Draw the right triangles to model each of the following situations, labeling them accordingly. Then, use right triangle trigonometry to answer the question. Show your work clearly.
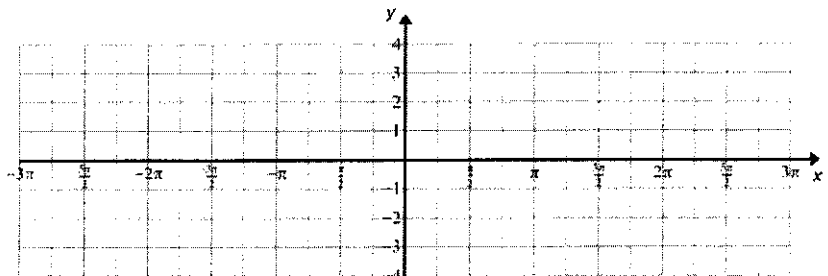
1. A flagpole casts a 42-foot shadow. If the angle of elevation of the sun is 57.4°, what is the height of the flagpole?

2. A 37-foot tree casts a 27-foot shadow. What is the angle of elevation of the sun?

3. An airplane is flying at 4000 feet above the ground. If the angle of depression from the airplane to the beginning of the runway is 5.4°, what is the horizontal distance to the nearest tenth of a mile of the airplane to the beginning of the runway?

4. A group of Boy Scouts on a straight trail headed N30.6° E found the trail led through a briar patch. They chose to walk 156 meters due east along the south edge of the briar patch, then due north along the east edge of the patch back to the trail. How much farther did they walk to avoid walking through the briar patch?

5. In the San Gabriel Mountains in California, lookout station Running Deer is 18 kilometers due west of station Lazy Bear. The bearing from Running Deer to a fire directly south of Lazy Bear is S38.4°E. To the nearest tenth of a kilometer, how far is the fire from Running Deer? From Lazy Bear?

6. An observer stands 120 feet away from a church and measures the angles of elevation of the top and bottom of the steeple to be 24.4° and 18.2° respectively. What is the height of the steeple to the nearest foot?

7. A fly, buzzing about the room, calculates the angle of depression of the base of an 8-foot wall is 33.7° and the angle of elevation of the top of the wall is 12.5°. Find to the nearest foot the horizontal distance the fly is from the wall.
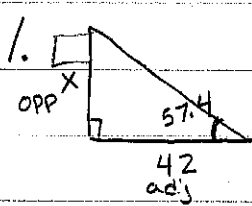
For the following graphs identify the function, amplitude, vertical shift and frequency. Also write the equation of the function.

8.

10.

9.

11.
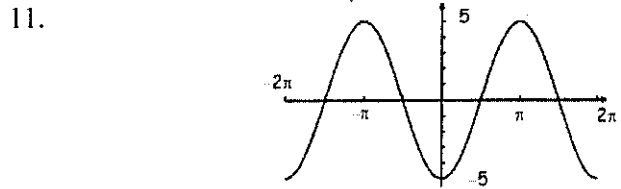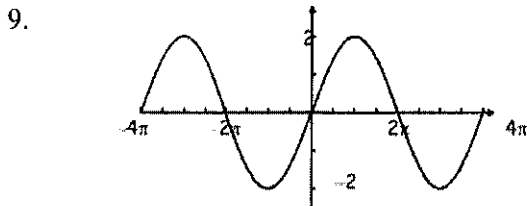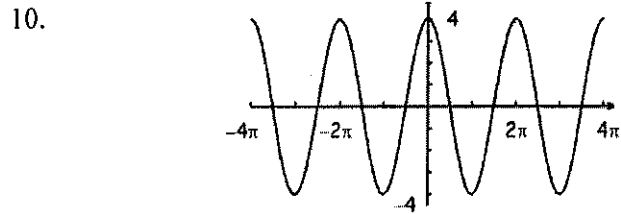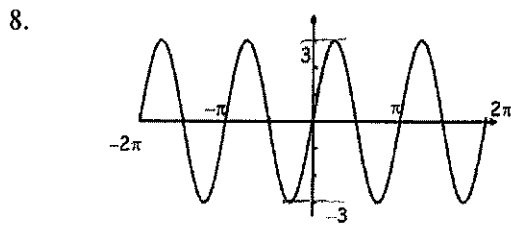
For the following equations, identify the amplitude, vertical shift, frequency and period. Sketch a graph of each function on your own paper.
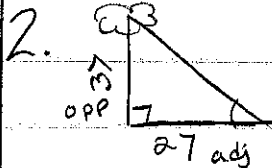
12. $y = sin\ 4x$

13. $y = 2\ cos\ x$

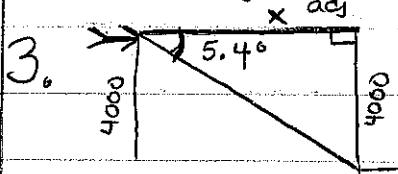14. $y = sin\ x - 2$

15. $y = 3\ cos\ 1/2x + 1$

1.

$$\tan(57.4) = \frac{x}{42}$$

$$65.674 ft = x$$

2.

$$\tan^{-1}(\tan\theta) = \tan^{-1}\left(\frac{37}{27}\right)$$

$$\theta = 53.881°$$

3.

$$x \cdot \tan(5.4) = \frac{4000}{x} \cdot x$$

$$\frac{}{\tan(5.4)} \quad \frac{}{\tan(5.4)}$$

$$x = 42315.580 ft$$

4.
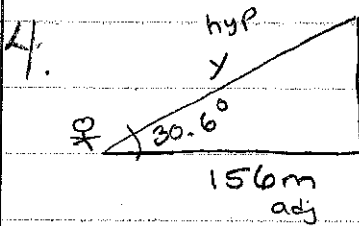
$$156 \tan(30.6) = \frac{x}{156} \cdot 156$$

$$92.258$$

$$\cos(30.6) = \frac{156}{y}$$

walked → 156 + 92.258

$$= 248.258 \text{ m}$$

$$181.239 = y \text{ (diagonal)}$$

$$248.258 - 181.239 = 67.019 \text{ meters}$$

5. RD ——18km—— LB (adj) /38.4
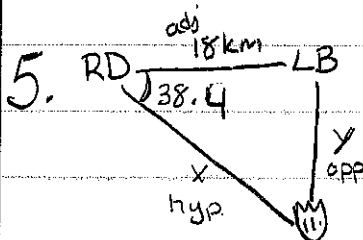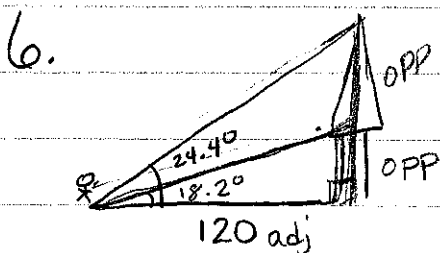
$$\cos(38.4) = \frac{18}{x} \qquad 18\tan(38.4) = \frac{y}{18} \cdot 18$$

$$22.968 km = x \qquad 14.267 km = y$$

6.

$$^{120}\tan(18.2) = \frac{x}{120} \cdot ^{120} \qquad ^{120}\tan(24.4) = \frac{x}{120} \cdot ^{120}$$

$$39.454 ft = x \qquad 54.434 ft = x$$

$$54.434 ft - 39.454 ft$$

$$14.98 ft$$

7.
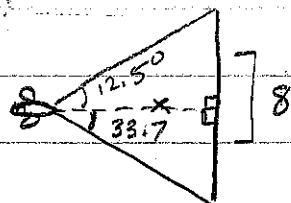
$\tan = \frac{opp}{adj}$

$adj \cdot \tan\theta = opp$

$x \cdot \tan(12.5) + x \cdot \tan(33.7) = 8$

$\dfrac{x(\tan(12.5) + \tan(33.7))}{.889} = \dfrac{8}{.889}$

approx 9 feet

$x = 9.002$

8. funct = sine

amp = 3

vshift = 0

freq = 2 /2π

$y = 3\sin 2x$

9. func = cosine

amp = 4

vshift = 0

freq = 1 /2π

$y = 4\cos x$

10. func = sine

amp = 2

vshift = 0

freq = $\frac{1}{2}$ /2π

$y = 2\sin\frac{1}{2}x$

11. func = cos

amp = -5

vshift = 0

freq = 1 /2π

$y = -5\cos x$

#___

$y = \sin 4x$

#___

$y = 2\cos x$

#___

$y = \sin x - 2$

#___

$y = 3\cos \frac{1}{2}x + 1$