MATH 34A PROBLEM SOLVING SKILLS

Things you might want to do when solving a problem:
A. Draw a picture
B. Label things we already know
C. Name the variables
D. Identify the unknown(s)
E. Translate the given information into math (e.g. equations)
F. Solve for the unknown(s)

I. General problems

Example. I know the sum of two positive numbers is 14/3 and the product is 5. What are they?

Example. A jet airliner flies 317mph for the first half hour and the last half hour of a flight. The rest of the time it flies at 620mph. How long does it take to fly a distance of 2195miles?

Additional Practice

1. A right-angle triangle has a 45° degree anglle. If the area of the triangle is 25cm^2, what is the perimeter?

2. There are 40 animals in a farmyard. Some are cows and some are chickens. In total there are 104 legs. How many chickens are there?

II. Car problems

Example. A highway patrolman traveling at the speed limit is passed by a car going 20mph faster than he is. After one minute, the patrolman speeds up to 100mph. How long after speeding up until the patrolman catches up with the speeding car? The speed limit is 60mph.

Additional Practice

1. Car A leaves Sacramento at noon travelling at 60mph on a road 560 miles long to Los Angelos. Car B leaves Los Angelos at 2pm travelling at constant speed along the same road to Sacamento. They meet at 6pm. What was the speed of Car B? Furthermore, when they meet, are they closer to Sacramento or to Los Angelos?

2. Car A and Car B leave Los Angeles at the same time and travel along the same route. Both cars arrive at the end of the route after 6 hours. Car A goes at 40mph for the first 4 hours then at 60mph for the rest of the time. Car B goes at 50mph for the first 2 hours and travels at a (different) constant speed for the remaining time. What is the spped with which car B travels the second part of the route?

III. Express in terms of problems

Example. Two cars leave the origin at noon. One goes north at 75mph and the other goes east at 41mph. Express the distance between them in terms of the number of hours they have been driving.

Example. A farmer wants to make a field in the shape of a rectangle using 1000 meters of fence. Express the area of the field in terms of the width of the field.

Additional Practice

1. A rectangular field is to have an area of 2000m^2 and is to be surrounded by a fence. The cost of the fence is \$15 per meter of length. Express the total cost of the fence in terms of the width of the field.

2. Let C be a cylinder whose height is twice its radius. Express its surface area in terms of its volume.

3. An acquarium with a square base has no top. There is a metal frame. Glass costs $3/m^2$ and the frame costs $2/m$. The volume is to be $20m^3$. Express the total cost in terms of the height.

VI. Mixing problems

Example. Can A contains 10% blue paint and 90% red paint. Can B contains 25% blue paint and 80% red paint. How much paint do I need from each can in order to get 2 liters of paint with 20% blue and 80% paint?

Additional Practice

1. Solution A contains 5% salt. Solution B contains 20% salt. How much solution A do you combine with 3 liters of solution B, to obtain a result containing 10% salt?

2. I have 2 pints of milk that contains 1% fat. How much pure fat do I need to add in order to get mile that is 4% fat?