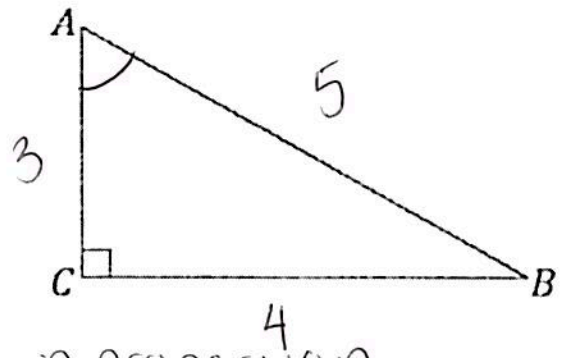
Name: Key Date: _____

UNIT 6 **LESSON 3**

AIM: HOW DO WE FIND MISSING SIDES USING SOHCAHTOA?

Do Now: Given the table of values below, label the sides of ΔABC.

	$sin\theta$	$cos\theta$	$tan\theta$
A	$\frac{4}{5}$ O H	$\frac{3}{5}$ A H	$\frac{4}{3}$ O A
B	$\frac{3}{5}$	$\frac{4}{5}$	$\frac{3}{4}$

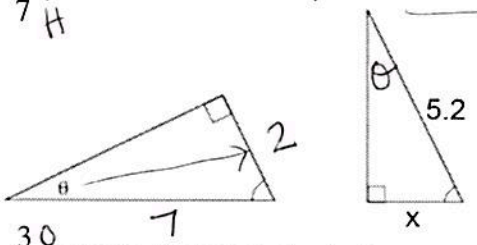


RECALL: In similar triangles, angles are $\cong$ and corresponding sides are in proportion

Example 1: The diagram below shows two similar triangles. If $\sin\theta = \frac{2}{7}$ O H, what is the value of *x*, to the *nearest tenth*?

$\frac{2}{7} = \frac{x}{5.2}$ $x = 1.5$

$7x = 10.4$

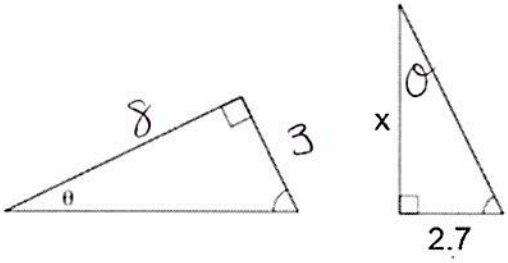


Example 2: The diagram below shows two similar triangles. If $\tan\theta = \frac{3}{8}$ O A, what is the value of *x*, to the *nearest tenth*?

$\frac{3}{8} = \frac{2.7}{x}$

$3x = 21.6$

$x = 7.2$



Example 2: Given ΔABC with $m\angle B = 90^\circ$. Match the following.

a) 3 Opposite Leg to ∠A $\overline{BC}$

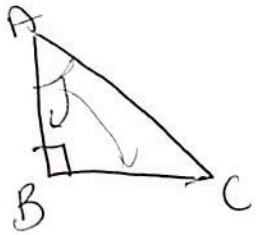
b) 5 Sine Ratio of ∠C $\frac{O}{H} = \frac{AB}{AC}$

c) 4 The Hypotenuse $\overline{AC}$

d) 2 Adjacent Leg to ∠A $\overline{AB}$

e) 6 Tangent Ratio of ∠C $\frac{O}{A} = \frac{AB}{AC}$

f) 1 Reference angle if $\frac{BC}{AC}$ O H is the Cosine Ratio. ∠C



1. ∠C
2. $\overline{AB}$
3. $\overline{BC}$
4. $\overline{AC}$
5. $\frac{AB}{AC}$
6. $\frac{AB}{BC}$

Example 3: In each of the following, solve for the value of x. Show all your steps.

(a) $\frac{x}{6} = \frac{5}{1}$

$X = 30$

(b) $\frac{3}{1} = \frac{18}{x}$

$3x = 18$

$x = 6$

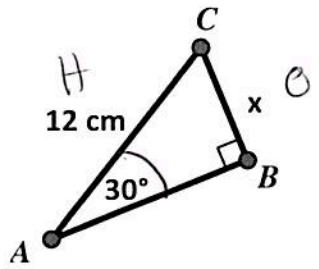
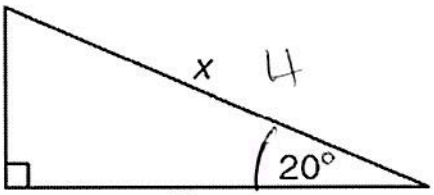
(c) $\frac{b}{1} = \frac{x}{a}$

$x = ab$

(d) $\frac{a}{x} = \frac{b}{1}$

$\frac{bx}{b} = \frac{a}{b}$

$x = \frac{a}{b}$

STEPS	EXAMPLE #1	EXAMPLE #2
1. Use SOHCAHTOA to determine which trig function you are using (sine, cosine or tangent). 2. Set up proportion (see example below): $\frac{\sin(Angle\ Measure)}{1} = \frac{opposite}{hypotenuse}$ 3. Cross multiply and solve for x. ~~DEGREE MODE!~~	 $\frac{SIN}{H}\ C\frac{A}{H}\ T\frac{O}{A}$ $\frac{\sin 30}{1} = \frac{x}{12}$ $x = 12\sin 30$ $x = 6$	 $S\frac{O}{H}\ C\frac{A}{H}\ T\frac{O}{A}$ $\frac{\cos 20}{1} = \frac{12}{x}$ $\frac{12}{\cos 20} = \frac{x\cos 20}{\cos 20}$ $x = 12.8$

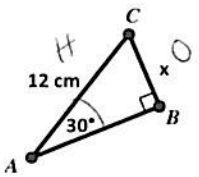
Example 1:

a) Label the sides of the triangle using the reference angle -- (O) for Opposite, (A) for Adjacent and (H) for Hypotenuse.

b) After you have labeled the triangle, then choose which trigonometric ratio that you would use to solve for the missing info.

c) Solve!

1)



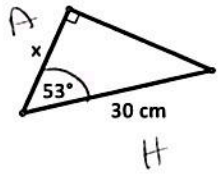
SIN COS TAN

$\frac{\sin 30}{1} = \frac{x}{12}$

$x = 12\sin 30$

$x = 6$

2)



H

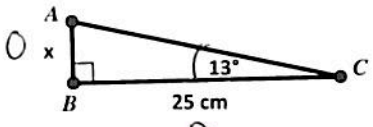
SIN **COS** TAN

$\frac{\cos 53}{1} = \frac{x}{30}$

$x = 30\cos 53$

$x = 18.1$

3)



A

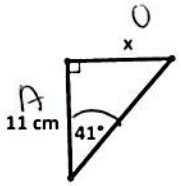
SIN COS **TAN**

$\frac{\tan 13}{1} = \frac{x}{25}$

$x = 25\tan 13$

$x = 5.8$

4)



SIN COS **TAN**

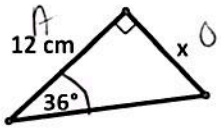
$\frac{\tan 41}{1} = \frac{x}{11}$

$x = 11\tan 41$

$x = 9.6$

Example 2: Solve for the missing information. (Round all final answers to the *nearest hundredth*)

a)



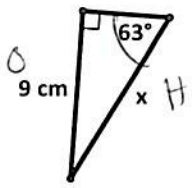
TAN!

$\frac{\tan 36}{1} = \frac{x}{12}$

$x = 12 \tan 36$

$x = 8.72$

b)



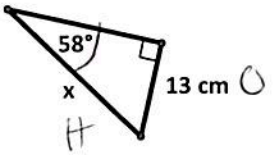
SIN!

$\frac{\sin 63}{1} = \frac{9}{x}$

$\frac{9}{\sin 63} = \frac{x \sin 63}{\sin 63}$

$x = 10.10$

c)



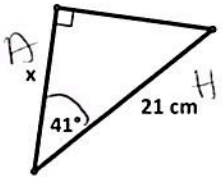
SIN!

$\frac{\sin 58}{1} = \frac{B}{x}$

$\frac{13}{\sin 58} = \frac{x \sin 58}{\sin 58}$

$x = 15.33$

d)



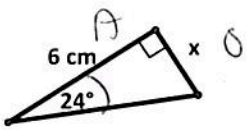
COS!

$\frac{\cos 41}{1} = \frac{x}{21}$

$x = 21 \cos 41$

$x = 15.85$

e)



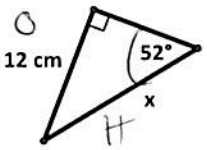
TAN!

$\frac{\tan 24}{1} = \frac{x}{6}$

$x = 6 \tan 24$

$x = 2.67$

f)



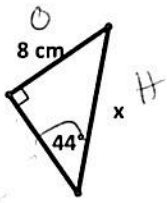
SIN!

$\frac{\sin 52}{1} = \frac{12}{x}$

$\frac{12}{\sin 52} = \frac{x \sin 52}{\sin 52}$

$x = 15.23$

g)



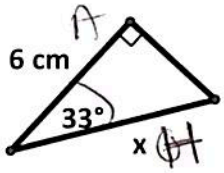
SIN!

$\frac{\sin 44}{1} = \frac{8}{x}$

$\frac{8}{\sin 44} = \frac{x \sin 44}{\sin 44}$

$x = 11.52$

h)



COS!

$\frac{\cos 33}{1} = \frac{6}{x}$

$\frac{6}{\cos 33} = \frac{x \cos 33}{\cos 33}$

$x = 7.15$

Name: Key

Date: _____

UNIT 6

LESSON 3

HOMEWORK

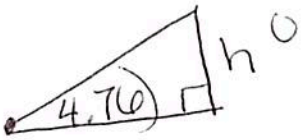
1. By law, a wheelchair service ramp may be inclined no more than 4.76°. If the base of a ramp begins 15 feet from the base of a public building, which equation could be used to determine the maximum height, *h*, of the ramp where it reaches the building's entrance?

1) $\sin 4.76° = \frac{h}{15}$

2) $\sin 4.76° = \frac{15}{h}$

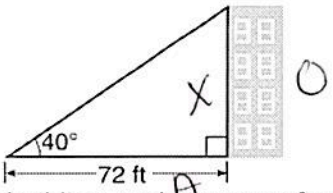
3) $\tan 4.76° = \frac{h}{15}$

4) $\tan 4.76° = \frac{15}{h}$



$\tan 4.76 = \frac{h}{15}$

2. As shown in the diagram below, a building casts a 72-foot shadow on the ground when the angle of elevation of the Sun is 40°.



How tall is the building, to the *nearest foot*?

1) 46

2) 60

3) 86

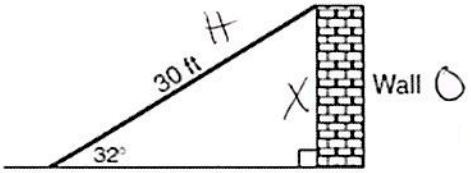
4) 94

$\frac{\tan 40}{1} = \frac{X}{72}$

$X = 72 \tan 40$

$X = 60.4151$

3. The accompanying diagram shows a ramp 30 feet long leaning against a wall at a construction site.



If the ramp forms an angle of 32° with the ground, how high above the ground, to the *nearest tenth*, is the top of the ramp?

1) 15.9 ft

2) 18.7 ft

3) 25.4 ft

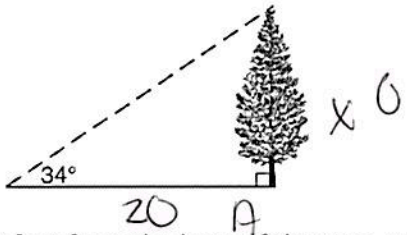
4) 56.6 ft

$\frac{\sin 32}{1} = \frac{X}{30}$

$X = 30 \sin 32$

$X = 15.8975$

4. As shown in the diagram below, the angle of elevation from a point on the ground to the top of the tree is 34°.



If the point is 20 feet from the base of the tree, what is the height of the tree, to the *nearest tenth of a foot*?

1) 29.7

2) 16.6

3) 13.5

4) 11.2

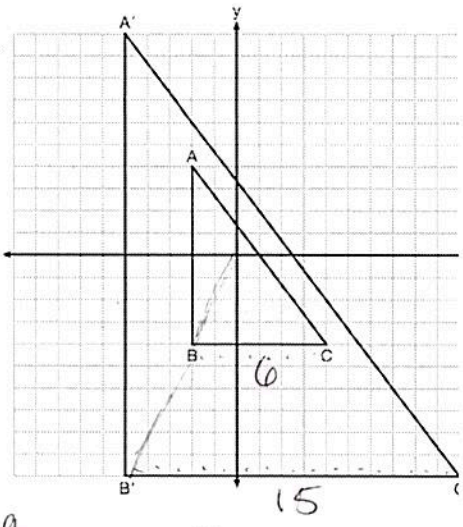
$\frac{\tan 34}{1} = \frac{X}{20}$

$X = 20 \tan 34$

$X = 13.5$

REVIEW:

5. In the diagram below, $\Delta A'B'C'$ is the image of ΔABC after a transformation.



a) Precisely describe the single transformation that was performed.

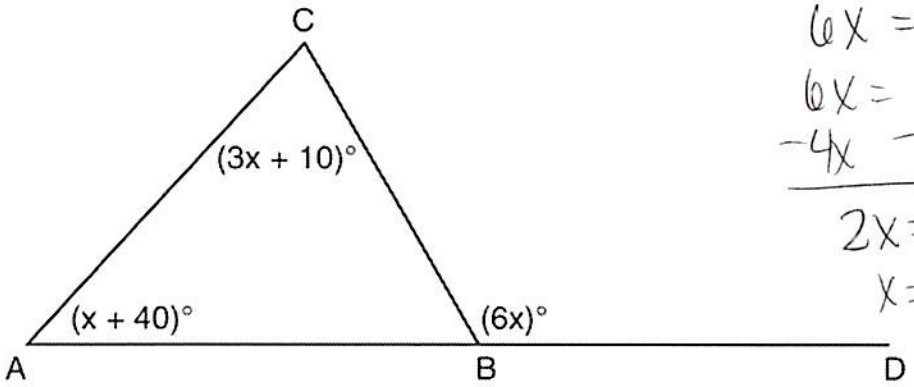
A dilation of 2.5 centered @ (0,0)

b) Explain why $\Delta ABC \sim \Delta A'B'C'$.

the Δ's are similar b/c corresponding sides are in proportion & ∠'s are ≅

$K = \frac{15}{6} = \frac{5}{2} = 2.5$

6. In the diagram of ΔABC below, $\overline{AB}$ is extended to point *D*. If $m\angle CAB = x + 40$, $m\angle ACB = 3x + 10$, $m\angle CBD = 6x$, what is $m\angle CAB$? **Explain your solution.**



$6x = x + 40 + 3x + 10$

$6x = 4x + 50$

$-4x \quad -4x$

$2x = 50$

$x = 25$

$\angle CAB = x + 40$

$25 + 40 = 65$

The exterior ∠ = the sum of the two non-adjacent interior ∠'s