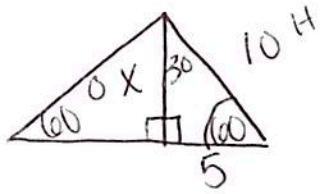
Name: Key Date: _____

UNIT 6 **LESSON 7**

AIM: APPLICATIONS OF FINDING SIDES AND ANGLES USING SOHCAHTOA (DAY 2)

Do Now:

1. Find the length, to the nearest tenth of a cm, of the altitude(height) of an equilateral triangle given the side length measures 10 cm.

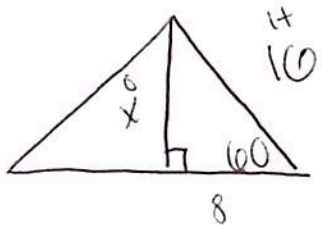


$\frac{\sin 60}{1} = \frac{x}{10}$

$x = 10\sin 60$

$x = 8.6603 \approx$ **8.7 cm**

2. Find the length, to the nearest tenth of a cm, of the altitude(height) of an equilateral triangle given the side length measures 16 cm.



$\frac{\sin 60}{1} = \frac{x}{16}$

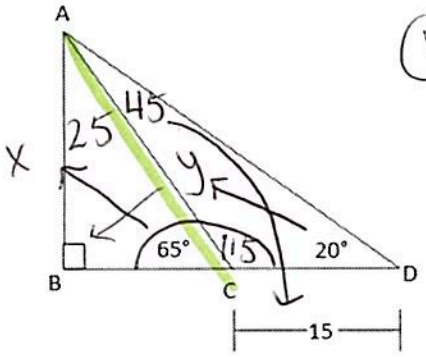
$x = 16\sin 60$

$x = 13.8564 \approx$ **13.9 cm**

RECALL: Using Law of Sines to Find Sides in Double Triangles
1. Find all missing angles (Linear pair, angles in a triangle) 2. Find shared side first (Label 'y')- 3. Set up proportion $\frac{side}{\sin(opposite\ angle)} = \frac{side}{\sin(opposite\ angle)}$ 4. Cross multiply (make sure you write the number or variable BEFORE sine! 5. Using the side you just found ('y'), set up Law of Sines a second time to find 'x'

PRACTICE:

1. Find AB. nearest tenth!



① $\frac{y}{\sin 20} = \frac{15}{\sin 45}$

$y\sin 45 = 15\sin 20$

$\frac{y\sin 45}{\sin 45} = \frac{15\sin 20}{\sin 45}$

$y = 7.2553$

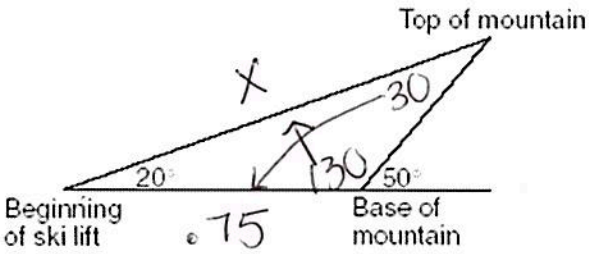
② $\frac{7.2553}{\sin 90} = \frac{x}{\sin 65}$

$\frac{x\sin 90}{\sin 90} = \frac{7.2553\sin 65}{\sin 90}$

$x = 6.5755$

$x \approx 6.6$

2. A ski lift begins at ground level 0.75 mile from the base of a mountain whose face has a 50° angle of elevation, as shown in the accompanying diagram. The ski lift ascends in a straight line at an angle of 20°. Find the length of the ski lift from the beginning of the ski lift to the top of the mountain, to the *nearest hundredth of a mile*.



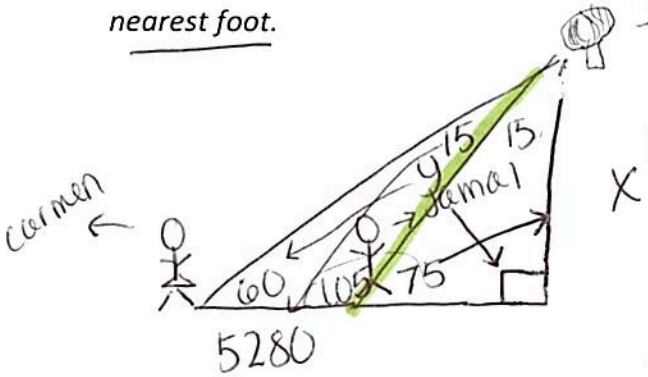
$\frac{.75}{\sin 30} = \frac{X}{\sin 130}$

$\frac{X \sin 30}{\sin 30} = \frac{.75 \sin 130}{\sin 30}$

$X = 1.1491$

$\boxed{X = 1.15 \text{ mi}}$

3. Carmen and Jamal are standing 5,280 feet apart on a straight, horizontal road. They observe a hot-air balloon between them directly above the road. The angle of elevation from Carmen is 60° and from Jamal is 75°. Draw a diagram to illustrate this situation and find the height of the balloon to the *nearest foot*.



$\frac{y}{\sin 60} = \frac{5280}{\sin 15}$

$\frac{y \sin 15}{\sin 15} = \frac{5280 \sin 60}{\sin 15}$

$y = 17667.2243$

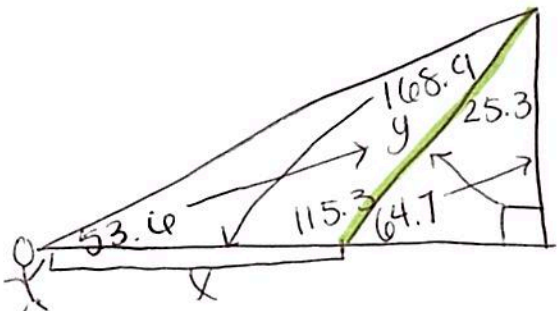
$\frac{17667.2243}{\sin 90} = \frac{X}{\sin 75}$

$\frac{17667.2243 \sin 75}{\sin 90} = \frac{\sin 90 \, X}{\sin 90}$

$X = 17065.228$

$\boxed{X \approx 17065 \text{ ft}}$

4. As Mr. Fox strolls down 34th street, he glances up at the Empire State Building, and estimates the angle of elevation of his view to be 53.6°. After walking closer to the building, he makes another estimation of 64.7°. Knowing that the Empire State Building is 1250 feet tall, how far, *to the nearest foot*, was he from the building at each of the two locations where he took his estimates?



1250

OPTION #1:

★Big Δ★ $\frac{\tan 53.6}{1} = \frac{1250}{y}$

$1250 = y \tan 53.6$

$y = 921.5795$

★small Δ★ $\frac{\tan 64.7}{1} = \frac{1250}{z}$

$1250 = z \tan 64.7$

$z = 590.8723$

★subtract★ $921.5795 - 590.8723 = \boxed{331 \text{ ft}}$

OPTION #2:

$\frac{y}{\sin 90} = \frac{1250}{\sin 64.7}$

$\frac{1250 \sin 90}{\sin 64.7} = \frac{y \sin 64.7}{\sin 64.7}$

$y = 1382.6171$

$\frac{1382.6171}{\sin 53.6} = \frac{X}{\sin 168.9}$

$\frac{X \sin 53.6}{\sin 53.6} = \frac{1382.6171 \sin 168.9}{\sin 53.6}$

$X = 330.7072$

$\boxed{X = 331 \text{ ft}}$

Name: Key

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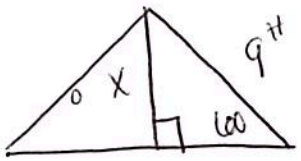
UNIT 6

LESSON 7

HOMEWORK

1. Find the length, to the nearest hundredth of a cm, of the altitude(height) of an equilateral triangle given the side length measures 9 cm.

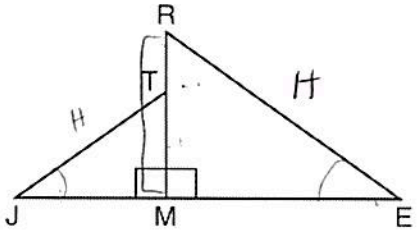


$\frac{\sin 60}{1} = \frac{x}{9}$

$x = 9\sin 60$

$x = 7.79$ cm

2. In the diagram below, $\triangle ERM \sim \triangle JTM$. Which statement is always true?



~~1)~~ $\cos J = \frac{RM}{RE}$

~~2)~~ $\cos R = \frac{JM}{JT}$

~~3)~~ $\tan T = \frac{RM}{EM}$

(4) $\tan E = \frac{TM}{JM}$ O A

↓

tan J!

SOH CAH TOA

$\angle E \cong \angle J$

$\angle R \cong \angle T$

$\angle M \cong \angle M$

so - $\cos J = \cos E$

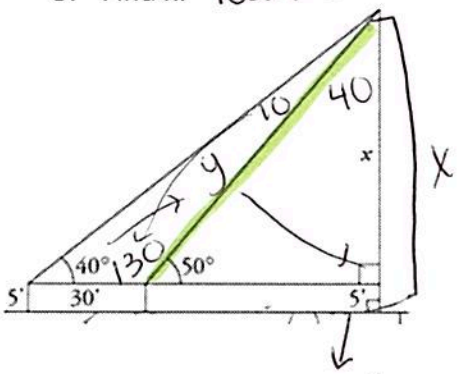
$\tan J = \tan E$

$\cos R = \cos T$

$\tan R = \tan T$

(~~ES~~

3. Find x: nearest tenth



add 5 at the end!

$\frac{y}{\sin 40} = \frac{30}{\sin 10}$

$\frac{30\sin 40}{\sin 10} = \frac{y\sin 10}{\sin 10}$

$y = 111.04998494$

$\frac{111.04998494}{\sin 90} = \frac{x}{\sin 50}$

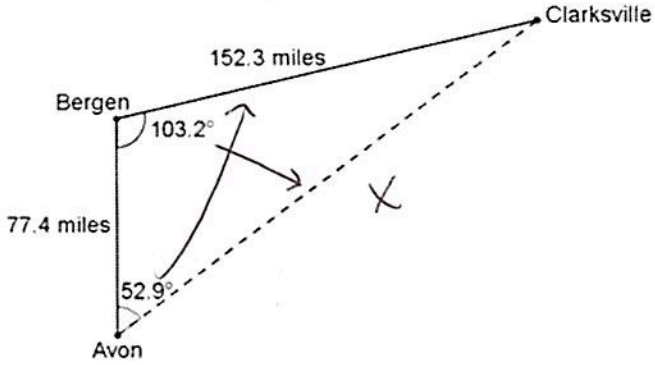
$\frac{x\sin 90}{\sin 90} = \frac{111.04998494\sin 50}{\sin 90}$

$x = 85.06922729$

$+5$

$x = 90.1$

4. As shown in the map below, it is possible to get from Avon to Clarksville by traveling first to Bergen and then to Clarksville. The state department wants to build a straight highway to connect Avon directly to Clarksville. To the *nearest tenth of a mile*, the length of the new highway from Avon to Clarksville will be



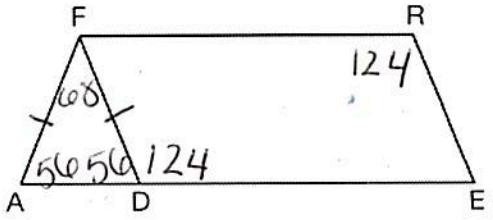
$$\frac{x}{\sin 103.2} = \frac{152.3}{\sin 52.9}$$

$$\frac{152.3 \sin 103.2}{\sin 52.9} = \frac{x \sin 52.9}{\sin 52.9}$$

$$x = 185.9065$$

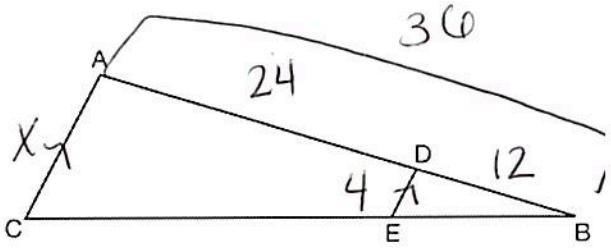
$$x = 185.91 \text{ mi}$$

5. In the diagram of parallelogram *FRED* shown below, $\overline{ED}$ is extended to *A*, and $\overline{AF}$ is drawn such that $\overline{AF} \cong \overline{DF}$. If $m\angle R = 124°$, what is $m\angle AFD$?



(1) 124°
(3) 68°
(2) 112°
(4) 56°

6. In the diagram of $\triangle ABC$, points *D* and *E* are on $\overline{AB}$ and $\overline{CB}$, respectively, such that $\overline{AC} \parallel \overline{DE}$. If $AD = 24$, $DB = 12$, and $DE = 4$, what is the length of $\overline{AC}$?



(1) 8
(3) 16
(2) 12
(4) 72

$$\frac{36}{x} = \frac{12}{4}$$

$$12x = 144$$

$$x = 12$$