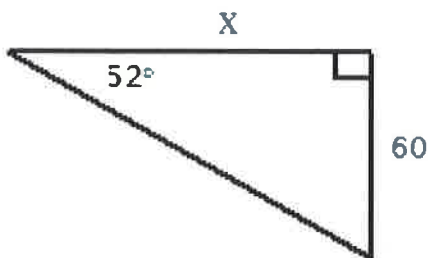


Name: \_\_\_\_\_ ANSWER KEY \_\_\_\_\_ Hour: \_\_\_\_\_ Date: \_\_\_\_\_

## *Angles of Elevation and Depression* *Assignment #2*

Solve the following problems. Round the segment lengths to 2 places past the decimal and angle measures to the nearest whole degree. For each problem, draw and label a picture AND set up and solve the appropriate trigonometric ratio.

1. From the top of a tower, the angle of depression to a stake on the ground is  $52^\circ$ . The top of the tower is 60 feet above ground. How far is the stake from the foot of the tower?

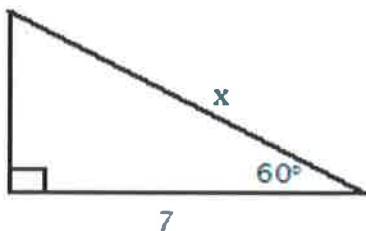


$$\tan 52 = \frac{60}{x}$$

$$x = \frac{60}{\tan 52}$$

$$x = 46.88 \text{ ft}$$

2. A ladder leaning against a house creates an angle of elevation of  $60^\circ$ . The foot of the ladder is 7 feet from the foundation of the house. How long is the ladder?

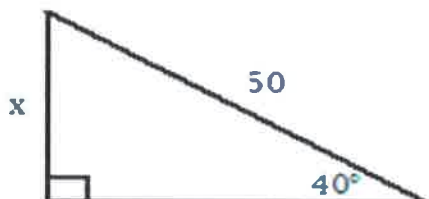


$$\cos 60 = \frac{7}{x}$$

$$x = \frac{7}{\cos 60}$$

$$x = 14 \text{ ft}$$

3. A balloon on a 50-foot string makes an angle of  $40^\circ$  with the ground. How high above the ground is the balloon?

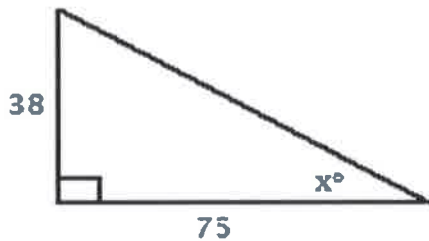


$$\sin 40 = \frac{x}{50}$$

$$50 (\sin 40) = x$$

$$x = 32.14 \text{ ft}$$

4. A tree 38 feet high casts a shadow 75 feet long. Find the measure of the angle of elevation of the sun.

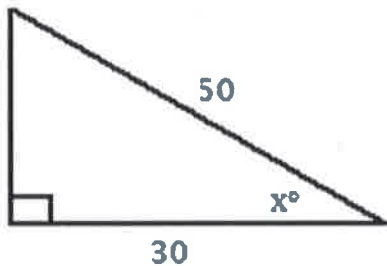


$$\tan x = \frac{38}{75}$$

$$\tan^{-1}\left(\frac{38}{75}\right) = x$$

$$x = 27^\circ$$

5. A 50-meter cable is secured at the top of the tower and tied 30 meters away from the base. What angle does the cable form with the ground?

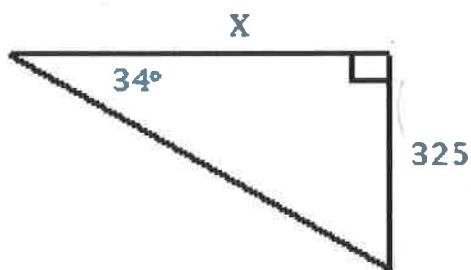


$$\cos x = \frac{30}{50}$$

$$\cos^{-1}\left(\frac{30}{50}\right) = x$$

$$x = 53^\circ$$

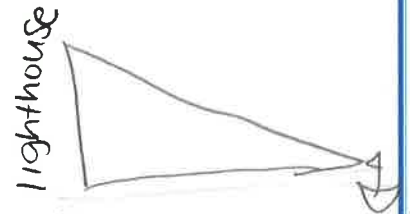
6. From the top of a lighthouse 325 feet high, the angle of depression of a boat is  $34^\circ$ . Find the distance from the boat to the foot of the lighthouse.



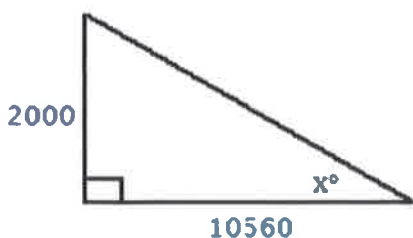
$$\tan 34 = \frac{325}{x}$$

$$x = \frac{325}{\tan 34}$$

$$x = 481.83 \text{ ft}$$



7. An airplane rises vertically 2,000 feet over a horizontal distance of 2 miles. What is the angle of elevation of the airplane's path? 1 mile = 5,280 feet.

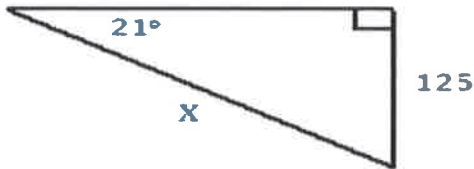


$$\tan x = \frac{2000}{10560}$$

$$\tan^{-1}\left(\frac{2000}{10560}\right) = x$$

$$x = 11^\circ$$

8. The top of a lighthouse is 125 m above the water. The angle of depression from the top of the lighthouse to a fishing boat is  $21^\circ$ . How far is the boat from the top of the lighthouse?

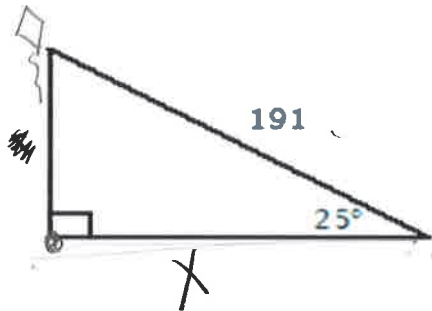


$$\sin 21 = \frac{125}{x}$$

$$x = \frac{125}{\sin 21}$$

$$x = 348.80 \text{ m}$$

9. A boy who is flying a kite lets out 191 feet of string which makes an angle of  $25^\circ$  with the ground. How far away is a point on the ground directly under the kite?

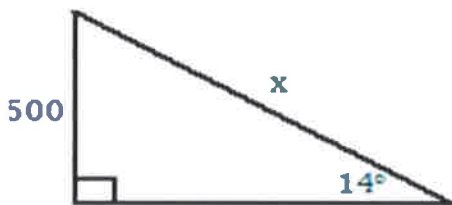


$$\cos 25 = \frac{x}{191}$$

$$191 (\cos 25) = x$$

$$x = 173.10 \text{ ft}$$

10. An airplane climbs at an angle of  $14^\circ$  with the ground. Find to the nearest foot the distance it has traveled when it has attained an altitude of 500 feet.

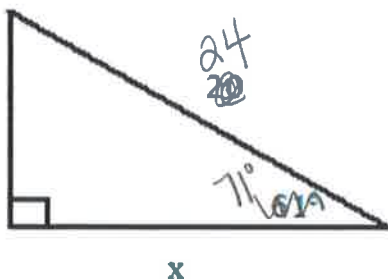


$$\sin 14 = \frac{500}{x}$$

$$x = \frac{500}{\sin 14}$$

$$x = 2066.78 \text{ ft}$$

11. A wooden beam 24 feet long leans against a wall and makes an angle of  $71^\circ$  with the ground. Find to the nearest foot how far from the base of the wall the bottom is.



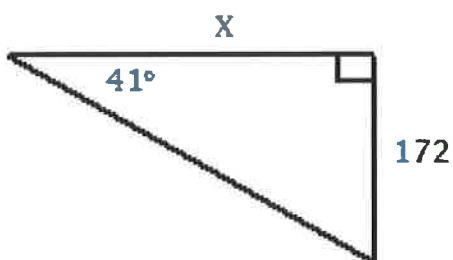
$$\cos 61 = \frac{x}{24}$$

$$24 (\cos 61) = x$$

$$x = 9.70 \text{ ft}$$

$$7.81$$

12. From the top of a lighthouse 172 feet high, the angle of depression of a boat out at sea is an angle of  $41^\circ$ . Find to the nearest foot the distance from the boat to the foot of the lighthouse, the foot of the lighthouse being at sea level.

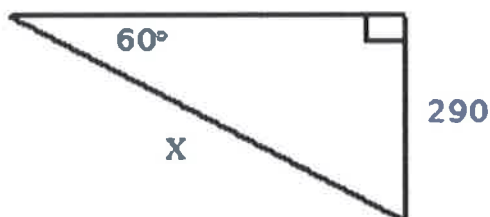


$$\tan 41 = \frac{172}{x}$$

$$x = \frac{172}{\tan 41}$$

$$x = 197.86 \text{ ft}$$

13. A coal mine shaft is 290 m deep and has an angle of depression of  $60^\circ$ . How long is the mine shaft?

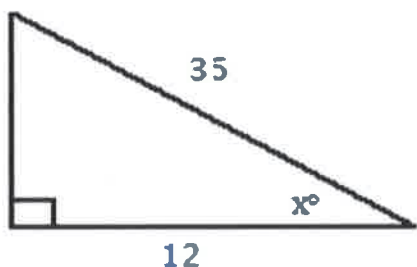


$$\sin 60 = \frac{290}{x}$$

$$x = \frac{290}{\sin 60}$$

$$x = 334.86 \text{ m}$$

14. Find the angle of elevation that a 35-foot ladder, leaning against a wall, if the bottom of the ladder is 12 feet from the base of the wall.

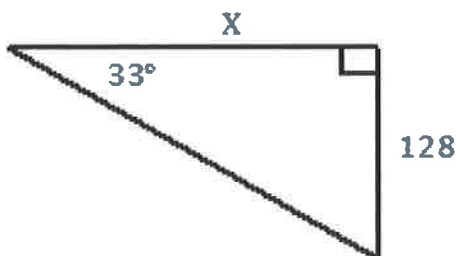


$$\cos x = \frac{12}{35}$$

$$\cos^{-1}\left(\frac{12}{35}\right) = x$$

$$x = 70^\circ$$

15. An observation tower is 128m tall. The angle of depression from the top of the tower to a hiker is  $33^\circ$ . How far is the hiker from the tower base?

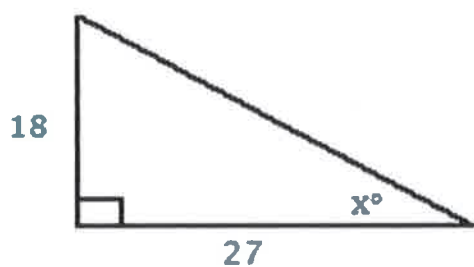


$$\tan 33 = \frac{128}{x}$$

$$x = \frac{128}{\tan 33}$$

$$x = 197.10 \text{ m}$$

16. Find the angle of elevation of the sun when a 18-meter-tall tree casts a 27-meter-long shadow.



$$\tan x = \frac{18}{27}$$

$$\tan^{-1}\left(\frac{18}{27}\right) = x$$

$$x = 34^\circ$$