

Assignment #24: Multivariable Rate, Time, And Distance

Example: A mosquito flew 40 miles upwind in 8 hours, and flew 30 miles downwind in three hours. How fast was the wind?

Solution. Here we have two rates to concern ourselves with, the mosquito in still air (x) and the speed of the wind (y). Going upwind, the wind reduces the mosquito's speed by y mph. Going downwind, the wind increases the mosquito's speed by y mph. Here's one way to label:

	Rate	Time	Distance
upwind	$x-y$	8	40
downwind	$x+y$	3	30

The equations are:

$$8(x-y) = 40$$

$$3(x+y) = 30$$

Problems

Find the values of all variables. Use any method, including Cramer's Rule.

1. $3x+8y+7z=-6$

$$7x+7y+5z=-1$$

$$4x+4y+4z=4$$

2. Two marbles and 23 jacks cost Patrick a dollar, but if he'd bought 10 less jacks and 3 more marbles it would have cost him \$1.30. What does a marble cost.

3. The average of two numbers and 8 and 34 is 15. Twice the smaller is 3 more than the larger. Find both numbers.
4. A tree 96 ft. tall breaks, leaving a stump, half of which is 3 times as long as the part that broke off. How long is the part that broke off?
5. Grace's plane can fly 250 mph in still air. In 3 hours with the wind, it flew 200 more miles than it flew in 4 hours against the wind. What was the wind speed?
6. Swimming downstream, Alex covered 6 miles in 4 hours. Returning upstream took 5 hours. How fast does Ethan swim in still water?
7. Francis flew his pet flamingo 26 miles upwind in 2 hours, and flew 39 miles downwind in 3 hours. How fast was the wind?

(L): How many 3-digit numbers have no zeroes? How many 3-digit numbers have no zeroes and no fives?