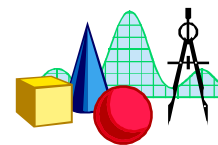




MATH DEPT. TUTORIAL 11

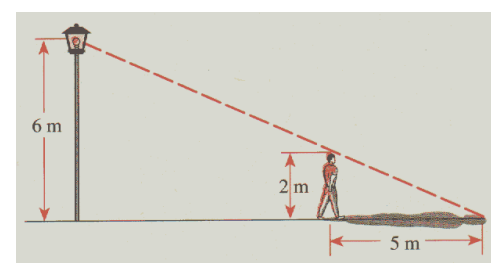
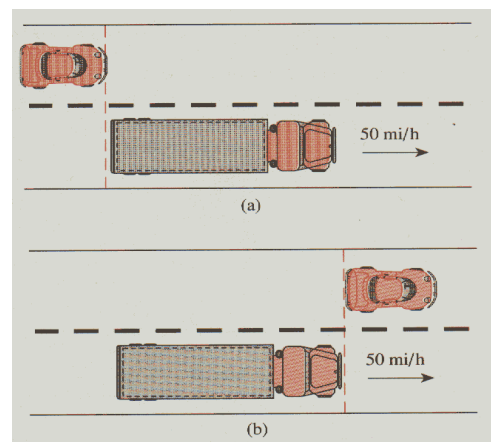


Tutorial 11: Setting up Word Problems.

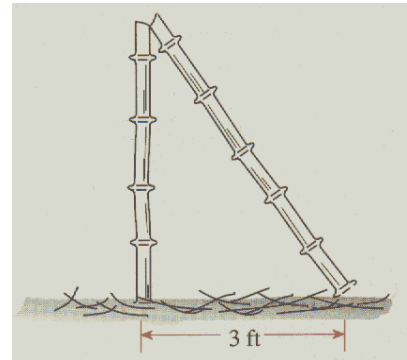
- Procedure:**
1. Read the problem over to get a general idea of what the problem is saying and what it is asking.
 2. Identify the quantity that the problem is asking you to find. This can usually be determined by carefully reading the question posed at the end of the problem. Give this quantity a name (x or some other variable). Make sure you write down precisely what the variable represents.
 3. Read each sentence in the problem again, and express all the quantities mentioned in the problems in terms of the variable you defined in step 2 whenever possible. Sometimes using a secondary equation involving other variable(s) is a necessary step in order to relate all the given information. (You may find it helpful to sometimes, if not often, organize the information by drawing a diagram or chart).
 4. Find the crucial fact in the problem (or a formula) that relates two or more of the expressions you listed in step 3.
 5. Set up an equation that expresses the crucial fact you found in step 4 in algebraic form. You will often need to use a formula to translate from English to algebra.
 6. Solve the equation, and check to make sure your answer satisfies the original word problem.

Examples: These problems are taken from Mathematics for Calculus, 2nd Edition by Stewart, Redlin & Watson (p.56-58).

14. One-half of John's age two years from now plus one-third his age three years ago is 20 years. How old is John ?
16. A merchant mixes tea that sells for \$3.00 per pound with tea that sells for \$2.75 per pound to get 80 lb of a mixture that sells for \$2.90 per pound. How many pounds of each type of tea does she use ?
18. If Ravi invests \$8000 at 8% per year, how much additional money must he invest at 11% to ensure that the interest he receives each year is 9% of the total invested ?
20. After robbing a bank in Dodge City, the Daltons gallop off at 14 mi/h. Ten minutes later the marshal leaves to pursue them at 16 mi/h. How long does it take the marshal to catch up to the Daltons ?
22. A coast guard boat that patrols a river separating two countries cruises at 20 knots (nautical miles per hour) in still water. The river flows at 4 knots. For each patrol the captain of the boat is ordered to travel upstream and then return. His trip takes exactly 6 hours. How far upstream does he travel ?
26. A woman driving a car 14 ft long is passing a bus 30 ft long. The bus is traveling at 50 mi/h. How fast must the woman drive her car so that she can pass the bus completely in 6 seconds, from the position shown in (a) to the position shown in (b) Hint: Use feet and seconds instead of miles and hours.
32. Candy and Tim share a paper route. It takes Candy 70 minutes to deliver all the papers, while Tim takes 80 min. How long would it take them if they work together ?
34. A man is walking away from a lamppost with a light 6 m above the ground. The man is 2 m tall. How far from the lamppost is he when his shadow is 5 m long ? Hint: Use similar triangles.

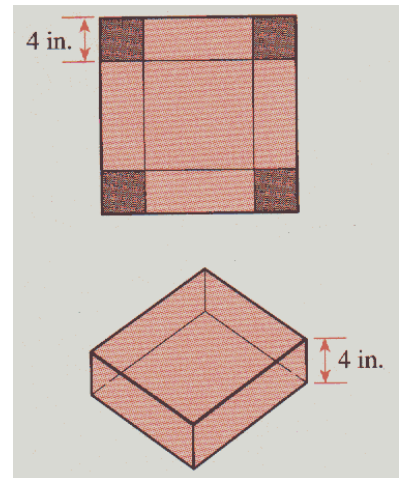


36. The problem is taken from a Chinese mathematics textbook called Chui-chang suan-shu, or Nine Chapters on the Mathematical Art, which was written about 250 BC. A 10-ft-long bamboo is broken in such a way that the tip touches the ground 3 ft from the base of the stem (as shown in the figure). What is the height of the break ?



40. A circle has a radius of 4 cm. By how much should the radius be increased so that the area is increased by 10 cm^2 ?

41. A box with a square base and no top is to be made from a square piece of cardboard by cutting 4-in. squares from each corner and folding up the sides as in the figure. The box is to hold 100 in^3 . How big a piece of cardboard is needed ?



50. A factory is to be built on a lot measuring 180 ft by 240 ft. A local building code specifies that a lawn of uniform width and equal in area to the factory must surround the factory. What must the width of this lawn be, and what are the dimensions of the factory ?

54. A man wishes to determine the water level in a deep well. He drops a stone into the well and hears the splash 3 s later. If the stone drops 16t² feet after t seconds, and the speed of sound is 1090 ft/s, how far down is the surface of the water?

44. A flagpole is secured on opposite sides by two guy wires, each of which is 5 ft longer than the pole. The distance between the points where the wires are fixed to the ground is equal to the length of one guy wire. How tall is the flagpole ?

