Answer the questions.

1. Isaac's camp is 5,280 feet from a point directly beneath Mt. Monadnock. What is the hiking distance along the ridge if the angle of elevation is 25° 16'?

2. How many feet higher is the top of the mountain than his campsite?

Express as a fraction.

3. csc θ =

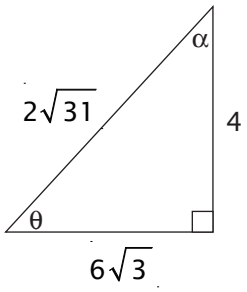
4. sec θ =

5. cot θ =

6. csc α =

7. sec α =

8. cot α =



Express as a decimal.

9. sin θ =

10. cos θ =

11. tan θ =

12. sin α =

13. cos α =

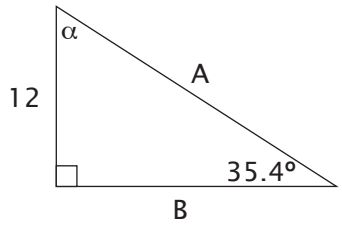
14. tan α =

15. Use your answers from #9–11 to find the measure of θ.

16. Use your answers from #12–14 to find the measure of α.

Solve for the lengths of the sides and the measures of the angles.

17.



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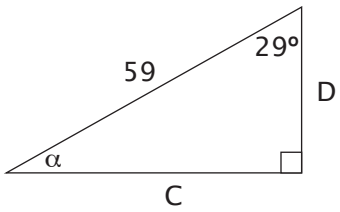

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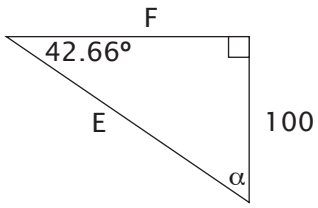

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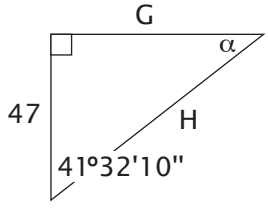


Answer the questions.

1. The side of a lake has a uniform angle of elevation of 15° 30'. How far up the side of the lake does the water rise if, during the flood season, the height of the lake increases by 7.3 feet?

2. A building casts a shadow of 110 feet. If the angle of elevation from that point to the top of the building is 29° 3', find the height of the building.

Express as a fraction.

3. csc θ =

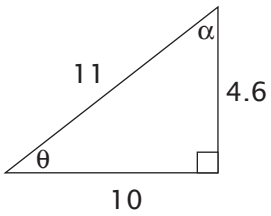
4. sec θ =

5. cot θ =

6. csc α =

7. sec α =

8. cot α =



Express as a decimal.

9. sin θ =

10. cos θ =

11. tan θ =

12. sin α =

13. cos α =

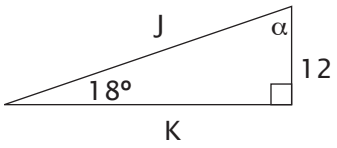
14. tan α =

15. Use your answers from #9–11 to find the measure of θ.

16. Use your answers from #12–14 to find the measure of α.

Solve for the lengths of the sides and the measures of the angles.

17.



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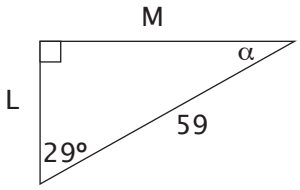

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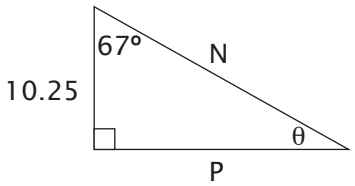

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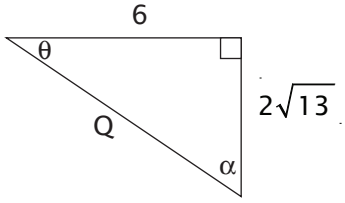


Answer the questions.

1. From a point 120 feet from the base of a church, the angles of elevation of the top of the building and the top of a cross on the building are 38° and 43° respectively. Find the height to the top of the cross. (The ground is flat.)

2. Find the height of the building as well as the height of the cross by itself.

Express as a fraction.

3. csc θ =

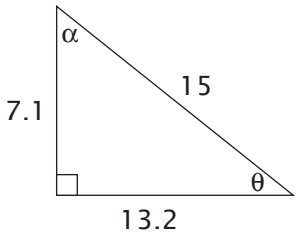
4. sec θ =

5. cot θ =

6. csc α =

7. sec α =

8. cot α =



Express as a decimal.

9. sin θ =

10. cos θ =

11. tan θ =

12. sin α =

13. cos α =

14. tan α =

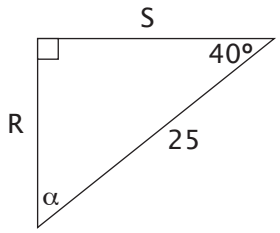
Results for #15 and 16 may vary slightly from the solutions, depending on when steps were rounded.

15. Use your answers from #9–11 to find the measure of θ.

16. Use your answers from #12–14 to find the measure of α.

Solve for the lengths of the sides and the measures of the angles.

17.



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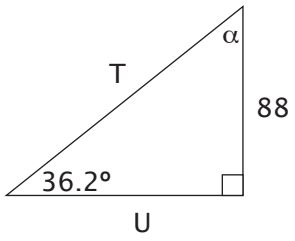

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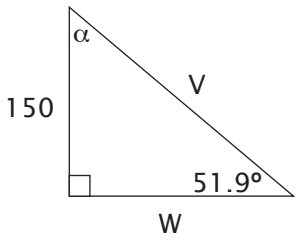

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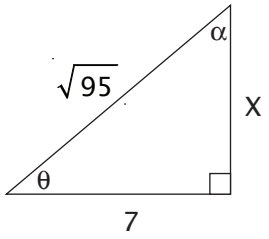


Answer the questions.

1. A campsite is 12.88 miles from a point directly below Mt. Adams. If the angle of elevation is 15.5° from the camp to the top of the mountain, how high is the mountain?

2. At a point 60.7 feet from the base of a building, the angle of elevation from that point to the top is 64.75°. How tall is the building?

Express as a fraction.

3. csc θ =

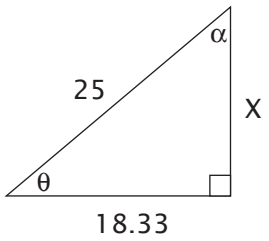
4. sec θ =

5. cot θ =

6. csc α =

7. sec α =

8. cot α =



Express as a decimal.

9. sin θ =

10. cos θ =

11. tan θ =

12. sin α =

13. cos α =

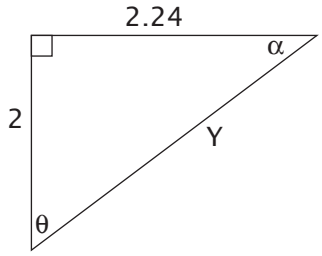
14. tan α =

15. Use your answers from #9–11 to find the measure of θ.

16. Use your answers from #12–14 to find the measure of α.

Solve for the lengths of the sides and the measures of the angles.

17.



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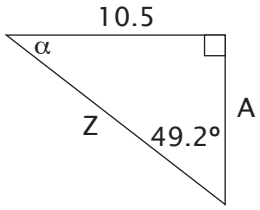

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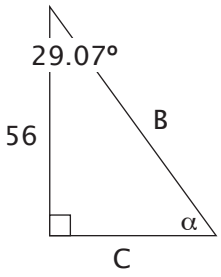

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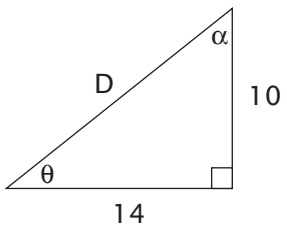


Here are some more applications of trig functions. In some of these you may need to find a missing side, and in others a missing angle.

Use the skills you have learned so far to answer the questions. Always begin by making a drawing and labeling the known information.

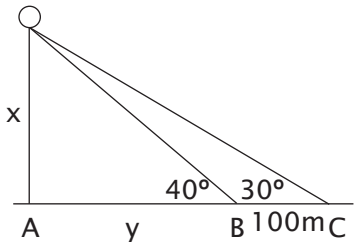
1. A girl who is 1.6 meters tall stands on level ground. The elevation of the sun is 60° above the horizon. What is the length of her shadow?

2. If the girl in #1 casts a shadow that is one meter long, what is the elevation of the sun?

3. A stairway forms an angle with the floor from which it rises. This angle may be called the angle of inclination. What is the angle of inclination of a stairway if the steps have a tread of 20 centimeters and a rise of 16 centimeters?

Some problems will require more of your algebra skills. There are some examples of these on the next page. The first one is done for you.

4. 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 the points B and C, the angle of elevation of the balloon is 40° and 30° respectively. Find the height of the balloon.



First, make a drawing. There's not enough information to find x using either the angle at B or the angle at C.

However, we can make two equations using x and y.

Equation 1 $\tan 40° = \frac{x}{y}$ **Equation 2** $\tan 30° = \frac{x}{y+100}$

Replace tan 40° with its ratio and solve for x in Equation 1.

$.8391 = \frac{x}{y}$ or $x = .8391y$

Replace tan 30° with its ratio in in Equation 2. $.5774 = \frac{x}{y+100}$

Substitute value of x from Equation 1 in Equation 2. $.5774 = \frac{.8391y}{y+100}$

Solve for y.
$$.5774(y + 100) = .8391y$$
$$.5774\,y + 57.74 = .8391y$$
$$57.74 = .2617y$$
$$y = 220.6 \text{ (rounded)}$$

Solve for x, which is the height of the balloon. $x = .8391y$

$x = .8391\ (220.6) = 185.1$ m

5. Tom wished to find the width of a river. He observed a tree directly across the river on the opposite bank. The angle of elevation to the top of the tree was 32°. Then Tom moved directly back from the bank 50 meters and found that the angle of elevation to the top of the tree was 21°. What is the width of the river?

6. In the side of a hill that slopes upward at an angle of 32°, a tunnel is bored sloping downward at an angle of 12°15' from the horizontal. How far below the surface of the hill is a point 38 meters down the tunnel?