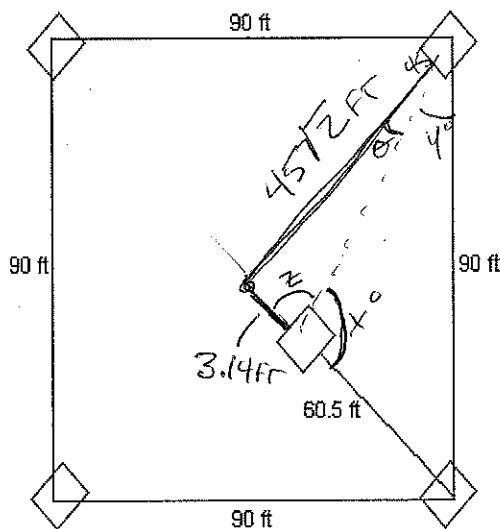


Baseball Trigonometry!

A baseball diamond is a square with sides of 90ft. The pitcher's mound is 60.5 feet from home base, right up the middle of the field. Notice, however, that the pitcher's mound is not in the very center of the field.

Trigonometry gives us the relationships between the sides of triangles and the interior angles of the triangle. We're going to use trigonometry to find some of the distances between bases and the pitcher's mound. Most of these can be found by using the Pythagorean Theorem.



1. If the person on first base wants to throw the ball to third base, how far will the ball have to be thrown?

SPECIAL RIGHT TRIANGLE -

ANSWER IN SIMPLEST RADICAL FORM

$$90\sqrt{2}$$

2. If the pitcher throws the ball to second from the pitcher's mound, how far will the ball have to be thrown?

$$90\sqrt{2} \approx 127.28 \text{ FT}$$

$$- 60.5 \text{ FT}$$

$$\boxed{66.78 \text{ FT}}$$

3. How far is the pitcher's mound from the center of the baseball diamond?

$$\text{CENTER} = 45\sqrt{2} \approx 63.64 \text{ FT}$$

$$- 60.5 \text{ FT}$$

$$\boxed{3.14 \text{ FT}}$$

4. If the pitcher wants to throw the ball to first (or third) base, how far will the ball have to be thrown?

$$3.14^2 + (45\sqrt{2})^2 = c^2$$

$$\sqrt{4059.86} = c^2$$

$$9.86 + 4050 = c^2$$

$$\boxed{c^2 = 63.72 \text{ FT}}$$

5. What is the angle from the pitcher's mound between home plate and first base?

$$\tan^{-1} \theta = \frac{3.14}{63.64}$$

$$\angle \gamma = 45^\circ - 2.82^\circ = 42.18^\circ$$

$$\theta = 2.82^\circ \quad \angle \alpha = 180 - 42.18 - 45 = \boxed{92.82^\circ}$$

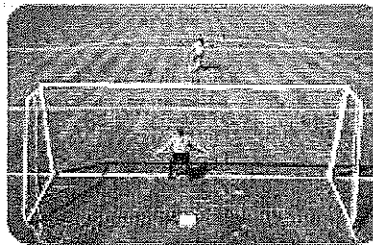
6. What is the angle from first base between the pitcher's mound and second base?

$$\angle \beta = 180 - 90^\circ + 2.82 = \boxed{87.18^\circ}$$

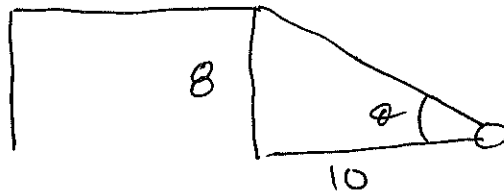
Trig Worksheet #4 – Word Problems

1.

SOCCER A soccer ball is placed 10 feet away from the goal, which is 8 feet high. You kick the ball and it hits the crossbar along the top of the goal. What is the angle of elevation of your kick?

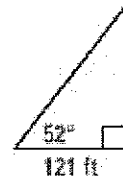


2.



$$\tan^{-1} \frac{8}{10} \approx 38.66^\circ$$

ROLLER COASTERS A roller coaster makes an angle of 52° with the ground. The horizontal distance from the crest of the hill to the bottom of the hill is about 121 feet, as shown. Find the height h of the roller coaster to the nearest foot.



$$\tan 52 = \frac{h}{121}$$

$$154.87 \text{ ft}$$

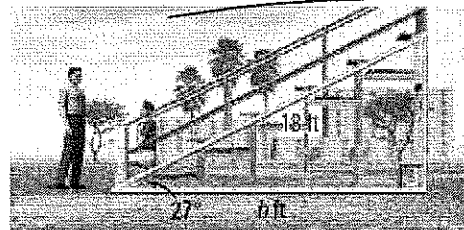
3.

AIRPLANE RAMP The airplane door is 19 feet off the ground and the ramp has a 31° angle of elevation. What is the length y of the ramp?



4.

BLEACHERS Find the horizontal distance h the bleachers cover. Round to the nearest foot.



$$\sin 31 = \frac{19}{x}$$

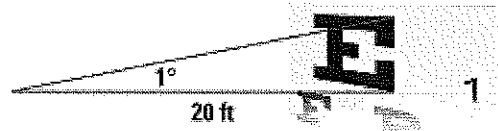
$$36.89 \text{ ft}$$

$$\cos 27 = \frac{h}{18}$$

$$16 \text{ ft}$$

5.

EYE CHART You are looking at an eye chart that is 20 feet away. Your eyes are level with the bottom of the "E" on the chart. To see the top of the "E," you look up 1° . How tall is the "E"?

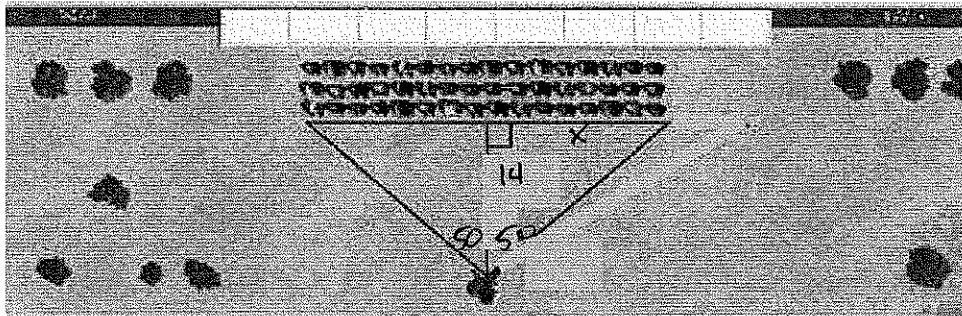


$$\tan 1 = \frac{E}{20} \quad \text{Not drawn to scale}$$

$$.35 \text{ FT}$$

6.

Your class is having a class picture taken on the lawn. The photographer is positioned 14 feet away from the center of the class. If she looks toward either end of the class, she turns 50° .



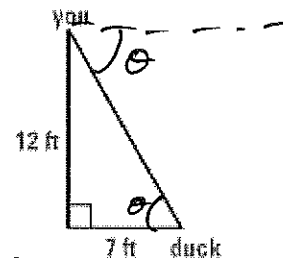
What is the distance between the ends of the class?

$$\tan 50 = \frac{x}{14}$$

$$16.68 \times 2 = \boxed{33.36 \text{ FT}}$$

7.

★ **SHORT RESPONSE** You are standing on a footbridge in a city park that is 12 feet high above a pond. You look down and see a duck in the water 7 feet away from the footbridge. What is the angle of depression? *Explain* your reasoning.



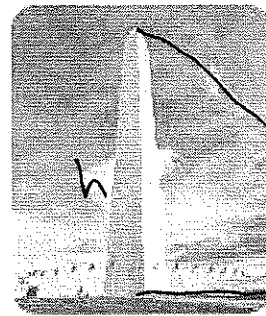
$$\angle AOD \cong \angle AOE$$

$$\tan^{-1} \theta = \frac{12}{7}$$

$$\boxed{59.74^\circ}$$

8.

WASHINGTON MONUMENT A surveyor is standing 118 feet from the base of the Washington Monument. The surveyor measures the angle between the ground and the top of the monument to be 78° . Find the height h of the Washington Monument to the nearest foot.



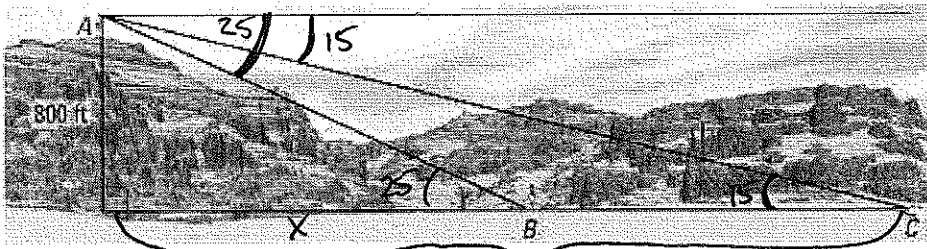
$$\tan 78 = \frac{h}{118}$$

$$\boxed{555.16 \text{ ft}}$$

118

9.

MULTI-STEP PROBLEM You are standing on a plateau that is 800 feet above a basin where you can see two hikers.



- If the angle of depression from your line of sight to the hiker at B is 25° , how far is the hiker from the base of the plateau?
- If the angle of depression from your line of sight to the hiker at C is 15° , how far is the hiker from the base of the plateau?
- How far apart are the two hikers? Explain.

a: $\tan 25 = \frac{800}{x}$

$$\boxed{1715.6 \text{ ft}}$$

b: $\tan 15 = \frac{800}{y}$

$$\boxed{2985.6 \text{ ft}}$$

c FIND THE DIFFERENCE BETWEEN THE 2 HIKERS

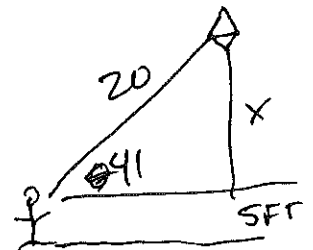
$$2985.6 - 1715.6 =$$

$$\boxed{1270 \text{ ft}}$$

10.

★ SHORT RESPONSE You are flying a kite with 20 feet of string extended. The angle of elevation from the spool of string to the kite is 41° .

- Draw and label a diagram to represent the situation.
- How far off the ground is the kite if you hold the spool 5 feet off the ground? Describe how the height where you hold the spool affects the height of the kite.



$$\sin 41 = \frac{x}{20}$$

$$13.1 \text{ ft} + 5 \text{ ft} = \boxed{18.1 \text{ ft}}$$