Write each trigonometric ratio as a fraction.
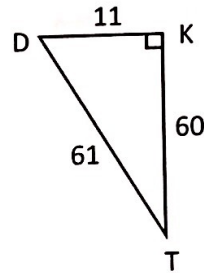
1. $\sin A = \frac{40}{41}$ $\sin B = \frac{9}{41}$

   $\cos A = \frac{9}{41}$ $\cos B = \frac{40}{41}$

   $\tan A = \frac{40}{9}$ $\tan B = \frac{9}{40}$
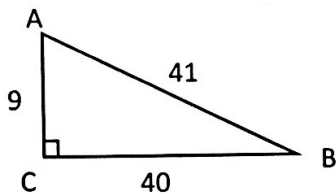
2. $\sin T = \frac{11}{61}$ $\sin D = \frac{60}{61}$

   $\cos T = \frac{60}{61}$ $\cos D = \frac{11}{61}$

   $\tan T = \frac{11}{60}$ $\tan D = \frac{60}{11}$

3.   Find the following trigonometric ratios on your calculator. Round to the nearest thousandth (3 decimal places.)

   a) $\cos 25° = 0.906$ b) $\sin 64° = 0.899$ c) $\tan 44° = 0.966$

4.   Solve for the measure of the angle in each trigonometric equation below. Show any algebra steps you use. Round your answers to the nearest degree.

   a) $\sin A = 0.6293$

   $A = \sin^{-1}(0.6293)$

   $\boxed{A = 39°}$

   b) $\cos B = 0.3007$

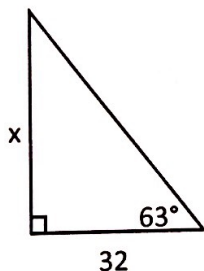 $B = \cos^{-1}(0.3007)$

   $B = 73°$

   (72.5)

   c) $\tan K = 0.3541$

   $K = \tan^{-1}(0.3541)$

   $K = 19°$

   (19.49)

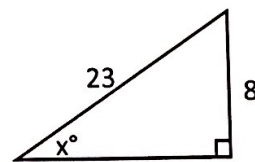5.   Use an appropriate trigonometric ratio to find the missing variable. Round to the nearest tenth.

   a)

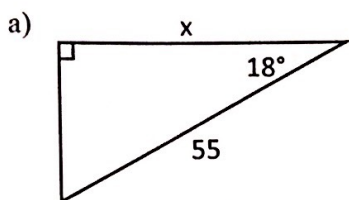 $\tan 63 = \frac{x}{32}$

   $32 \tan 63 = x$

   $x = \underline{62.8}$

   b)

   $\sin x = \frac{8}{23}$

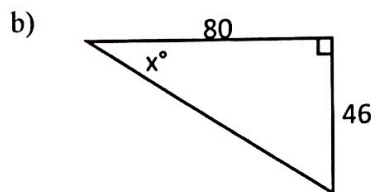 $x = \sin^{-1}\left(\frac{8}{23}\right)$

   $x = 20.4°$

6. Use an appropriate trigonometric ratio to find the missing variable. Round to the nearest tenth.
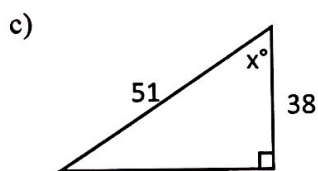
a)

$$\cos 18° = \frac{x}{55}$$

$$55 \cos 18° = x$$

x = _52.3°_

b)

$$\tan x = \frac{46}{80}$$

$$x = \tan^{-1}\left(\frac{46}{80}\right)$$

x = _29.9°_

c)

$$\cos x = \frac{38}{51}$$

$$x = \cos^{-1}\left(\frac{38}{51}\right)$$

x = _41.8°_

d)
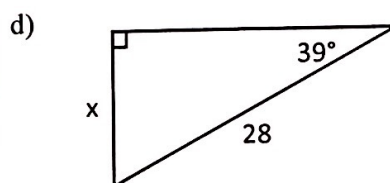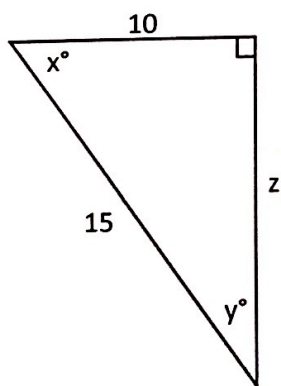
$$\sin 39 = \frac{x}{28}$$

$$28 \sin 39 = x$$

x = _17.6_

7. Solve the following triangle.

$$10^2 + z^2 = 15^2$$

$$100 + z^2 = 225$$

$$z^2 = 125$$

$$z = \sqrt{125}$$

125 → 5, 25 → 5, 5

$$z = 5\sqrt{5}$$

$$\cos x = \frac{10}{15}$$

$$x = \cos^{-1}\left(\frac{10}{15}\right)$$
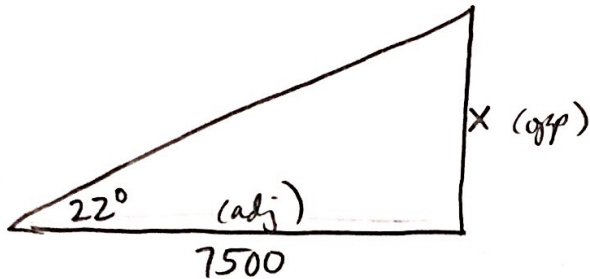
$$x = 48.2$$

$$90 - 48.2 = 41.8$$

x = _48.2°_

y = _41.8°_

z = _$5\sqrt{5} \approx 11.2$_

Draw a picture and solve the problem. Round your answer to the nearest tenth. Make sure to draw a diagram and analyze your answer.

8. The angle of elevation from a hiker to the top of a cliff is 22°. If the hiker is 7,500 feet from the base of the cliff, what is the height of the cliff?

$$\tan 22° = \frac{x}{7500}$$

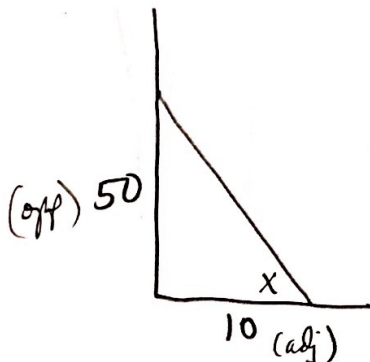$$7500 \tan 22 = x = \boxed{3,030.2 \text{ ft}}$$

22°   (adj)
7500

x (opp)

9. A telephone pole has a wire attached to it 50 feet above the ground. If the other end of the wire is pulled taut and attached to the ground 10 feet from the base of the pole, what is the angle that the wire forms with the ground?

$$\tan x = \frac{50}{10}$$

$$x = \tan^{-1}\left(\frac{50}{10}\right)$$
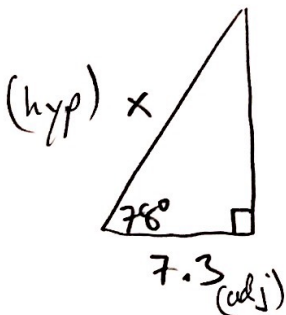
$$\boxed{x = 78.7°}$$

(opp) 50   x   10 (adj)

10. A ladder is leaning against a wall, and it forms a 78° angle with the ground. If the base of the ladder is about 7.3 feet from the wall, how long is the ladder?

$$\cos 78 = \frac{7.3}{x}$$

$$x \cos 78 = 7.3$$

$$x = \frac{7.3}{\cos 78} = \boxed{35.1 \text{ ft}}$$
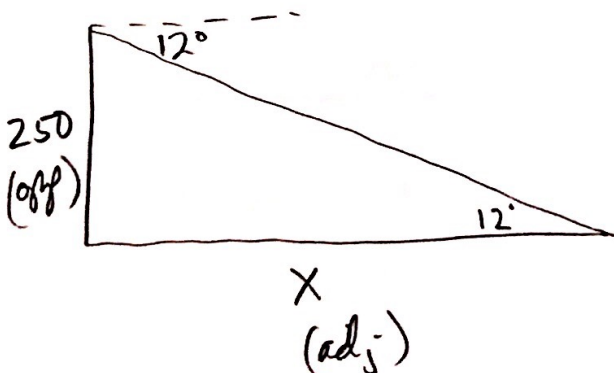
(hyp) x   78°   7.3 (adj)

11. The angle of depression from the top of a lighthouse to a buoy floating out at sea is 12°. If the lighthouse is 250 feet tall, how far is the buoy from the lighthouse?
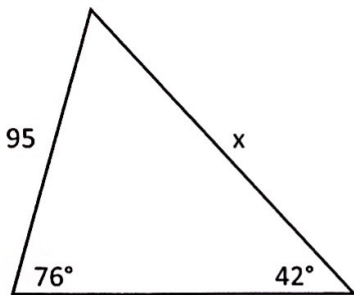
$$\tan 12 = \frac{250}{x}$$

$$x \tan 12 = 250$$

$$x = \frac{250}{\tan 12} = \boxed{1176.2 \text{ ft}}$$

12°   250 (opp)   12°   x (adj)

Use the Law of Sines to find the missing side or angle.

12.

$$\frac{X}{\sin 76} = \frac{95}{\sin 42}$$
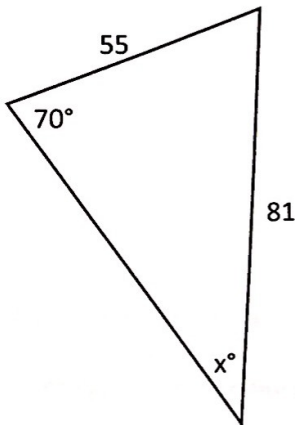
$$X = \frac{95 \sin 76}{\sin 42}$$

$x = \underline{137.8}$

13.
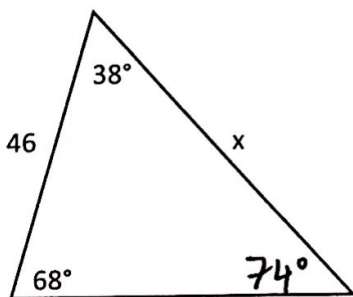
$$\frac{\sin X}{55} = \frac{\sin 70}{81}$$

$$\sin X = \frac{55 \sin 70}{81}$$

$$\sin X = 0.6381$$

$$X = \sin^{-1}(0.6381)$$

$x = \underline{39.7°}$

14.

$$\frac{X}{\sin 68} = \frac{46}{\sin 74}$$
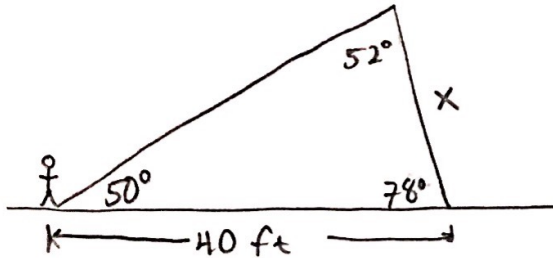
$$X = \frac{46 \sin 68}{\sin 74}$$

$68 + 38 = 106$

$180 - 106 = 74$

$x = \underline{44.4}$

15. A pole sticking out off the ground is leaning directly towards you. The angle the pole forms with the ground is 78°. The distance from the base of the pole to your feet is 40 feet. If the angle of elevation from your feet to the top of the pole is 50 degrees, what is the length of the pole?

$$50 + 78 = 128$$

$$180 - 128 = 52$$

$$\frac{X}{\sin 50} = \frac{40}{\sin 52}$$

$$X = \frac{40 \sin 50}{\sin 52}$$

$$\boxed{X = 38.9 \ ft}$$

16. A tall pole is standing vertically out of the ground, and there are two co-planar wires attached to the same point on the pole. Each wire is then attached to the ground on opposite sides of the pole. If one wire is 45 feet long, the other wire is 55 feet long, and the angle between the wires is 80 degrees, what angle does each wire create with the ground?
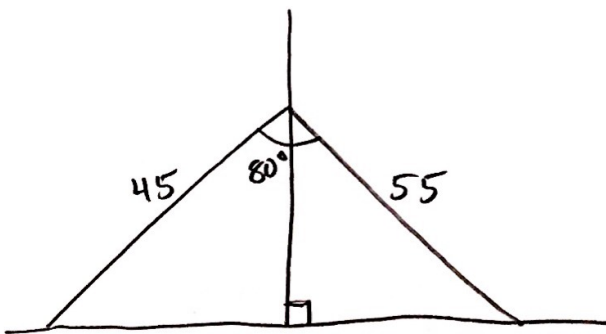
NOT Law of Sines

SKIP.

Geometry Chapter 12 Mixed Practice – Setting up application Problems – Use this as a study tool.
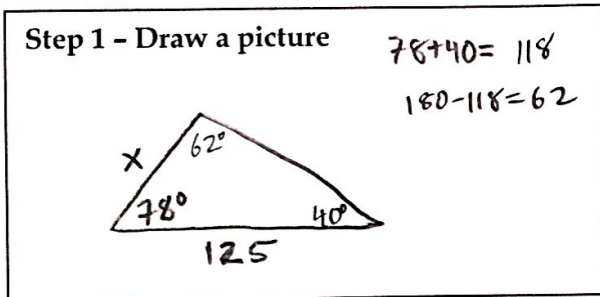**Note: Applications will be 39% of your test.**

1)   Mrs. Boots wants to measure the height of a tree. She walks 125 feet from the base of the tree and looks up. The angle from the ground to the top of the tree is 40°. The tree leans toward Mrs. Boots and grows at an angle of 78° with respect to the ground rather than vertically 90°. How tall is the tree?
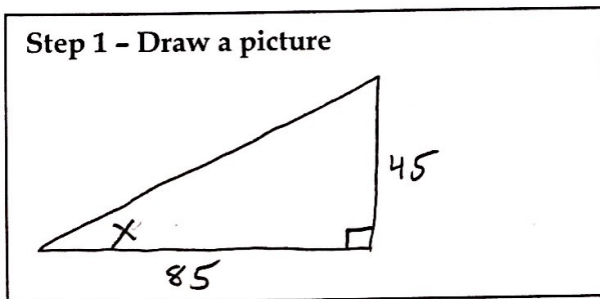
Step 1 – Draw a picture	$78 + 40 = 118$	Step 2 – Which will you use to solve? Circle one.
	$180 - 118 = 62$	Trigonometry Ratios ✓ **Law of Sines**

Step 3 – Write the equation you will use to find the missing information. Use the variable x.

$$\frac{x}{\sin 40} = \frac{125}{\sin 62} \quad \text{or} \quad \frac{\sin 40}{x} = \frac{\sin 62}{125}$$

2)   Brenda is looking up at a 45 foot tower. If she is 85 feet from the base of the tower, what is Brenda's angle of elevation to the top of the tower?
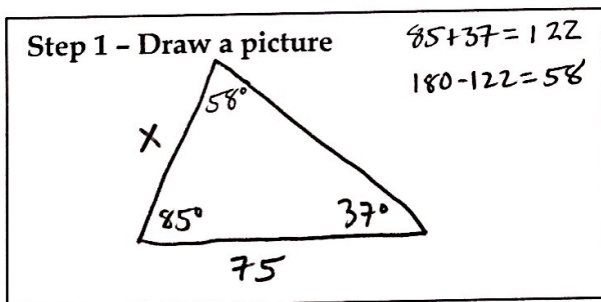
Step 1 – Draw a picture

Step 2 – Which will you use to solve? Circle one.
Trigonometry Ratios ✓ Law of Sines

Step 3 – Write the equation you will use to find the missing information. Use the variable x.

$$\tan x = \frac{45}{85}$$

3)   Jimmy wants to measure the height of a telephone pole. He walks 75 feet from the base of the telephone pole and looks up. The angle from the ground to the top of the telephone pole is 37°. The telephone pole leans toward Jimmy and makes at an angle of 85° with respect to the ground rather than vertically 90°. How tall is the telephone pole?
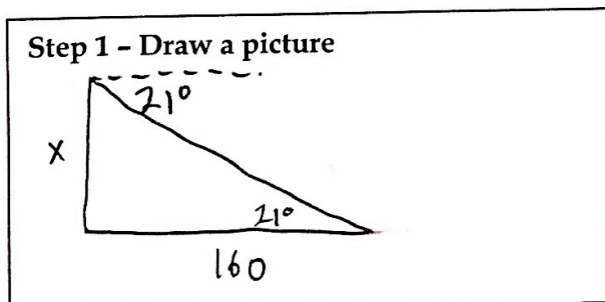
Step 1 – Draw a picture	$85 + 37 = 122$
	$180 - 122 = 58$

Step 2 – Which will you use to solve? Circle one.
Trigonometry Ratios ✓ **Law of Sines**

Step 3 – Write the equation you will use to find the missing information. Use the variable x.

$$\frac{x}{\sin 37} = \frac{75}{\sin 58°} \quad \text{or} \quad \frac{\sin 37}{x} = \frac{\sin 58}{75}$$

4)   From the top of a lighthouse, an observer spots a ship in distress at an angle of depression of 21°. If the ship is 160 feet away from the base of the lighthouse, how high above sea level is the observer?

Step 1 – Draw a picture

Step 2 – Which will you use to solve? Circle one.
Trigonometry Ratios ✓ Law of Sines

Step 3 – Write the equation you will use to find the missing information. Use the variable x.

$$\tan 21° = \frac{x}{160} \quad \text{or} \quad \tan 69° = \frac{160}{x}$$