MATH 1010 ~ Intermediate Algebra

Chapter 2: LINEAR EQUATIONS AND INEQUALITIES

#### Section 2.3: Business and Scientific Problems

#### Objectives:

- \* Use mathematical models to solve business-related problems.
- \* Use mathematical models to solve mixture problems.
- \* Use mathematical models to solve rate problems.

It takes me 3 hours to perform a task; It takes my friend 5 hours. If we work together, how long should it take?

### **RATES IN BUSINESS**

#### ① EXAMPLE:

Simple Interest:

(#86) Find the annual interest rate on a CD that earned \$400 interest in 2 years on a principal of \$2500.

A = P(1+r) or I = Prt 
$$t = time (yrs)$$

A = and after time  $T = uiterest (t)$ 

P = principal (initial I = \$400
Investment)

r = interest rate (?)

P =  $t = time = 2 yrs$ 

$$T = Prt$$

$$t = time = 2 yrs$$

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$$t = time$$

#### 2 EXAMPLE:

(#32) An appliance store charges \$50 for the first 1/2 hour of a call and \$18 for each additional 1/2 hour of labor. Find the length of service call if you were charged \$104.

X = length of service call (hrs) 
$$y = length$$
 of service call (hrs)  $y = length$  of service call (hours)

104 = 50 + 18x (hours)

-50 -50

 $\frac{54}{18} = \frac{18x}{18}$ 
 $3 = x$ 
 $3(\frac{1}{2}) = \frac{3}{2} = 1.5 \text{ hrs}$ 
 $1(\frac{1}{2}hr) + 3(\frac{1}{2}hr)$ 

=  $4(\frac{1}{2}hr) = 2hrs$  total

### **3** EXAMPLE:

A department store sells a beach towel for \$14.00. On sale, the towel is \$10.00. What is the discount rate?

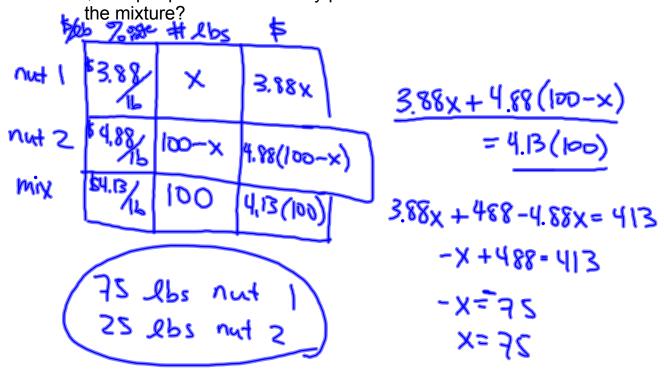
$$\frac{4}{14} = \frac{14x}{14} \qquad x \approx 0.2857 \approx 8.52$$

$$\frac{3}{3} = x$$

# **MIXTURE PROBLEMS**

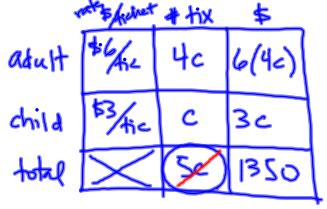
#### **4** EXAMPLE:

A grocer mixes two kinds of nuts costing \$3.88 per pound and \$4.88 per pound to make 100 pounds of a mixture costing \$4.13 per pound. How many pounds of each kind of nut are in



### **⑤** EXAMPLE:

Ticket sales for a spaghetti dinner total \$1350. There are 4 times as many adult tickets sold as children's tickets. The adult tickets are \$6.00 and the children's are \$3.00. Find the number of children's tickets sold.



$$6(4c) + 3c = 1350$$

$$24c + 3c = 1350$$

$$27c = 1350$$

$$c = 50$$

# **DISTANCE PROBLEMS**

d= distance d= rt r= rate (speed) t= time

**6** EXAMPLE:

You ride your bike at an average speed of 8 mi/hr. How long will it take you to ride 12 miles?

r=8mix t=? d=12mi

$$12 = 8t$$
 $\frac{12}{8} = t$ 
 $1.5 = \frac{3}{2} = t$ 
 $1.5 Ms$ 

#### **WORK-RATE PROBLEMS**

# **7** EXAMPLE:

I can complete a typing task in 4 hours. My daughter can do the task in 7 hours. How long will it take us if we work together?

t = time it takes to complete job together

$$28t \left(\frac{1}{4} + \frac{1}{4}\right) = \left(\frac{1}{4}\right) 28t$$

and of ant and of job done
in 1 hr daughter together

 $1 \text{ hr}$  in 1 hr

 $28t \left(\frac{1}{4}\right) + 28t \left(\frac{1}{4}\right) = \frac{28t}{4}$ 
 $7t + 4t = 28$ 
 $1t = 28$ 

# SOLVING FOR A VARIABLE IN A FORMULA

Solve for c in this formula.

$$s = C + rC$$