Worksheet 3 - Lesson 18

Strategies for Word Problems

1. Read the problem carefully. Underline the important pieces of information. Assign variable names to the things you need or want to find.

2. Draw a picture! Label your variables in the picture.

3. Write equations for what's been given to you and for what you want to find.

4. Use the equations to solve for what you want.

5. CHECK YOUR ANSWER! Is my answer reasonable? Does it make sense? Does it have the correct units?

Together

1. How much pure alcohol should be added to 20 liters of 40% alcohol concentration to increase the concentration to 50% alcohol?

2. From the top of a canyon, the angle of depression to the far side of the river is $58°$, and the angle of depression to the near side of the river is $74°$. The depth of the canyon is 191 meters. What is the width of the river at the bottom of the canyon? Round to the nearest tenth of a meter.

3. A grain bin in the shape of an inverted cone has height 11 feet and radius 3.5 feet. If the grain in the bin is 7 feet high, calculate the volume of the grain to one decimal place. *Hint:* Use similar triangles.

Your Turn

1. A puzzle in the shape of a triangle has a perimeter of 30 centimeters. Two sides of the triangle are eahc twice as long as the shortest side. Find the length of the shortest side.

2. A kite is flying on 50 feet of string. How high is it above the ground if its height is 10 feet more than the horizontal distance from the person flying it? What is the angle of elevation from the ground to the string? Assume that the string is being held at ground level.

3. The manager of an 80-unit apartment complex knows from experience that at a rent of \$400 per month, all units will be rented. However, for each increase of \$20 in rent, he can expect one unit to be vacated. Let x represent the number of \$20 increases over \$400.

   (a) Express, in terms of x, the number of apartments that will be rented if x increases of \$20 are made. (For example, with three such increases, the number of apartments rented will be $80 - 3 = 77$).

   (b) Express the rent per apartment if x increases of \$20 are made. (For example, if he increases rent by $3 \times \$20 = \$60$, the rent per apartment is \$460).

   (c) Determine the revenue R in terms of x that will give the revenue generated.

   (d) For what number of increases will the revenue be \$37,500?

4. A company wishes to run a utility cable from point A on the shore to an installation at point B on the island. The island is 6 miles from the shore and the company at A is 9 miles from point C. It costs $400 per mile to run the cable on the land and $500 per mile under water. Assume that the cable starts at A, runs along the shoreline, and then anlges and runs under water to the island. Let x represent the distance from C at which the under water portion of the cable run begins.
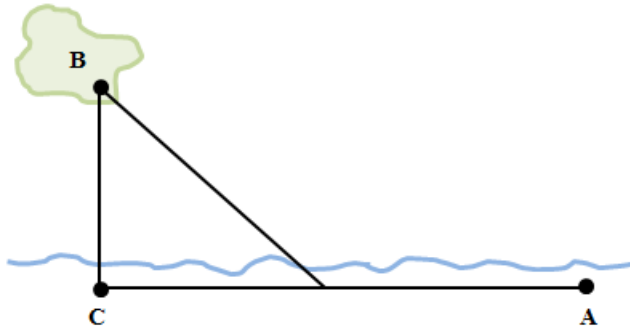
(a) What are the possible values for x?

(b) Express the total cost of laying the cable in terms of x.

(c) Find the total cost if 3 miles of cable are on land.

5. Marion is observing the launch of a space shuttle from the command center. When she first sees the shuttle, the angle of elevation to it is 16°. About 10 seconds later, the angle of elevation is 74°. If the command center is 1 mile from the launch pad, how far did the shuttle travel while Marion was watching and what was it's average speed in miles per hour? Round to the nearest thousandth of a mile.

6. Two vertical poles of lengths 12 feet and 16 feet are situated on level ground, 20 feet apart, as shown below. A piece of wire is to be strung from the top of the 12-foot pole to the top of the 16-foot pole, attached to a stake in the ground at a point P. Let x represent the distance from P to D. Express the total length of the wire from A to P to B in terms of x. How long is the wire to two decimal places, if x is 16 feet?
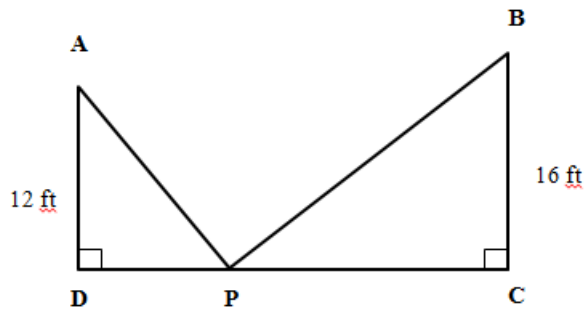
7. How much water should be added to 8 milliliters of 6% saline solution to reduce the concentration to 4% saline?

8. An automoblie radiator holds 16 liters of fluid. There is currently a mixture in the radiator that is 80% antifreeze and 20% water. How much of this mixture should be drained and replaced by pure antifreeze so that the resulting mixture is 90% antifreeze?