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 CC GEOMETRY

Date: 3/2/18
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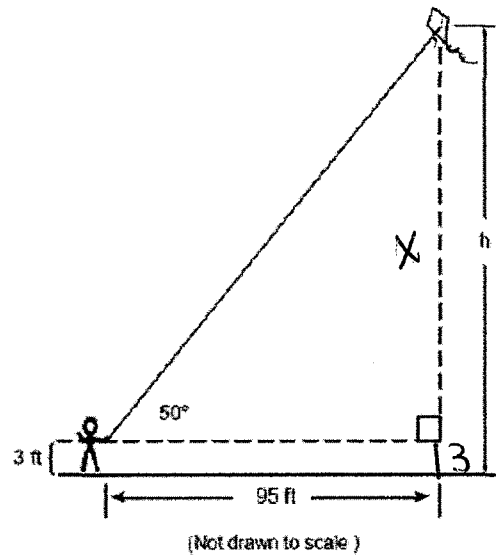
QUIZ 7.3: TRIGONOMETRY REVIEW
Quiz Tuesday, March 6th

- Topics on quiz:
- ◆ Angle of Elevation/Angle of Depression
 - ◆ Pythagorean Theorem and Trigonometry
 - ◆ Law of Sines
 - ◆ Cofunctions

TOPIC #1: ANGLE OF ELEVATION/DEPRESSION

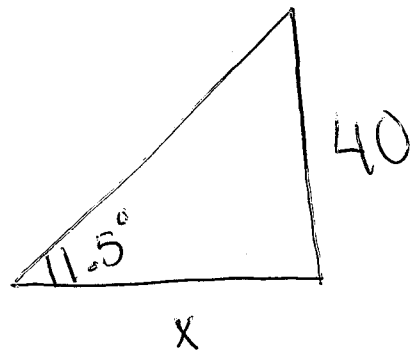
1. Joe is holding his kite string 3 feet above the ground, as shown in the accompanying diagram. The distance between his hand and a point directly under the kite is 95 feet. If the angle of elevation to the kite is 50° , find the height, h , of his kite, to the nearest foot.

$$\begin{aligned} \tan 50 &= \frac{x}{95} \\ x &= 95 \tan 50 \\ x &= 113.2105 \\ &+ 3 \\ \hline &116.2105 \\ &\boxed{116 \text{ ft}} \end{aligned}$$

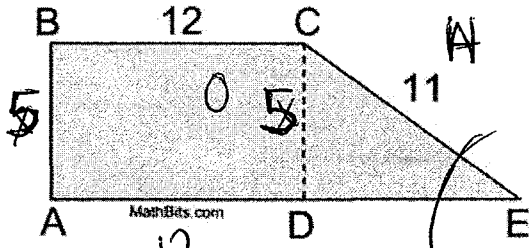


- *2. Samuel is at the top of a tower and will ride a trolley down a zip-line to a lower tower. The total vertical distance drop of the zip-line is 40 feet. The zip line's angle of elevation from the lower tower is 11.5° . What is the horizontal distance between the towers, to the nearest foot? *base and the base*

$$\begin{aligned} \tan 11.5 &= \frac{40}{x} \\ x \tan 11.5 &= 40 \\ \frac{x \tan 11.5}{\tan 11.5} &= \frac{40}{\tan 11.5} \\ x &= 196.6062 \\ &\boxed{x = 197 \text{ ft}} \end{aligned}$$



3. $ABCD$ is a rectangle with a perimeter of 34. Find, to the nearest degree, the measure of angle E .



$$12 + 12 + x + x = 34$$

$$24 + 2x = 34$$

$$\begin{array}{r} -24 \\ \hline 2x = 10 \\ x = 5 \end{array}$$

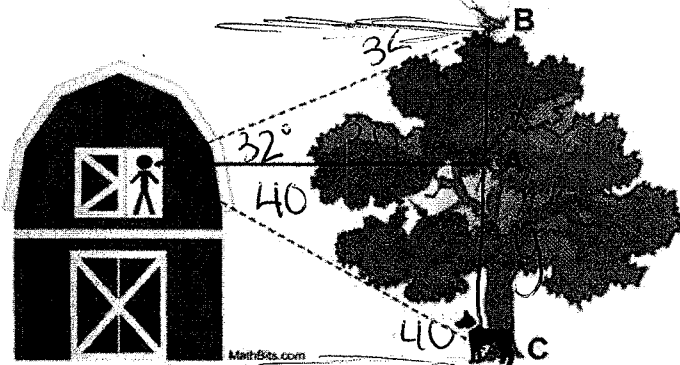
$$2x = 10$$

$$x = 5$$

$$(\sin x)^{-1} = \left(\frac{5}{11}\right)^{-1}$$

$$x = 27^\circ$$

4. Alex is standing in the hay loft doorway of the barn looking at a nearby tree. The horizontal distance from Alex to the tree (A) is 30 feet. The angle of elevation of bird (B) at the top of the tree is 32 degrees and the angle of depression of his dog (C) at the foot of the tree is 40 degrees. What is the height of the tree, to the nearest tenth of a foot?



$$x + y = \text{height of tree}$$

$$\frac{\tan 32}{1} = \frac{x}{30}$$

$$\frac{\tan 40}{1} = \frac{y}{30}$$

$$x = 30 \tan 32$$

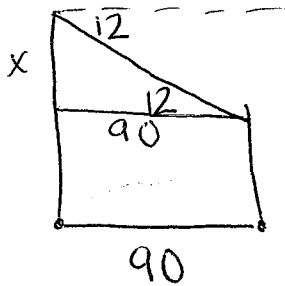
$$y = 30 \tan 40$$

$$x = 18.746$$

$$y = 25.173$$

$$43.9 \text{ ft}$$

5. Two buildings stand 90 feet apart at their closest points. At those points, the angle of depression from the top of the taller building to the top of the shorter building is 12° . How much taller is the taller building? Draw a diagram to support your answer. Round your answer to the nearest foot.



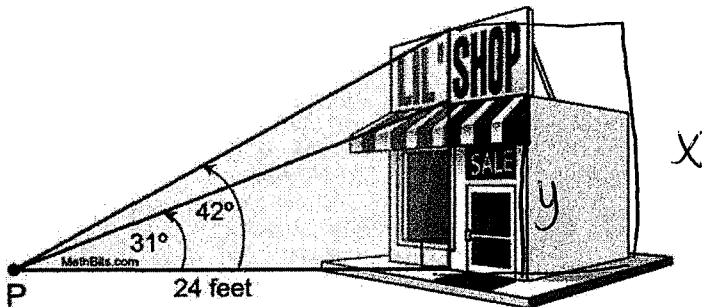
$$\frac{\tan 12}{1} = \frac{x}{90}$$

$$x = 90 \tan 12$$

$$x = 19.13$$

$$\boxed{x = 19 \text{ ft}}$$

6. Simon bought a new shop and wants to order a new sign for the roof of the building. From point P , he finds the angle of elevation of the roof, from ground level, to be 31° and the angle of elevation of the top of the sign to be 42° . If point P is 24 feet from the building, how tall is the sign to the nearest tenth of a foot?



$$x - y = \text{Height of sign}$$

$$\frac{\tan 42}{1} = \frac{x}{24}$$

$$\frac{\tan 31}{1} = \frac{y}{24}$$

$$x = 24 \tan 42$$

$$y = 24 \tan 31$$

$$x = 21.6096$$

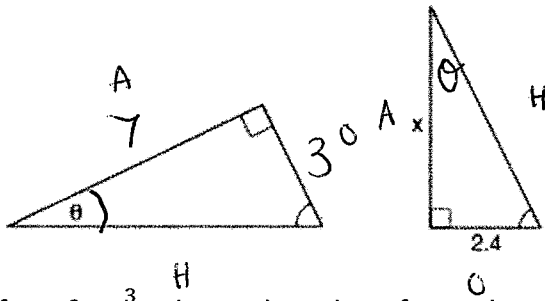
$$- y = 14.4206$$

$$7.1890$$

$$\boxed{7.2 \text{ ft}}$$

TOPIC #2: TRIGONOMETRY AND THE PYTHAGOREAN THEOREM

7. The diagram below shows two similar triangles



If $\tan\theta = \frac{3}{7}$, what is the value of x , to the nearest tenth?

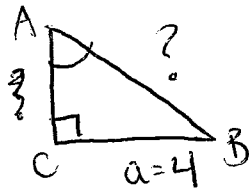
$$\frac{3}{7} = \frac{2.4}{x}$$

$$3x = 16.8$$

$$x = 5.6$$

8. In right triangle ABC, $m\angle C = 90^\circ$, $a = 4$ and $\sin A = \frac{1}{2}$. What is the length of the hypotenuse?

- a. $4\sqrt{3}$
- b. $\frac{8\sqrt{3}}{3}$
- c. 8
- d. $8\sqrt{2}$



$$\frac{4}{x} = \frac{1}{2}$$

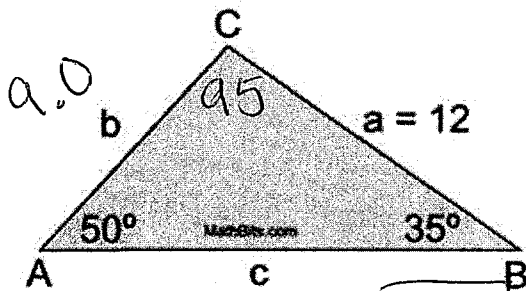
$$x = 8$$

9. Find the trig ratios below:

<p>If $\cos\theta = \frac{4}{5}$, find $\tan\theta$.</p> $x^2 + 4^2 = 5^2$ $\sqrt{x^2} = \sqrt{9}$ $x = 3$ $\tan\theta = \frac{3}{4}$	<p>If $\sin\theta = \frac{44}{125}$, find $\cos\theta$.</p> $44^2 + x^2 = 125^2$ $\sqrt{x^2} = \sqrt{13689}$ $x = 117$ $\cos\theta = \frac{117}{125}$
<p>If $\tan\theta = \frac{5}{1}$, find $\sin\theta$.</p> $5^2 + 1^2 = x^2$ $\sqrt{26} = \sqrt{x^2}$ $x = \sqrt{26}$ $\sin\theta = \frac{5}{\sqrt{26}}$	<p>If $\sin\theta = \frac{\sqrt{5}}{5}$, find $\cos\theta$.</p> $(\sqrt{5})^2 + x^2 = 5^2$ $5 + x^2 = 25$ $\sqrt{x^2} = \sqrt{20}$ $x = \sqrt{20}$ $\cos\theta = \frac{\sqrt{20}}{5}$

TOPIC #3: LAW OF SINES

10. Given triangle ABC shown below, find the missing sides and angle, to the nearest tenth.



$$180 - (50 + 35) = 95^\circ$$

$$\frac{b}{\sin 35} = \frac{12}{\sin 50}$$

$$b \sin 50 = 12 \frac{\sin 35}{\sin 50}$$

$$b = 8.9850$$

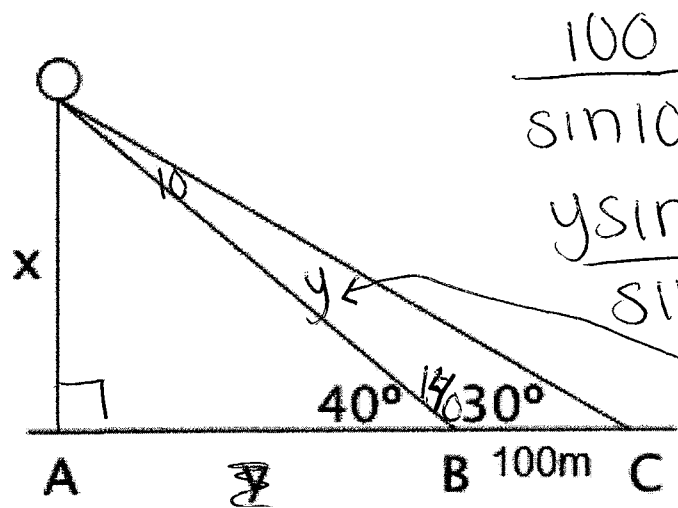
$$\boxed{b = 9.1}$$

$$\frac{c}{\sin 95} = \frac{12}{\sin 50}$$

$$\frac{c \sin 50}{\sin 50} = \frac{12 \sin 95}{\sin 50}$$

$$\boxed{c = 15.6}$$

11. An observation balloon is attached to the ground at point A. On a level with A and in the same straight line, the points B and C were chosen so that BC equals 100 meters. From points B and C, the angle of elevation of the balloon is 40° and 30° respectively. Find the height of the balloon. nearest ft



$$\frac{100}{\sin 10} = \frac{y}{\sin 30}$$

$$\frac{y \sin 10}{\sin 10} = \frac{100 \sin 30}{\sin 10}$$

$$y = 287.9385$$

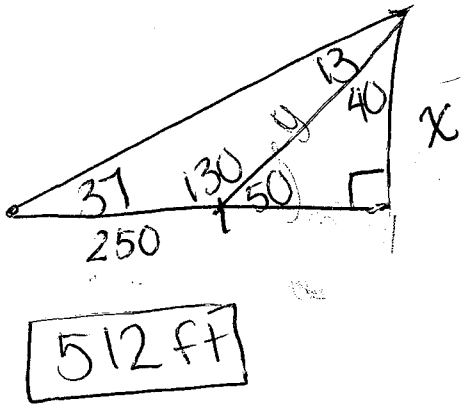
$$\frac{x}{\sin 40} = \frac{287.9385}{\sin 90}$$

$$\frac{x \sin 90}{\sin 90} = \frac{287.9385 \sin 40}{\sin 90}$$

$$x = 185.0833$$

$$\boxed{185\text{ft}}$$

12. A ship captain at sea uses a sextant to sight an angle of elevation of 37 degrees to the top of the lighthouse. After the ship travels 250 feet directly toward the lighthouse, another sighting is made, and the new angle of elevation is 50 degrees. ~~The ship's charts show that there are dangerous rocks 100 feet from the base of the lighthouse. Find, to the nearest foot, how close to the rocks the ship is at the time of the second sighting.~~ ~~the height of the lighthouse~~



$$\frac{y}{\sin 37} = \frac{250}{\sin 13}$$

$$\frac{y \sin 13}{\sin 13} = \frac{250 \sin 37}{\sin 13}$$

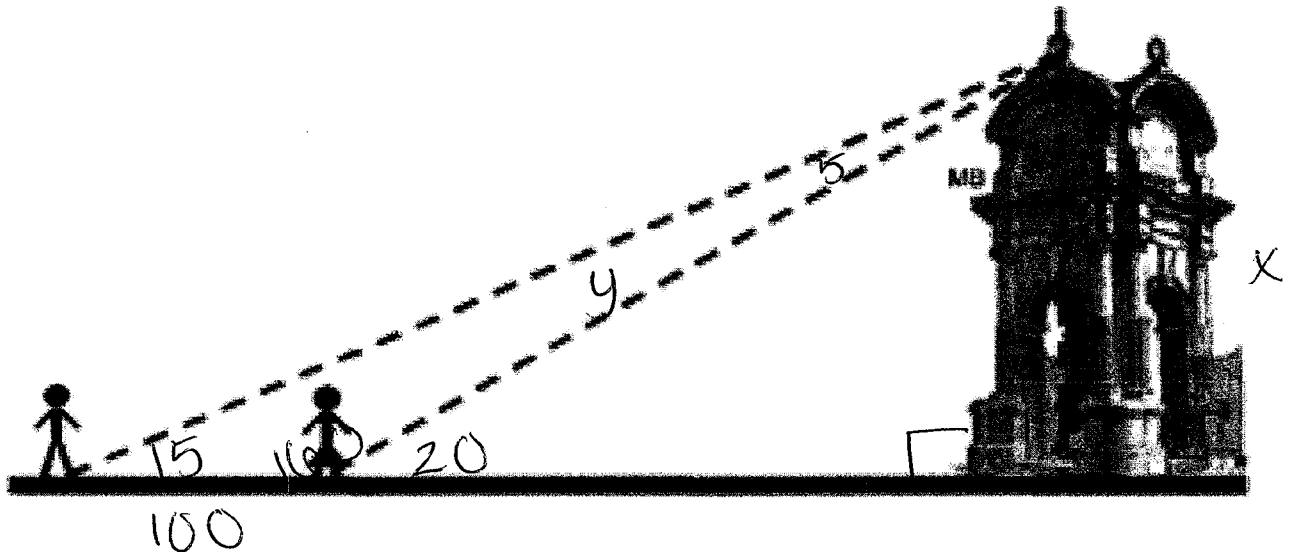
$$y = 668.8288$$

$$\frac{x}{\sin 50} = \frac{668.8}{\sin 90}$$

$$\frac{x \sin 90}{\sin 90} = \frac{668.825 \sin 50}{\sin 90}$$

$$x = 512.352$$

13. From his location, Rick sees the angle of elevation of the top of a monument to be 15°. Kate sees the angle of elevation of the top to be 20°. If Rick and Kate are 100 feet apart, how tall the monument, to the nearest foot?



$$\frac{100}{\sin 5} = \frac{y}{\sin 15}$$

$$\frac{100 \sin 15}{\sin 5} = \frac{y \sin 5}{\sin 15}$$

$$y = 296.9615$$

$$\frac{x}{\sin 20} = \frac{296.9615}{\sin 90}$$

$$\frac{x \sin 90}{\sin 90} = \frac{296.9615 \sin 20}{\sin 90}$$

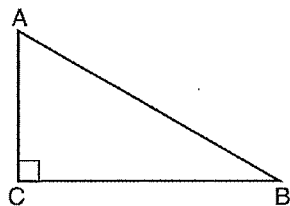
$$x = 101.5668$$

$$\boxed{102 \text{ ft}}$$

When $A + B = 90^\circ$, $\sin A = \cos B$
 $\sin B = \cos A$

TOPIC #4: COFUNCTIONS

14. In scalene triangle ABC shown in the diagram below, $m\angle C = 90^\circ$.



Which equation is always true?

- 1) $\sin A = \sin B$
- 2) $\cos A = \cos B$
- 3) $\cos A = \sin C$
- 4) $\sin A = \cos B$

16. In right triangle ABC , $m\angle C = 90^\circ$. If $\cos B = \frac{5}{13}$, which function also equals $\frac{5}{13}$?

- 1) $\tan A$
- 2) $\tan B$
- 3) $\sin A$
- 4) $\sin B$

17. In right triangle ABC , $m\angle C = 90^\circ$:

- a) If $\cos A = \frac{1}{5}$, what is $\sin B$? $\frac{1}{5}$
- b) If $\sin A = \frac{8}{10}$, what is $\cos B$? $\frac{8}{10}$

18. The following equations contain the measure of two acute angles. Find a value of x for which the statement is true:

$$\sin 60 = \cos x \quad x = \underline{30}$$

$$90 - 60 = 30$$

$$\cos 44 = \sin x \quad x = \underline{46}$$

$$90 - 44 = 46$$

19. If $\sin 6A = \cos 9A$, then $m\angle A$ is equal to

- 1) 6
- 2) 36
- 3) 45
- 4) $1\frac{1}{2}$

$$6A + 9A = 90$$

$$\frac{15A}{15} = \frac{90}{15}$$

$$\boxed{A = 6}$$

20. If $\sin 2A = \cos 3A$, then $m\angle A$ is

- 1) $1\frac{1}{2}$
- 2) 5
- 3) 18
- 4) 36

$$2A + 3A = 90$$

$$\frac{5A}{5} = \frac{90}{5}$$

$$A = 18$$

21. If $\sin(A - 30)^\circ = \cos 60^\circ$, the number of degrees in the measure of angle A is

1) 30

2) 60

3) 90

4) 120

$$A - 30 + 60 = 90$$

$$A + 30 = 90$$

$$A = 60$$

22. Which is a value of x if $\sin 60^\circ = \cos(x + 10)^\circ$?

1) 10°

2) 20°

3) 50°

4) 60°

$$60 + x + 10 = 90$$

$$x + 70 = 90$$

$$x = 20$$

23. If $\cos(x + 30^\circ) = \sin x$, a measure of angle x is

1) 15°

2) 30°

3) 45°

4) 60°

$$x + 30 + x = 90$$

$$2x + 30 = 90$$

$$2x = 60$$

$$x = 30$$

24. If $\sin(x + 20^\circ) = \cos x$, the value of x is

1) 35°

2) 45°

3) 55°

4) 70°

$$x + 20 + x = 90$$

$$2x + 20 = 90$$

$$2x = 70$$

$$x = 35$$