Section 1.6 Notes

Modeling with Equations

1 Investment-Style Questions

Simple Interest Formula

$$I = Prt$$

I is interest earned
P is the pricipal (the initial amount of money invested/borrowed)
r is the yearly interest rate (always written in decimal form, not percent)
t is the time in years

Example

Phyllis invested \$12000, a portion earning a simple interest rate of 4.5% per year and the rest earning 4% per year. After 1 year the total interest earned on these investments was \$525. How much did she invest at each rate?

Amount at 4.5%: \$9000

Amount at 4%: \$3000

2 "Working Together"-Style Questions

Explanation
In these examples, you will usually have two or more people working together to make a job get done faster.
The same formula works for things besides people, as well (for example two machines in a factory working on the same job).

Formula
Make sure all units of time are the same.

- For two people:

$$\frac{1}{A} + \frac{1}{B} = \frac{1}{T}$$

A is the time it takes for person A to finish the job alone
B is the time it takes for person B to finish the job alone
T is the time it takes to finish the job working together.

- For three people:

$$\frac{1}{A} + \frac{1}{B} + \frac{1}{C} = \frac{1}{T}$$

A is the time it takes for person A to finish the job alone
B is the time it takes for person B to finish the job alone
C is the time it takes for person C to finish the job alone
T is the time it takes to finish the job working together.

Example

Betty and Karen have been hired to paint the houses in a new development. Working together, the women can paint a house in two-thirds the time that it takes Karen working alone. Betty takes 6 hours to paint a house alone. How long does it take Karen to paint a house working alone?

3 hours

3 Mixtures/Concentration-Style Questions

Example

A jeweler has five rings, each weighing 18 grams, made of an alloy of 10% silver and 90% gold. She decides to melt down the rings and add enough silver to reduce the gold content to 75%. How much silver should she add?

18 g

4 Distance-Style Questions

Distance Formula

$$d = rt$$

d is the distance
r is the rate (speed)
t is the time
Make sure the units match. If d is in miles, and t is in hours, then r *must* be in miles/hour.

Example

Kiran drove from Tortula to Cactus, a distance of 250 miles. She increased her speed by 10 mi/h for the 360 mile trip from Cactus to Dry Junction. If the total trip took 11 hours, what was her speed from Tortula to Cactus?

50 mi/h