# MOTION PROBLEMS:
AN INTRODUCTION

Whether it's the police pursuing a bank robber, or a physicist determining the velocity of a proton in a linear accelerator, the concepts of time, distance, and speed are at the heart of all science and technology.

If you travel from San Francisco to L.A., 400 miles away, and you travel for 8 hours at an average speed of 50 miles per hour, then

you traveled a **DISTANCE** of 400 miles

at a **RATE** (speed) of 50 mph

during a **TIME** interval of 8 hours.
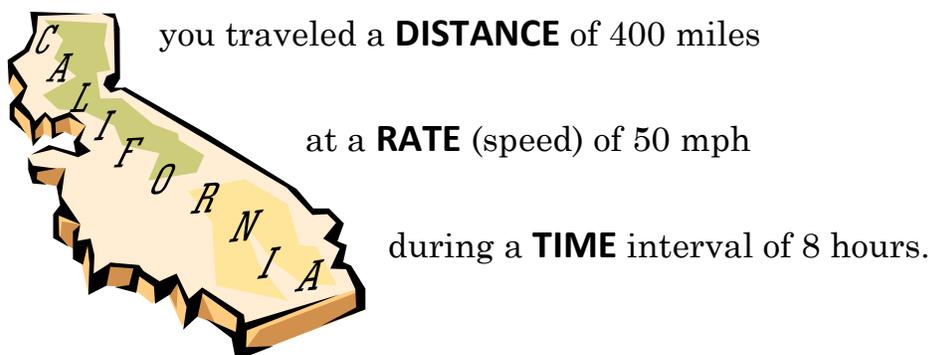
Notice that in this example, if you multiply the rate by the time (50 mph × 8 hrs), you get the distance (400 mi). This idea always holds:

$$\text{Rate} \times \text{Time} \ = \ \text{Distance}$$

Homework

1.   a. Moe traveled at a rate of 120 km/hr for 12 hours. Find Moe's distance.

     b. Larry flew a distance of 3000 miles in 6 hours. What was Larry's rate?

     c. Curly jogged 12 miles at a rate of 3 mph. How long was Curly jogging?

2. Which is the proper formula for distance?

     a. $d = rt$ b. $d = \dfrac{r}{t}$ c. $d = \dfrac{t}{r}$

3. Two skaters leave the skate park and skate in opposite directions, one at 10 mph and the other at 8 mph. After some time, they are 18 miles apart. If d_1 is the distance traveled by the first skater, and if d_2 is the distance traveled by the second skater, write an appropriate equation.

4. A woodpecker traveled from the maple tree to the oak tree at 13 mph, and then made a return trip at 19 mph. If d_1 is the distance it traveled to the oak tree, and if d_2 is the distance from the oak back to the maple, write an appropriate equation.

5. A 1096-mi trip took a total of 16 hours. The speed was 71 mph for the first part of the trip, and then decreased to 67 mph for the rest of the trip. If d_1 is the distance traveled on the first part of the trip, and if d_2 is the distance traveled on the second part of the trip, write an appropriate equation.

6. A jet ski leaves the beach. Nine hours later a motorboat begins to pursue the jet ski and finally catches up with it. If d_1 is the distance the jet ski travels, and if d_2 is the distance the motorboat travels, write an appropriate equation.

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7. Mutt and Jeff leave the mall at the same time and head in the same direction. Jeff's speed is 9 mph more than 6 times Mutt's speed. Four hours later Jeff is 1036 miles ahead of Mutt. If d_1 is the distance Mutt traveled, and if d_2 is the distance Jeff traveled, write an appropriate equation.

Solutions

1. a. 1440 km   b. 500 mi/hr   c. 4 hrs

2. a. $d = rt$ or $rt = d$ 3. $d_1 + d_2 = 18$ 4. $d_1 = d_2$

5. $d_1 + d_2 = 1096$ 6. $d_1 = d_2$

7. $d_1 + 1036 = d_2$ OR $d_2 - d_1 = 1036$ OR $d_2 - 1036 = d_1$

> "Formal education is but an incident in the lifetime of an individual. Most of us who have given the subject any study have come to realize that education is a continuous process ending only when ambition comes to a halt."
>
> *– R.I. Rees*

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