios using the sides using the side lengths..

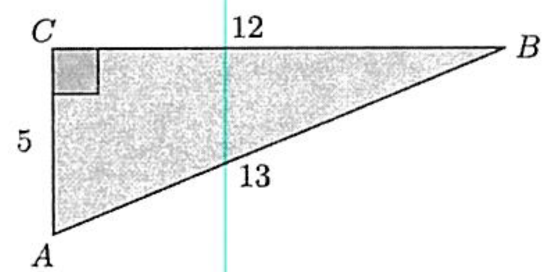
(a) $\sin X = \_\_\_\_$ (b) $\cos X = \_\_\_\_$ (c) $\tan X = \_\_\_\_$

(d) $\sin Z = \_\_\_\_$ (e) $\cos Z = \_\_\_\_$ (f) $\tan Z = \_\_\_\_$

PRACTICE PROBLEMS:

Example:

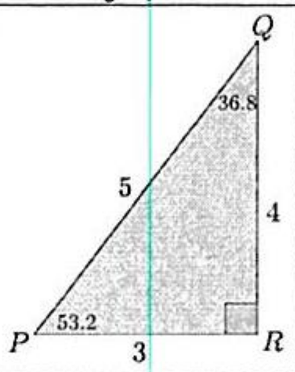
1. With respect to angle B, label the sides as opposite, adjacent, and hypotenuse.



Find the value of

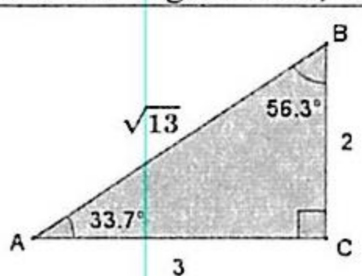
a) Sin A	b) Cos A	c) Tan A
d) Sin B	e) Cos B	f) Tan B

2. In ΔPQR, $m\angle P$=53.2° and $m\angle Q$=36.8°. Complete the following table.



Measure of Angle	Sine $\left(\frac{opp}{hyp}\right)$	Cosine $\left(\frac{adj}{hyp}\right)$	Tangent $\left(\frac{opp}{adj}\right)$
53.2			
36.8			

3. In the triangle below, $m\angle A$=33.7° and $m\angle B$=56.3°. Complete the following table.



Measure of Angle	Sine	Cosine	Tangent
33.7			
56.3			

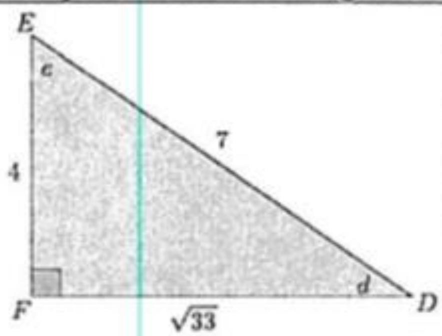
WHAT DO RELATIONSHIPS DO YOU NOTICE?

Name: ______________________________ Date: _________________

UNIT 6 **LESSON 2**

HOMEWORK

1. In the triangle below, let e be the measure of $\angle E$ and d be the measure of $\angle D$. Complete the following table.



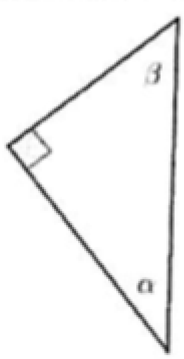
Measure of Angle	Sine	Cosine	Tangent
d			
e			

2. Tamer did not finish completing the table below for a diagram similar to the previous problems that the teacher had on the board where p was the measure of $\angle P$ and q was the measure of $\angle Q$. Complete the table for Tamer.

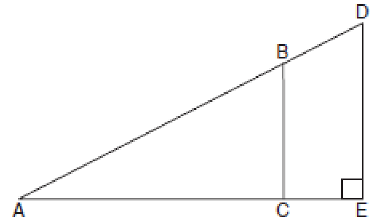
Measure of Angle	Sine	Cosine	Tangent
p	$\sin p = \frac{11}{\sqrt{157}}$	$\cos p = \frac{6}{\sqrt{157}}$	$\tan p = \frac{11}{6}$
q			

3. Given the table of values below (not in simplest radical form), label the sides and angles in the right triangle.

Angle Measure	sin	cos	tan
α	$\frac{4}{2\sqrt{10}}$	$\frac{2\sqrt{6}}{2\sqrt{10}}$	$\frac{4}{2\sqrt{6}}$
β	$\frac{2\sqrt{6}}{2\sqrt{10}}$	$\frac{4}{2\sqrt{10}}$	$\frac{2\sqrt{6}}{4}$



4. In the diagram of right triangle *ADE* below, $\overline{BC} \parallel \overline{DE}$.
Which ratio is always equivalent to the sine of $\angle A$?



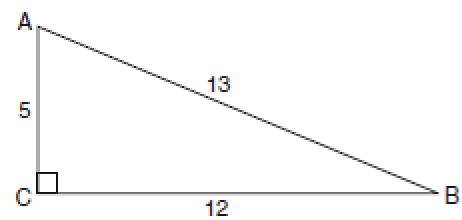
1) $\frac{AD}{DE}$

2) $\frac{AE}{AD}$

3) $\frac{BC}{AB}$

4) $\frac{AB}{AC}$

5. Which ratio represents $\cos A$ in the accompanying diagram of $\triangle ABC$?



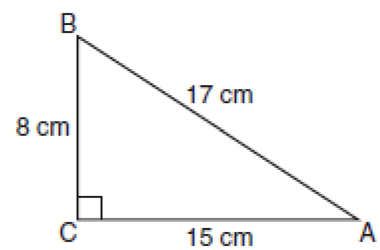
1) $\frac{5}{13}$

2) $\frac{12}{13}$

3) $\frac{12}{5}$

4) $\frac{13}{5}$

6. Which equation shows a correct trigonometric ratio for angle *A* in the right triangle below?



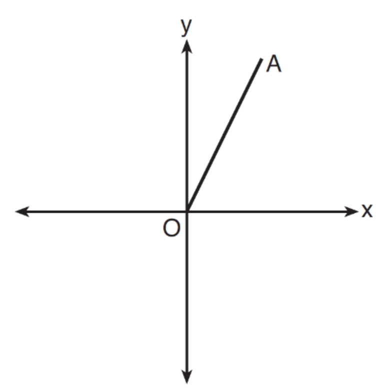
1) $\sin A = \frac{15}{17}$

2) $\tan A = \frac{8}{17}$

3) $\cos A = \frac{15}{17}$

4) $\tan A = \frac{5}{8}$

7. Which transformation of $\overline{OA}$ would result in an image parallel to $\overline{OA}$?



(1) a translation of two units down

(2) a reflection over the *x*-axis

(3) a reflection over the *y*-axis

(4) a clockwise rotation of 90° about the origin

Where sine and cosine got their names! https://www.youtube.com/watch?v=AzVL432lEWA

Corny SOHCAHTOA story: https://www.youtube.com/watch?v=s8R7ysURvkw