UCSC PIE
Worksheet 12

1. Some questions on change: suppose I have d dimes and n nickels in my pocket.

   (a) Write an algebraic expression for the total monetary value of my dimes, and a similar expression for the total monetary value of my nickels.

   (b) I have \$2.05 total. Write an equation to express this.

   (c) Suppose I have a total of 25 coints. Write an equation involving d and n to express this.

   (d) You now have two equations involving the variables d and n. Graph both equations and find the point where the graphs cross.

   (e) Solve the two equations using either substitution or addition. How many dimes and how many nickels do I have?

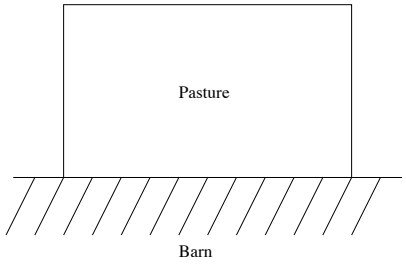
2. An airplane flies a route between New York and San Francisco, a distance of about 3000 miles. On the eastward trip, there is a tailwind that makes the plane go faster. On the westward trip, a headwind of the same speed slows the plane down.

   (a) With no wind, the plane travels at speed v. The wind as speed w. Write an expression for the speed of the plane on the eastward and westward parts of the trip.

   (b) The eastward trip takes 5 hours, and the westward trip takes 6 hours. Write two equations using this information and the formula distance = rate times time.

   (c) Solve the equations to find the speed of the wind and the speed of the plane in still air.

3. A farmer wants to enclose a rectangular pasture with a fence. One side of the pasture is up against the wall of a barn, as shown below:



   The side of the fence opposite the barn will be made of stone, and the other sides will be made of wood. Stone costs \$12 per meter, and wood costs \$8 per meter. Let x be the length of the fence side opposite the barn, and y be the length of the other two sides.

   (a) Write an algebraic expression for the cost of the stone portion of the fence. Write similar expressions for the wood part of the fence and for the entire fence.

   (b) Write an algebraic expression for the total length of the fence.

   (c) Suppose the total length of the fence is 24 meters. Find an equation relating the cost of the fence to x. Graph it.

   (d) Suppose the fence costs \$232. Find the length of each side of the fence.

4. A metallurgist is trying to make a new alloy by mixing two others. She has one alloy that is 10% tungsten and 20% iron, and another alloy that is 50% tungsten and 10% iron.

   (a) If she uses x grams of the first alloy, how many grams of iron will she have (in terms of x)? How many grams of tungsten?

   (b) If she uses y grams of the second alloy, how many grams of iron and tungsten will she have (in terms of y)?

(c) She combines x grams of alloy 1 with y grams of alloy 2. How many grams of iron and tungsten are in the resulting mixture?

(d) Suppose she wants to create a new alloy containing 21 grams of tungsten and 6 grams of iron. How much of each alloy should she use?

(e) Suppose she wants to create a new alloy containing 20% tungsten. What ratio of of alloys 1 and 2 (i.e. parts of alloy 1 to parts of alloy 2) should she use? What will be the percentage iron content?