Warm Up

There are 95 grams of fat in 16 oz. of ground beef.

How much fat is in a 3 oz. patty of ground beef?

Key

$$\frac{grams\ of\ fat}{oz}$$

$$(3)\frac{95}{16} = \frac{x}{3}(3)$$

$$17.81 = x$$

$$17.8$$

Proportions Practice

For each problem, make a key. Then write the proportion and solve. Be sure to include units in your answer.

1.) Three pumps can remove a total of 1700 gallons of water per minute from a flooded mineshaft. If engineers want to remove at least 5500 gallons per minute, how many pumps will they need operating?

$$\frac{\text{\# of pumps}}{\text{gallons/min}}$$

$$(5500) \cdot \frac{3}{1700} = \frac{x}{5500} \cdot (5500)$$

$$9.7 = x$$

They will need ten pumps working.

2.) Geologists in Antarctica find an average of 7 meteorite fragments in every 500 tons of gravel they sift through. How much gravel must they sift through in order to get 100 fragments?

$$\frac{\text{tons of gravel}}{\text{\# of fragments}}$$

$$(100) \frac{500}{7} = \frac{x}{100} (100)$$

$$7142.9 = x$$

They must sift through 7142.9 tons of gravel.

3.) The ratio of boys to girls in Ms. Alper's math classes is 5 : 7. If there are 60 students in all of her classes, how many are boys?

5:7
There are 5 boys for every 7 girls.
5 boys out of 12 total.

$$\frac{\text{Boys}}{\text{Total Kids}}$$

$$(60) \frac{5}{12} = \frac{x}{60} (60)$$

$$25 = x$$

There would be 25 boys in a class of 60.

4.) A cookie recipe calls for 3 eggs and makes 4 dozen cookies.

a. How many (dozen) cookies could you make with a dozen eggs?

$$\frac{\text{Dozen Cookies}}{\text{\# of eggs}}$$

$$(12) \frac{4}{3} = \frac{x}{12} (12)$$

$$16 = x$$

You can make 16 dozen cookies with one dozen (12) eggs.

b. How many eggs would you need to make 18 dozen cookies?

$$\frac{\text{\# of eggs}}{\text{dozen cookies}}$$

$$(18) \frac{3}{4} = \frac{x}{18} (18)$$

$$13.5 = x$$

You will need 13.5 eggs to make 18 dozen cookies.

Notice how the ratios are flipped based on the problem.

5.) A case of 24 tennis balls weighs 3 pounds. How much would a shipment of 2560 tennis balls weigh?

$$\dfrac{weight}{tennis\ balls}$$

$$(2560)\ \dfrac{3}{24} = \dfrac{X}{2560}\ (2560)$$

$$320 = X$$

2560 tennis balls weigh 320 pounds.

6.) A map of Connecticut is drawn to a scale where 2 inches on the map represents 35 miles.

a. If Greenwich and Stonington are 105 miles from each other, how far apart do they appear on the map?

$$\dfrac{inches}{mile}$$

$$(105)\ \dfrac{2}{35} = \dfrac{X}{105}\ (105)$$

$$6 = X$$

Greenwich and Stonington are 6 inches apart on the graph.

b. On this same map the road from Mystic to Hartford is 1½ inches long. How far apart are Mystic and Hartford?

$$\dfrac{mile}{inch}$$

$$(1.5)\ \dfrac{35}{2} = \dfrac{X}{1.5}\ (1.5)$$

$$26.25 = X$$

Mystic and Hartford are 26.25 miles apart.

7.) A bag of 8 apples costs $1.50 at Sam's Orchard.

a. At this same rate, how much would 18 apples cost?

$$\dfrac{cost}{\#\ of\ apples}$$

$$(18)\ \dfrac{1.5}{8} = \dfrac{X}{18}\ (18)$$

$$3.375 = X$$

18 apples would cost approximately $3.38.

b. How many apples could you buy for $5.00?

$$\dfrac{\#\ of\ apples}{cost}$$

$$(5)\ \dfrac{8}{1.5} = \dfrac{X}{5}\ (5)$$

$$26.7 = X$$

You could buy about 27 apples for $5.

c. What is the unit cost per apple?

$$\dfrac{cost}{\#\ of\ apples}$$

$$\dfrac{1.5}{8} = \dfrac{X}{1}$$

$$0.19 = X$$

One apple costs 19 cents.

8.) Emily can ride her scooter 18 miles in 50 minutes.

a. At this same rate (speed) how far can she ride in two hours?

120 minutes

$$\boxed{\dfrac{\text{miles}}{\text{minute}}}$$

$$(120)\dfrac{18}{50} = \dfrac{X}{120}(120)$$

$$43.2 = X$$

She can ride 43.2 miles in 2 hours.

b. How long would it take for her to ride 4 miles?

$$\boxed{\dfrac{\text{minutes}}{\text{miles}}}$$

$$(4)\dfrac{50}{18} = \dfrac{X}{4}(4)$$

$$11.1 = X$$

It would take 11.1 minutes to ride 4 miles.

c. What is her unit rate in miles per hour?

$$\boxed{\dfrac{\text{miles}}{\text{minute}}}$$

$$(60)\dfrac{18}{50} = \dfrac{X}{60}(60)$$

60 minutes = 1 hour

$$21.6 = X$$

The unit rate is 21.6 miles per hour.

9.) Will's Widget Works can produce 2½ tons of widgets in an 8 hour work day.

a. How many widgets can Will's Widget Works produce between 9 am and noon?

$$\boxed{\dfrac{\text{tons of widgets}}{\text{hours}}}$$

$$(3)\dfrac{2.5}{8} = \dfrac{X}{3}(3)$$

3 hours

$$0.94 = X$$

They would produce 0.94 tons of widgets.

b. McGee Manufacturing, Inc. needs to order 17 tons of widgets. How many work days will it take Will's Widget works to fill this order?

$$\boxed{\dfrac{\text{hours}}{\text{tons of widgets}}}$$

$$(17)\dfrac{8}{2.5} = \dfrac{X}{17}(17)$$

total hours → $54.4 = X$

$$54.4 \div 8 = 6.8 \text{ work days}$$

It would take 6.8 8-hour work days to fill the order.

10.) The Jakobshavn Glacier in Greenland, reputed to be the fastest in the world, has sped up
lately (perhaps due to global warming?). The last accurate measurements have it travelling
at 5.25 kilometers (5250 meters) in a five month period. At this rate, how far does it travel
in a year?

$$\frac{km}{month}$$

$$(12)\frac{5.25}{5} = \frac{x}{12}(12)$$

12 months = 1 year

$$12.6 = x$$

At this rate, the glacier would
travel 12.6 km in one year.

Categorical Data vs. Numerical Data

Classify each variable as categorical (C) or numerical (N).

N 1. number of text messages you send in a day

C 2. brands of breakfast cereal

N 3. heights of students in your class

N 4. daily maximum temperature for your city

C 5. breeds of dogs

N 6. number of hours you sleep each night

C 7. types of flowers available from a florist

N 8. number of oranges in the 5-lb bags at a supermarket

N 9. heights of trees that were planted one year ago

N 10. number of students absent from school each day for one month

5.1 Wood or Steel? That's the Question
Relationships in Categorical Data

To plan a new amusement park, a team of coaster designers asked customers, "Do you prefer wood or steel frames in roller coasters?" The table shows the preferences by age group.

	Prefer Wood	Prefer Steel
Age ≤ 40 years	45	60
Age > 40 years	15	20

younger
older

? Does it look like younger and older riders have the same preferences in roller coaster type?

Problem 5.1

Study the roller coaster survey data by age of rider. Make a recommendation about the type of coaster that should be installed in the new park.

A Use the survey data. Is each statement *true* or *false*? Explain.

1. Younger riders are three times as likely as older riders to prefer wood-frame coasters. $\frac{45}{105} = 0.43$ $\frac{15}{35} = 0.43$ **FALSE**

2. Younger riders are three times as likely as older riders to prefer steel-frame coasters. $\frac{60}{105} = 0.57$ $\frac{20}{35} = 0.57$ **FALSE**

3. The number of riders who prefer wood-frame coasters is about three quarters of the number who prefer steel-frame coasters. $\frac{60}{80} = \frac{3}{4}$ **TRUE**

4. Younger riders are more likely than older riders to prefer steel-frame coasters.

5. Older riders are more likely than younger riders to prefer wood-frame coasters.

	Prefer Wood	Prefer Steel	totals
Age ≤ 40 years	45	60	105
Age > 40 years	15	20	35
totals	60	80	

Y
0

B Suppose that a park installed one of each type of roller coaster. One day there were 210 riders over the age of 40 and 420 riders under the age of 40. Use the survey data from Question A.

1. How many riders would you expect on the wood-frame coaster and how many on the steel-frame coaster?

2. How would you expect those riders to be distributed by age and coaster type in the following table?

	Prefer Wood	Prefer Steel	Total
Age ≤ 40 years	■	■	420
Age > 40 years	■	■	210
Total	■	■	■

C If only one roller coaster type could be installed in the park, which would you recommend? Explain your choice.

	Prefer Wood	Prefer Steel	Total
Age ≤ 40 years	180	240	420
Age > 40 years	90	120	210
Total	270	360	630

Homework

Finish classwork