Real World Rates Name_____

A ***rate*** is a comparison of the measures of two things. We **divide** the two measures.

For example, if a car travels 150 miles in 3 hours, we divide:

$$150 \text{ miles} \div 3 \text{ hours} = \frac{150 \text{ miles}}{3 \text{ hours}} = 50 \text{ miles per hour}$$

Per means "for every" or "for each" or "for one." Fifty miles per hour means the car travels an average of 50 miles each hour.

Per means to divide.

If a problem is looking for ***"per gallon"*** then you put gallons in the denominator, which means you will divide by the number of gallons.

For example, if a car travels 150 miles, using 4.8 gallons of gas, and we want to find miles per gallon, we divide:

$$150 \text{ miles} \div 4.8 \text{ gallons} = \frac{150 \text{ miles}}{4.8 \text{ gallons}} = 31.25 \text{ miles per gallon}$$

Rates are so commonly used in the world that abbreviations such as *mph* and *mpg* are often used.

Answer the following questions (use mental math when possible and round off as needed).

1. The Jones family traveled 1200 miles to Walt Disney World on vacation and used 60 gallons of gas. What was the average number of miles per gallon on the trip?

2. The snack box has 10 ounces and has 5.5 servings in the box. What is the number of ounces per serving?

3. An Olympic distance runner covers 26 miles in 2 hours and 10 minutes. Determine his race pace, in minutes per mile.

Day: 1.1 ~ Obj.: 1.a

Real World Rates Name_____

A *rate* is a comparison, using division, of the measures of two different things or quantities. We **divide** the two measures.

When asked for a rate, the words "for each" or "for every" may be used.

For example, if we buy 200 baseball cards for $16.00 and we want to find the cost of each card, we divide:

$\$16.00 \div 200 \text{ cards} = \frac{\$16.00}{200 \text{ cards}} = \$0.08 \text{ per card}$, which means each card costs 8 cents.

To find the cost for one item, divide by the number of items you have.

Answer the following questions (use mental math when possible and round off as needed).

1. A farmer harvests 7,250 bushels of corn from 50 acres. Find the number of bushels from each acre.

2. A carton of eggs costs $3.18. Each carton contains a dozen eggs. How much does each egg cost?

3. During the spring, when the snow and ice melts in the Inka Binka Mountains, it causes the Habooka River to rise. If the river rises 42 cm in one week, how much does the river rise in one day?

Day: 1.2 ~ Obj.: 1.b

Finding Unit Rates

Name_____

A ***unit rate*** is tells us how much of something we need for <u>one</u> unit of another.

For example, a used book store sells 15 books for three dollars. Let's say we want to find how much it costs for **1 book**:

$$\$3.00 \div 15 \text{ books} = \frac{\$3.00}{15 \text{ books}} = \$0.20 \text{ per book,}$$

which means it costs 20 cents for one book.

Now let's find how many books you can buy for **1 dollar**:

$$15 \text{ books} \div 3 \text{ dollars} = \frac{15 \text{ books}}{\$3.00} = 5 \text{ books per dollar,}$$

which means you can buy 5 books for one dollar.

To find a unit rate, you divide by that unit. For example, to find a unit rate for one dollar, divide by the number of dollars. Notice that dollars must be in the denominator**.**

Answer the following questions (use mental math when possible and round off as needed).

1. The Krispy Kreme Donut Machine can make 5 donuts in 10 seconds! How many donuts can it make in 1 second? How many seconds does it take to make 1 donut?

2. Angie puts 1/3 of a gallon of gas in her lawn mower. She can mow the lawn 4 times before she needs to refill it. How many gallons of gas does it take to mow the lawn once? How many times can she mow the lawn with one gallon of gas?

Finding Rates From Amounts

Name_____

We know that to find a rate we usually **divide**. **Sometimes an extra step is required *before* we divide.**

For example, Chuck starts playing a computer game at 2:13 and he gets 3,000 points, when the game is over the clock reads 2:27. How many points did he get per minute?

First, we subtract to find how long he played.

2:27 – 2:13 means he played for 15 minutes

Then divide:

$$\frac{3000 \text{ points}}{15 \text{ minutes}} = 200 \text{ points per minute}$$

Answer the following questions (use mental math when possible and round off as needed).

1. Ryan finished 12 of his homework problems at school. He starts working on his homework at 5:00. By 6:30 he has 36 finished, how many problems can Ryan do per hour?

2. Once finished with his homework, he heads off to hockey practice. The odometer reads 12502 before he leaves and when he arrives a ½ hr later it reads 12520. What was his average speed for his trip (in miles per hour)?

3. At practice the team wants to know how fast Ryan can skate. He skates 10 laps around the rink in 3 minutes and, later on in practice he skates 5 laps in 1 minute. What was his average speed in laps per minute?

Finding Rates from a Graph

Name_____

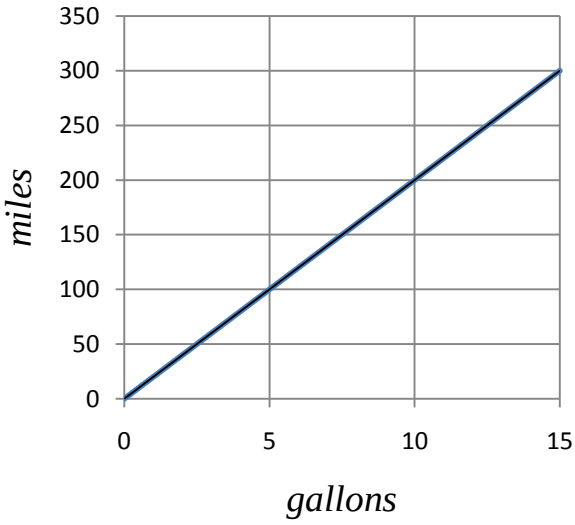
A ***rate*** is a comparison using division. **Sometimes the numbers we'll divide come from a graph** (a graph is a good way to show change).

Example: Use the graph to find the miles per gallon for the car at the right. To find miles per gallon we need to divide the number of miles traveled by the number of gallons. We see in the diagram that the car traveled 300 miles and used 15 gallons.

$$300 \text{ miles} \div 15 \text{ gallons} = \frac{300 \text{ miles}}{15 \text{ gallons}}$$

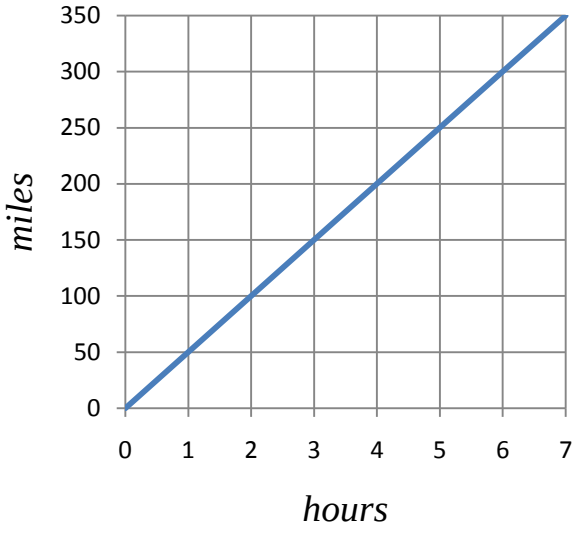
$$= 20 \text{ miles per gallon}$$

Note that we could have used a different point such as (5 gallons, 100 miles) and arrived at the same answer.

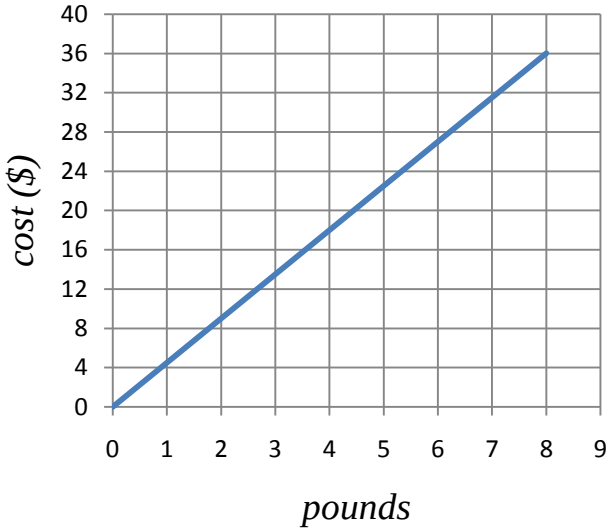


Answer the following questions using the graphs (use mental math when possible and round off as needed).

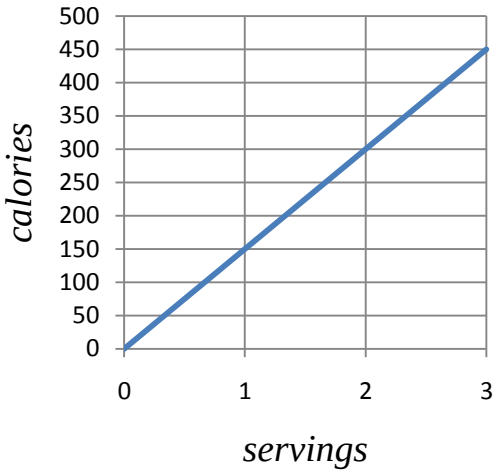
1. Find the miles per hour.



2. Find the cost per pound of the chocolate.



3. Find the calories per serving.



Day: 2.2 ~ Obj.: 1.e

Finding Rates from a Table Name_____

A ***table*** can show information in a neat, organized way. **Sometimes the numbers we'll divide to find a rate come from a table.**

For example, the following table shows the cost of buying tickets for rides at the county fair.

Tickets	Cost ($)
5	10
10	15
20	30

Is the cost per ticket the same whether you buy 5, 10 or 20?
Remember cost per ticket means we will divide the cost by the number of tickets.

For 5 tickets, \$10 ÷ 5 tickets = $\frac{\$10}{5 \text{ tickets}}$ = \$2 per ticket.

For 10 tickets, \$15 ÷ 10 tickets = $\frac{\$15}{10 \text{ tickets}}$ = \$1.50 per ticket.

For 20 tickets, \$30 ÷ 20 tickets = $\frac{\$30}{20 \text{ tickets}}$ = \$1.50 per ticket.

It costs the same amount per ticket to buy 10 or 20 tickets, but it costs more per ticket if you only buy 5 tickets.

Answer the following question (use mental math when possible and round off as needed).

1. The following table shows the cost of buying tokens at the local arcade

Tokens	Cost ($)
10	5.00
25	12.50
40	18.00

Is the cost per token the same whether you buy 10, 20, or 50 tokens?

Finding Rates

Name_____

Sometimes we are faced with problems which ask for a rate, but the numbers to divide are not directly given. So, we first find the amounts we need to divide.

To find a rate we may need to first find the total units by subtracting and then divide.

For example, if a car's odometer reads 25,500 at 3:00, and 25,650 at 6:00, we can find the unit rate:

To find miles traveled: 25650 – 25500 = 150 miles

To find the total time: 6:00 – 3:00 = 3 hours

$$150 \text{ miles} \div 3 \text{ hours} = \frac{150 \text{ miles}}{3 \text{ hours}} = 50 \text{ miles per hour}$$

A ***unit rate*** is how many of the first type corresponds to one unit of the second type. Common examples of this are miles per hour, cost per item, and earnings per week.

Answer the following questions (use mental math when possible and round off as needed).

1. Molly is selling candy bars for a fundraiser. She started at 12:00 with 60 bars and ended at 5:00 with 20. How many bars did Molly sell per hour?

2. A scuba diver searching for a missing treasure starts with 30 cubic feet of air in his tank. He was under water from 3:15 to 3:30 and when he resurfaced he had 12 cubic feet of air left. How many cubic feet per minute did he use?

3. Sam spent his day shopping at the local mall. He started his day with $74.03 in his wallet and purchased 3 shirts, 2 hats, and 1 pair of pants. When he counted his money at the end of the day he had $5.33 left. What is his average cost per item?

Finding Reciprocal Rates

Name_____

Often you are given the rate in terms of one thing and we want it in terms of the other. Recall, for example, that the ***reciprocal*** of $\frac{5}{8}$ is $\frac{8}{5}$. The reciprocal is the multiplicative inverse.

To find the reciprocal rate, switch the unit positions and take the inverse of the number.

For example, if we are given the rate 5 miles per hour and want to find the hours per mile:

$$\frac{5 \text{ miles}}{1 \text{ hour}} \text{ can be switched to } \frac{\frac{1}{5}\text{hour}}{1 \text{ mile}}$$

Always simplify when possible.

For example, if we are given the rate 24 miles in 4 hours, we can find the hours per mile:

$$\frac{24 \text{ miles}}{4 \text{ hours}} = \frac{6 \text{ miles}}{1 \text{ hour}} \text{ can be written as } \frac{\frac{4}{24}\text{hours}}{1 \text{ mile}} = \frac{\frac{1}{6}\text{hour}}{1 \text{ mile}}$$

Rates are so commonly used in the world that abbreviations such as *mph* and *mpg* are often used.

Answer the following questions (use mental math when possible and round off as needed).

1. Mike's car gets 30 miles per gallon highway gas mileage. His brother wants to borrow the car and Mike decides he is going to charge him per mile. How many gallons does the car use per mile?

2. Maria purchased some kiwi for 40 cents per pound. How many pounds of kiwi did she get per dollar?

3. During a relay race the team traveled 12 miles in 36 minutes. What was their average in minutes per mile?

Mixed Practice 1 Name_____

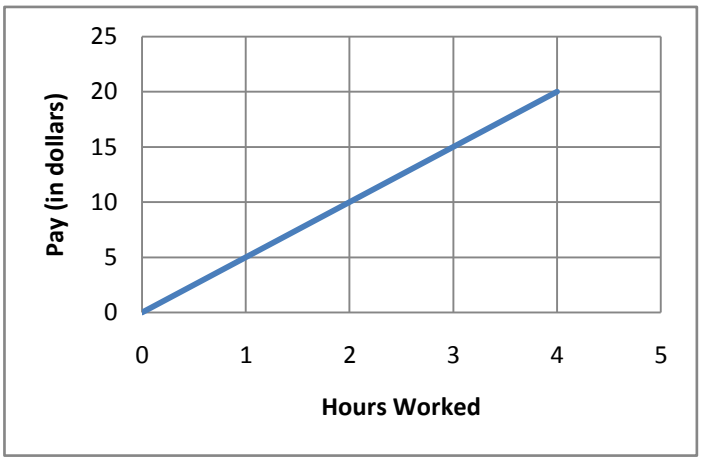
Use any method to answer the following questions (use mental math when possible and round off as needed).

1. At Steve's hot dog stand he sold 30 hot dogs over a 15 minutes time period.
   a. How many hot dogs did he sell in 1 minute?

   b. How long did it take (on average) to sell 1 hot dog?

2. Julie has a part-time job. The graph at the right. Shows the relationship between time worked and pay.
   a. What was her pay per hour?

   b. How long does it take to make one dollar?



3. At 3:00 p.m. the temperature was 84º. At 5:00 p.m. the temperature was 93º. At what rate is the temperature increasing?

Day: 3.3 ~ MP1

The Meaning of Rates

Name_____

Q: Jack goes fishing. He catches 6 fish per hour. What does this mean?

A: Remember, *per* means 'for one.' So, a rate of 6 fish per hour means in one hour he catches 6 fish.

Q: Jill catches fish at a rate of 15 minutes per fish (quarter hour per fish). What does this mean?

A: This means each fish takes 15 minutes (quarter hour) to catch.

Q: Who is catching fish faster, Jack or Jill?

A: Jack is catching fish faster. We can see this in two ways. Jill catches 4 fish in an hour, which is smaller than Jack's 6 fish per hour, so she must be catching them slower. The other way to see it is to figure out how long it takes Jack to catch 1 fish. He can catch 6 fish in one hour which is 60 minutes. That's one fish every 10 minutes, which is quicker than Jill's rate of one fish every 15 minutes.

Q: Jack catches 6 fish per hour. Would he rather this number be larger or smaller?

A: Larger, because he'll have more fish each hour.

Q: Jill catches fish at a rate of 15 minutes per fish. Would she rather this number be larger or smaller?

A: Smaller, because it will take less time per fish.

To understand the meaning of rates recall that <u>per</u> can mean

for one ▪ for each ▪ for every ▪ in one ▪ in each ▪ in every.

Answer the following questions (use mental math when possible and round off as needed).

1. Madison is braiding friendship bracelets at a rate of 3 bracelets per hour. Explain what this means.

2. Jordan is delivering newspapers at a rate of 1 minute per paper.
   a. Explain what this means.

   b. Taylor delivers 45 newspapers per hour. Explain what this means.

   c. Who is faster, Jordan or Taylor?

   d. How many newspapers will Jordan deliver in two hours?

   e. How many newspapers will Taylor deliver in two hours?

Comparing Rates Name_____

Often we need to compare rates to make a decision. For example, to decide which of the following bag of potato chips is the better deal

Bob's Tato Chips are $4.20 for a 7 ounce bag
Larry's Salty Crisps are $5.00 for an 8 ounce bag

Method 1: Find cost per ounce

$$\$4.20 \div 7 \text{ ounces} = \frac{\$4.20}{7 \text{ ounces}} = \$.60 \text{ per ounce}$$

$$\$5.00 \div 8 \text{ ounces} = \frac{\$5.00}{8 \text{ ounces}} = \$.625 \text{ per ounce}$$

This means that Bob's Tato Chips are 60 cents an ounce and Larry's Salty Crisps are 62.5 cents per ounce. Bob's Tato chips are less expensive so they are the better deal.

Method 2: Find ounces per dollar

$$7 \text{ounces} \div \$4.20 = \frac{7 \text{ ounces}}{\$4.20} = 1.67 \text{ ounces per dollar}$$

$$8 \text{ ounces} \div \$5.00 = \frac{8 \text{ ounces}}{\$5.00} = 1.60 \text{ ounces per dollar}$$

These rates tell us how much you get for one dollar. This means that you can by .07 ounces MORE per dollar of Bob's Tato Chips than Larry's Salty Crisps. Because you can get more potato chips for the same amount of money, Bob's Tato Chips are the better deal.

To compare rates for two situations, use the same units to find the rate for each situation, then consider the meaning of the units to decide which one is "better."

Answer the following questions (use mental math when possible and round off as needed).

1. Bill sees two boxes of baseball cards at a card show. The first box has 150 cards for $12.55. The second box has 120 cards for $9.60. The cards in which box are cheaper?

2. There are two ways to mix the hot chocolate mix in hot water. One set of directions says to mix 2 tablespoons of mix in 6 ounces of hot water. The second set of directions says to mix 2.5 tablespoons of mix in 7 ounces of hot water. Which directions will give hot chocolate that is *more chocolaty*?

3. A bag of Valentine chocolate is $8.20 for 2 pounds. A box of Valentine chocolate is $8.91 for 2.2 pounds. Kevin divides 8.20 ÷ 2 and gets 4.10 and then divides 8.91 ÷ 2.2 and gets 4.05. He says, "The *bag* is the better buy, because 4.10 is greater than 4.05." Is Kevin correct?

Day: 4.2 ~ Obj.: 2.b

Mixed Practice 2 Name_____

Use any method to answer the following questions (use mental math when possible and round off as needed).

1. A scientist makes a saline solution in which he mixes 15 milligrams of salt in 2 liters of water. His lab assistant mixes a solution of 40 milligrams of in 5 liters of water. Which solution is saltier?

2. A ray gun can vaporize 4.2 grams of matter per second.
    a. What does this mean?

    b. An engineer tries to build a better ray gun. He aims it at a box of Klondike bars that is 486 grams. After 10 seconds, only 443 grams are left. Is his ray gun better?

Day: 4.3 ~ MP2

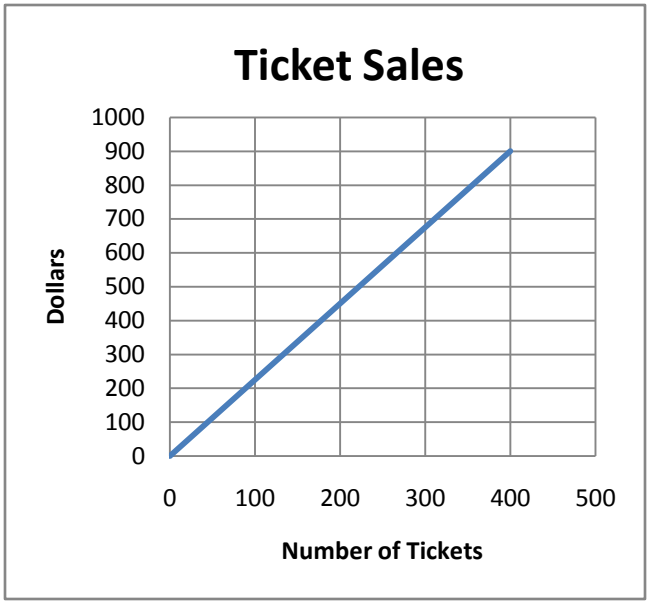
Quiz 1 Name_____

Use any method to answer the following questions (use mental math when possible and round off as needed). Use a calculator when appropriate.

1. A farmer harvests 2,480 bushels in 15.5 acres.
   a. Find the number of bushels per acre.

   b. Find the number of acres per bushel.

2. Sam took tickets at the volleyball game. The graph shows the relationship between tickets sold and the amount of money collected. What is the price per ticket?



3. The Video Central Company sells video games over the Internet. The table shows the shipping cost for three different games they sell. Find the shipping cost per pound for the Vii Game System.

Shipping Costs		
Item	Weight (pounds)	Cost ($)
YBOX720	2	$10.52
Vii Game System	2.3	$12.42
PT4 Console	2.6	$13.78

4. Two machines are manufacturing T-Shirts. Machine A can make a T-shirt in 5 minutes. Machine B can make a T-shirt in 3 minutes. Which machine can make more in an hour?

5. Ashley and Jessica are painting their nails. Ashley puts 2 mL of finger nail polish on an area of 9 square centimeters. Jessica puts 2.3 mL of finger nail polish on an area of 11 square centimeters. Which girl has the thicker layer of polish on her fingers?

Multiplying Rates and Amounts

Name_____

Suppose a car travels 30 miles per hour for 4 hours. 30 miles per hour can be written as $\frac{30 \text{ miles}}{1 \text{ hour}}$. If we **multiply** by 4 hours we get the number of miles traveled.

$$\frac{30 \text{ miles}}{1 \text{ hour}} \times 4 \text{ hours} = \frac{30 \text{ miles}}{1 \text{ hour}} \times 4 \text{ hours} = 120 \text{ miles}$$

***Like units that are in the numerator (top) and the denominator (bottom) cancel*. A number that is multiplied which is *not* a fraction is treated as a number on the top (in the numerator).**

Answer the following questions (use mental math when possible and round off as needed).

1. A car gets 25 miles per gallon and has a 9 gallon tank. How far can you travel on a full tank?

2. Candy costs $1.50 per pound and you buy 3.4 pounds. How much does the candy cost?

3. Andy can eat 5 pieces of candy in 30 minutes. He ate candy for three and a half hours straight. How much candy did he eat?

Day: 5.2 ~ Obj.: 3.a

Using Rates to Convert Units

Name_____

Units can be converted using rates. A ***unit multiplier*** is a fraction (a rate) in which the numerator and denominator are equal (but different units). A unit multiplier is equal to 1. We can multiply by a unit multiplier and it will not change the size of the object (because we are multiplying by 1).

Examples of unit multipliers:

$$\frac{12 \text{ inches}}{1 \text{ foot}}, \frac{1 \text{ pound}}{16 \text{ ounces}}, \frac{1000 \text{ m}}{1 \text{ km}}, \frac{1 \text{ foot}}{12 \text{ inches}}, \frac{1 \text{ year}}{365 \text{ days}}, \frac{365 \text{ days}}{1 \text{ year}}.$$

Notice that you may use reciprocals (because the reciprocal of 1 is 1!).

To convert units we multiply by a unit multiplier. **When a number is not a fraction (just a number) or on the top (numerator) of a fraction we multiply. When a number is in the bottom (denominator) you divide. Cancel like units.**

We chose which unit multiplier to use by looking at the units we have and the units we want in our answer.

For example, if a mouse travels 24 feet we can find how many inches he traveled:

$$24 \text{ feet} \times \frac{12 \text{ inches}}{1 \text{ foot}} = 24 \cancel{\text{feet}} \times \frac{12 \text{ inches}}{1 \cancel{\text{foot}}} = 288 \text{ inches}$$

For example, if a person is waiting in line for 150 minutes we can find how many hours they waited:

$$150 \text{ minutes} \times \frac{1 \text{ hour}}{60 \text{ minutes}} = 150 \cancel{\text{minutes}} \times \frac{1 \text{ hour}}{60 \cancel{\text{minutes}}} = 2.5 \text{ hours}$$

Notice that since 60 is on the bottom, we ***divide*** by 60.

Answer the following questions (use mental math when possible and round off as needed).

1. A football player ran the ball 27 yards, how many feet did he run the ball?

2. A heart beats at 72 bpm (beats per minute). How many beats per second is this?

3. How many liters is 8 quarts? (1 liter = 1.057 quarts)

BONUS) How many seconds are there in a 365 day year?

Day: 5.3 ~ Obj.: 3.b

Scale Drawings and Map Keys

Name_____

A ***scale drawing*** is a representation of a large object in a small figure (or possibly, a enlarged picture of a tiny object). The scale, such as 1 cm = 30 ft gives us a unit multiplier, $\frac{30 \text{ feet}}{1 \text{ cm}}$ (also, we could use $\frac{1 \text{ cm}}{30 \text{ feet}}$.)

Just like converting units, we multiply by a unit multiplier to find the actual size of a scale drawing.

The equal sign in a key to set up the unit multiplier.

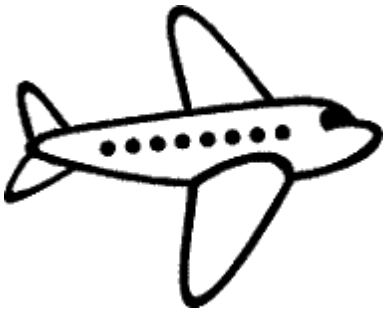
For example, to find the actual length of the airplane we measure the drawing and multiply by the scale:

The length of the drawing is 5 cm.

1 cm represents 30 feet.

$5 \text{ cm} \times \frac{30 \text{ feet}}{1 \text{ cm}} = 150 \text{ feet}$

1 cm = 30 ft



A ***Map Key*** works in the same way as a scale drawing, with the of size the measure being distance.

Scale drawings are commonly used by architects and mapmakers.

Answer the following questions (you will need a ruler).

1. What is the height of the Sears Tower?

1 cm = 432.5 ft

2. You would like to travel from Chicago to Springfield. On the map they are 15 inches apart. What is the distance in miles between the two cities?

KEY:
1 inch = 12 miles

3. Decatur and Springfield are 3.25 inches apart. What is the distance between Decatur and Springfield?

KEY:
1 inch = 12 miles

Day: 6.1 ~ Obj.: 3.c

Multiplying Rates to Solve Problems Name_____

Often a problem involves two rates.

Multiplying the rates and cancelling some of the units is often useful.

For example, if a farmer can harvest 200 acres per day and gets 150 bushels per acre, we can multiply these rates. Notice that some of the units cancel.

$$\frac{200 \text{ acre}}{1 \text{ day}} \times \frac{150 \text{ bushel}}{1 \text{ acre}} = \frac{200 \text{ } \cancel{\text{acre}}}{1 \text{ day}} \times \frac{150 \text{ bushel}}{1 \text{ } \cancel{\text{acre}}} = 30{,}000 \text{ bushel per day}$$

This means that in a day he harvests 30,000 bushels.

Answer the following questions (use mental math when possible and round off as needed).

1. At the bowling alley it costs $1.10/game. In an hour 20 games can be played. Find the cost per hour.

2. Gold costs $880 per troy ounce. A gold bar weighs 400 troy ounces. Find the cost of 3 gold bars.

3. John is unpacking a case of Trideal chewing gum. There are 10 sticks of gum per package. There are 6 packages per bag. The case contains 80 bags.
   a. How many packages are in the case?
   b. How many sticks of gum are in the case?

Multiplying Rates to Convert Units Name_____

To convert units in rates we multiply by a unit multiplier.

Recall, that we get unit multipliers from equations, such as 1 hour = 60 minutes.
We chose either $\left(\frac{1 \text{ hour}}{60 \text{ minutes}}\right)$ or $\left(\frac{60 \text{ minutes}}{1 \text{ hour}}\right)$ depending on which units we want to cancel (and which units we want in our answer.

For example, Mandy is driving through the desert at 75 miles per hour. What is her speed in miles per minute?

$$\left(\frac{75 \text{ miles}}{1 \text{ hour}}\right) \times \left(\frac{1 \text{ hour}}{60 \text{ minutes}}\right) = \left(\frac{75 \text{ miles}}{1 \cancel{\text{ hour}}}\right) \times \left(\frac{1 \cancel{\text{ hour}}}{60 \text{ minutes}}\right) = \left(\frac{75 \text{ miles}}{60 \text{ minutes}}\right) = \left(\frac{5 \text{ miles}}{4 \text{ minutes}}\right)$$

5 miles ÷ 4 minutes = 1.25 miles per minute

Remember, ***the units must cancel out***. The unit on the bottom of one fraction must be on the top of another fraction.

For example, a machine produces 20 yards of fabric in one hour. Let's find how many feet it produces per minute.

$$\left(\frac{20 \text{ yards}}{1 \text{ hour}}\right) \times \left(\frac{1 \text{ hour}}{60 \text{ minutes}}\right) \times \left(\frac{3 \text{ feet}}{1 \text{ yard}}\right) = \left(\frac{20 \cancel{\text{ yards}}}{1 \cancel{\text{ hour}}}\right) \times \left(\frac{1 \cancel{\text{ hour}}}{60 \text{ minutes}}\right) \times \left(\frac{3 \text{ feet}}{1 \cancel{\text{ yard}}}\right) = \left(\frac{60 \text{ feet}}{60 \text{ minutes}}\right) = \left(\frac{1 \text{ feet}}{1 \text{minute}}\right)$$

= 1 foot per minute

Answer the following questions (use mental math when possible and round off as needed).

1. Sam is making cookies. He needs 1 cup of flour for every dozen cookies he makes. How many tablespoons of flour are in 1 cookie? (There are 8 tablespoons per cup.)

2. There are 150 calories per bottle of juice. There are 354 mL of juice per bottle. How many calories per mL?

3. Mary is mowing the lawn. She can mow half the lawn in 15 minutes. How many lawns can she mow per hour?

Mixed Practice 3 Name_____

Use any method to answer the following questions (use mental math when possible and round off as needed).

1. A school district has a policy that each class must have 20-25 students.
   At Millwood Middle, they have an average of 21 students per class among the 5 math classes.
   a. If 18 new students enroll, does the school need to hire a new teacher?

   b. What is the minimum number of students that need to enroll in order to hire a new teacher?

2. Blood travels at a rate of .7 miles per hour. In 20 seconds, a drop of blood can circulate completely from the heart, through the body, back to the heart.
   How far does a drop of blood travel in one complete circulation?

Day: 7.1 ~ MP3

Solving Proportions - Using Doubling or Halving

Name_____

Proportion problems are common in real life (and on math tests ☺). ***Some proportions can be solved by doubling or by halving.***

Example 1: If 14 ounces of weed killer are needed for 2000 square feet for a lawn, how many ounces are needed for 1,000 square feet?
Solution: Since the area is cut in half, we can cut the number of ounces in half to get 7 ounces.

Example 2: If 14 ounces of weed killer are needed for 2000 square feet, how many ounces are needed for 4,000 square feet?
Solution: Since the area is doubled, we can double the number of ounces to get 28 ounces.

These can be set up as a proportion (fraction equal to a fraction).

$$\frac{14 \text{ oz.}}{2000 \text{ sq. ft.}} = \frac{x \text{ oz.}}{1000 \text{ sq. ft.}}$$ since bottom is divided by two, divide the top by two

Giving an answer of 7 oz.

For example 2:

$$\frac{14 \text{ oz.}}{2000 \text{ sq. ft.}} = \frac{x \text{ oz.}}{4000 \text{ sq.ft.}}$$ since bottom is doubled by two, double the top

Giving an answer of 28 oz.

Answer the following questions (use mental math when possible and round off as needed).

1. If a 58 kilobyte document takes 3 seconds to download, how long will it take for a 116 kilobyte document to download?

2. A waiter makes $62 in tips in 8 hours. How much can the waiter expect to make in 4 hours?

3. If 300 mL of a solution contains 6.14 g of sodium, how many grams of sodium are in 600 ml of the solution?

Solving Proportions - Using Factor of Change or the Equivalent Fraction Method

Name_____

Proportion problems are common in real life (and on math tests ☺). ***Some proportions can be solved by using a factor of change or the equivalent fraction method.***

Example 1: If you can get $6 for 10 pounds of aluminum (at the recycling center), how much will you get for 80 pounds of aluminum?

Since the weight is multiplied by 8, we do the same to the price and we get an answer of $48.

$$\frac{\$6}{10 \text{ pounds}} = \frac{\$6 \times 8}{10 \text{ pounds} \times 8} = \frac{\$48}{80 \text{ pounds}}$$

Example 2: If you can get $6 for 10 pounds of aluminum, how much will you get for 35 pounds of aluminum?

First we can reduce $6 for 10 pounds to an equivalent ratio of $3 for 5 pounds.
Then we multiply both the weight and the price by 7.

$$\frac{\$6}{10 \text{ pounds}} = \frac{\$6 \div 2}{10 \text{ pounds} \div 2} = \frac{\$3}{5 \text{ pounds}} = \frac{\$3 \times 7}{5 \text{ pounds} \times 7} = \frac{\$21}{35 \text{ pounds}}$$

These can be set up as a proportion (fraction equal to a fraction).

$\frac{\$6}{10 \text{ pounds}} = \frac{\$ \times}{80 \text{ pounds}}$ Multiply the top and bottom by 8, giving an answer of $48.

$\frac{\$6}{10 \text{ pounds}} = \frac{\$ \times}{35 \text{ pounds}}$ As above, reduce the $\frac{6}{10}$ to $\frac{3}{5}$ and then multiply the top and bottom by 7, giving an answer of $21.

Answer the following questions (use mental math when possible and round off as needed).

1. If 2 cups of sugar are need for 2½ quarts of Cool-aid, how much sugar is needed for 7½ quarts of Cool-aid?

2. If a 5 foot boy casts a 4 foot shadow, and the shadow of the tree is 36 feet, how tall is the tree?

3. If there are 12 deer in 40 acres, how many deer would we expect in 70 acres?

Day: 7.3 ~ Obj.: 5.b

Solving Proportions - Using the Unit Rate Method

Name_____

Proportion problems can be solved by using the <u>unit rate</u>.

Example 1: If you can get $25 for 10 pounds of recycled cooper, how much will you get for 7 pounds of cooper?

First, find the cost per pound. Per means divide, so we divide by the number of pounds to get $2.50 per pound. Then, multiply by 7 pounds.

$$\frac{\$25}{10 \text{ pounds}} = \$2.50 \text{ per pound}$$

$$\frac{\$2.50}{1 \text{ pound}} \times 7 \text{ pounds} = \$17.50 \quad \text{The answer is } \$17.50.$$

Example 2: If a hose can fill 40 gallon tank in 3 minutes, how long will it take to fill a 19,000 gallon swimming pool?

First, find the amount of time per gallon.

$$\frac{3 \text{ minutes}}{40 \text{ gallons}} = .075 \text{ minutes per gallon}$$

$$\frac{.075 \text{ minutes}}{1 \text{ gallon}} \times 19000 \text{ gallons} = 1425 \text{ minutes}$$

We can convert to hours: $1425 \text{ minutes} \times \frac{1 \text{ hour}}{60 \text{ minutes}} = 23.75 \text{ hours}.$

The answer is 1425 minutes or 23.75 hours.

These can be set up as a proportion.

$$\frac{\$25}{10 \text{ pounds}} = \frac{\$ \times}{7 \text{ pounds}} \quad \text{and} \quad \frac{3 \text{ minutes}}{40 \text{ gallons}} = \frac{\times \text{ minutes}}{19000 \text{ gallons}}$$

Answer the following questions (use mental math when possible and round off as needed).

1. If Sam is paid $12.78 for 3 hours of work, how much should he be paid for 5 hours of work?

2. It's clean-up time at the ball park after the big game. Four crew members can clean up 3½ sections of the stadium in a half hour. If only 3 crew members are available, how many sections can they clean up in a half hour?

3. If Shaneel O'Keel can make 45 free throws out of 100, how many will he make out of 40?

Day: 8.1 ~ Obj.: 5.c

Solving Proportions - Using Cross Multiplication

Name_____

The doubling, halving, factor of change, or equivalent fraction methods work on many proportion problems and are fast and easy to use. If these methods won't work you can always use cross multiplication.

Proportion problems can be solved by cross multiplying.

Example 1: If you can get $25 for 10 pounds of recycled cooper, how much will you get for 7 pounds of cooper?

$$\frac{\$25}{10 \text{ pounds}} = \frac{\$\ x}{7 \text{ pounds}}$$

Cross multiplication gives: 17.50 = 10x
Then we divide both sides of the equation by 10, giving 17.50 = x.
We see in the proportion that x was in dollars, so the answer is $17.50.

Example 2: If a hose can fill 40 gallon tank in 3 minutes, how long will it take to fill a 19,000 gallon swimming pool?

$$\frac{3 \text{ minutes}}{40 \text{ gallons}} = \frac{x \text{ minutes}}{19000 \text{ gallons}}$$

Cross multiplication gives: 57000 = 40x
Then we divide both sides of the equation by 40, giving 1425 = x.
We see in the proportion that x was in minutes, so the answer is 1425 minutes.

Answer the following questions (use mental math when possible and round off as needed).

1. A recipe requires three cups of flour and two eggs to make eight servings of a cake. How many cups of flour are needed to make 20 servings of the same cake?

2. There are 114 calories in ¾ cups of Kellogg's Frosted Flakes. How many calories are there in 2¼ cups?

3. A surveillance camera photographs a shoplifter in front of a 3.6 foot counter. In the photograph, the shoplifter appears to be 6 inches tall and the counter appears 3.9 inches. How tall is the shoplifter in feet (round off to one decimal place)?

Mixed Practice 4 Name_____

Use any method to answer the following questions (use mental math when possible and round off as needed).

The Boston Molasses Disaster, also known as the Great Molasses Flood and the Great Boston Molasses Tragedy, occurred on January 15, 1919, in the North End neighborhood of Boston, Massachusetts. A 50 foot high, 90 foot diameter molasses tank burst and a wave of molasses rushed through the streets at an estimated speed of 35 mph, killing 21 and injuring 150 people.

1. How fast was the molasses moving in feet per minute? (5,280 feet = 1 mile)

2. Billy is making a diorama depicting the event. He uses 4 inch high clothes pins to represent men 6 feet tall. How high should he make his felt molasses wave if he wants it to appear to be 12 feet?

3. Marcia is making a 4.5 foot tall model of the giant molasses tank. What should the diameter of her model tank be?

Day: 8.3 ~ MP4

Quiz 2 Name_____

Use any method to answer the following questions (use mental math when possible and round off as needed). Use a calculator when appropriate.

1. A car gets 28 miles per gallon and has an 11 gallon tank. How far can you travel on a full tank?

2. How many liters is 6 quarts? (1 liter = 1.057 quarts)

3. At the miniature golf course it costs $4.60/game. In an hour 15 games can be played. Find the revenue per hour.

4. If 400 mL of a solution contains 8.42 g of sulfur, how many grams of sulfur are in 800 mL of the solution?

5. There are 450 calories in $\frac{2}{3}$ cups of trail mix. How many calories are there in $2\frac{2}{3}$ cups?

Day: 9.1 ~ Quiz 2

Dividing Rates to Find Amounts Name_____

We have learned how to multiply a rate by an amount. For example, if gas cost $3.75 per gallon, how much would 5 gallons cost?

$$5 \text{ gallons} \times \left(\frac{\$3.75}{1 \text{ gallon}}\right) = \$18.75$$

Sometimes, we need to divide to get our answer. For example, if you have $5 and gas costs $3.75 per gallon, how many gallons can we buy? Our answer is in gallons, so gallons needs to end up on the top of our rate. Furthermore, we want dollars to cancel out. We will need to flip our rate upside down to get the answer!

$$\$5 \div \left(\frac{\$3.75}{1 \text{ gallon}}\right) = \$5 \times \left(\frac{1 \text{ gallon}}{\$3.75}\right) = 1.33 \text{ gallons}$$

Dividing by a rate is the same as multiplying by the reciprocal (flip and multiply).

Remember, the unit we want in our answer must end up on the top of our rate.
Also, it may be that you will take *a small number divided by a larger number* (and get an answer less than 1)—*that's OK*.

Answer the following questions (use mental math when possible and round off as needed).

1. If you can type 50 words per minute, how many minutes would it take to type a 500 word essay?

2. My pet mouse needs 27 grams of food each day. I have 81 grams of food left. How many days until I need to buy more mouse food?

3. It costs $8 per half hour session at a tanning salon. Jenny only has $4.50. How many minutes can she stay?

Rate Divided by a Rate (to give a rate) Name_____

When we are given two rates with common divisors, we can **divide** the two measures and we are left with a new rate.

For example, if a car gets 28 miles per gallon, and it costs $3.50 per gallon of gas, we can find miles per dollar or cost ($) per mile. To do this we divide the rates:

$$\frac{28 \text{ miles}}{1 \text{ gallon}} \div \frac{\$3.50}{1 \text{ gallon}} = \frac{28 \text{ miles}}{1 \text{ gallon}} \times \frac{1 \text{ gallon}}{\$3.50} = 8 \text{ miles per dollar}$$

or…

$$\frac{\$3.50}{1 \text{ gallon}} \div \frac{28 \text{ miles}}{1 \text{ gallon}} = \frac{\$3.50}{1 \text{ gallon}} \times \frac{1 \text{ gallon}}{28 \text{ miles}} = \$0.125 \text{ per mile}$$

Answer the following questions (use mental math when possible and round off as needed).

1. It is feeding time at the local aquarium. There are 30 fish per tank and during a feeding the fish are fed 3 pounds per tank. How much food in pounds does each fish receive?

2. The snack box has 10 ounces and has 5.5 servings in the box. The label says that there are 15 mg of fat per serving. How much fat per ounce does this snack contain?

3. Sam is looking to purchase some baseball cards. There are 200 cards per box and the cost of the box is $10.
   a. Find the cost per card.

   b. How many cards can he get for $1?

Day: 9.3 ~ Obj.: 6.b

Mixed Practice 5 Name_____

Use any method to answer the following questions (use mental math when possible and round off as needed).

1. If the Girl Scouts make a profit of $2.50 per box of cookies sold and they want to make a profit of $400, how many boxes of cookies to they need to sell?

2. The weight of concrete (mixture of water, cement, sand, and gravel) is 4,082 lb/yd^3. The cost (to have it delivered to pour your patio) is $75/yd^3 (a cubic yard is 3 feet by 3 feet by 3 feet). What is the cost per pound?

3. If an ant can travel 10 inches in 3 seconds, what is its speed in miles per hour?
(1 mile = 5,280 feet)

Day: 10.1 ~ MP5

Rate – Rate – Amount Problems: How to Solve Using the Units

Name_____

In many real-world problems we have rates and amounts given. Each amount and rate has units (for example, miles, hours, miles per gallon). We know the units given and we know the units we want in the answer.

We set up the problem so that most of the units cancel out, leaving the units we want for the answer.

This will then tell us whether to multiply or divide the numbers.

Example: A farmer harvests 500 acres of corn. He gets 145 bushels per acre. He sells the corn for $3.90 per bushel. Find how much he earns from the sale of the corn.

Solution: First, we find how many bushels are harvested:

$$500 \text{ acres} \cdot \frac{145 \text{ bushels}}{1 \text{ acre}} = 500 \cancel{\text{acres}} \cdot \frac{145 \text{ bushels}}{1 \cancel{\text{acre}}} = 72{,}500 \text{ bushels}$$

(Note that the amount of *500 acres* multiplied "on the side" is actually multiplied on the top!)

Next, we find the amount the farmer earns.

$$72{,}500 \text{ bushels} \cdot \frac{\$3.90}{1 \text{ bushel}} = 72{,}500 \cancel{\text{bushels}} \cdot \frac{\$3.90}{1 \cancel{\text{bushel}}} = \$282{,}750$$

The farmer earns $282,750 from the sale of the corn.

Answer the following questions (use mental math when possible and round off as needed).

1. You need to paint a room. Each gallon of paint will cover 500 square feet. Each gallon of paint costs $16.00. You have 1,000 square feet of walls to paint. Find the cost of the paint.

2. As you paint, you drink Mountain Dew. If there are 140 calories in a can of Mountain Dew, then how many calories are in 1.5 cases? (There are 24 cans per case.)

3. Your mom is recycling the Mountain Dew cans. She has 155 cans. The weight is .0312 lb./can. She can sell the cans to a recycler for $0.60/lb. How much money can Mom make?

Day: 10.2 ~ Obj.: 7.a

Multiplying and Dividing Rates and Amounts to Solve Problems

Name_____

Many problems give us many rates and amounts involving various units. We first need to identify the units that will be in our answer. Next, we need to set up our rates so all other units will cancel out.

Maryanne is making bracelets for her friends. It costs $3 for a 2 foot strand of beads. She can make 3 bracelets per foot. She wants to make 5 bracelets. How much will it cost?

We want dollars in our answer. We'll make dollars the top of our first rate.

$$\left(\frac{\$3}{2 \text{ feet}}\right) \div \left(\frac{3 \text{ bracelet}}{1 \text{ foot}}\right) \times 5 \text{ bracelets} = \left(\frac{\$3}{2 \text{ } \cancel{\text{feet}}}\right) \times \left(\frac{1 \text{ } \cancel{\text{foot}}}{3 \text{ } \cancel{\text{bracelet}}}\right) \times 5 \text{ } \cancel{\text{bracelets}} = \$2.50$$

Answer the following questions (use mental math when possible and round off as needed).

1. Batteries cost about $1.20 per pair and last for 32 hours. How much does it cost for Joey to listen to his mp3 player for 4 hours? (The mp3 player uses 2 batteries.)

2. Tiffany's babysitting fees are $2 per hour per child. The Bedfords have 3 children and are willing to pay Tiffany $30. How long will she babysit for them? (There is more than one way to solve this problem!)

3. Mike eats 2 string cheese sticks every day. He can buy 3 sticks for $1. How much does he spend on string cheese in February (not leap year)?

Day: 10.3 ~ Obj.: 7.b

Multiplying and Dividing Rates and Amounts – Repeatedly if Necessary

Name_____

Often we encounter rates and amounts involving various units. We need to identify the units that will be in our answer. Next, we need to set up our rates so all other units will cancel out.

Example problem: Pat wants to paint two rooms. There are four walls which are 8′ by 7′ and four walls which are 8′ by 12′ (8′ means 8 feet). A gallon of paint costs $31.99. The paint covers at a rate of 350 square feet per gallon. Pat plans to put on two coats of paint. What is the cost of the paint for this project?

First we need to find the total area.

$$8\text{ ft} \times 7\text{ ft} = 56\text{ ft}^2,\ \ 8\text{ ft} \times 12\text{ ft} = 96\text{ ft}^2,$$

$$56\text{ ft}^2 \times 4 = 224\text{ ft}^2,\ \ 96\text{ ft}^2 \times 4 = 384\text{ ft}^2,\ \ 224 + 384 = 608\text{ ft}^2$$

$$608\text{ ft}^2 \text{ per coat} \times 2 \text{ coats} = 1216\text{ ft}^2 = \text{total area to paint}$$

Next we find the number of gallons needed.

$$1216\text{ ft}^2 \div 350\ \frac{\text{ft}^2}{\text{gallon}} = 3.47 \text{ gallons. (or, we could multiply by } \frac{1\text{ gallon}}{350\text{ ft}^2})$$

Therefore, Pat will buy 4 gallons.

We want our answer in dollars. We want $ on the top and the other units to cancel.

$$31.99\frac{\$}{\text{gallon}} \times 4 \text{ gallons} = \$127.96$$

Answer the following questions (use mental math when possible and round off as needed).

1. The owner of a vending machine company collects the quarters from her vending machines. She has $221 in quarters. Each quarter weighs 5.67 grams. How many kilograms of quarters does the owner have (1 kg = 1,000 g)?

2. A landscaper is planning to plant grass seed in an area that is 70 feet by 40 feet. Each 5-pound bag of seed will cover 350 square feet and costs $12. How many bags will the landscaper need and what will the cost be?

Mixed Practice 6 Name_____

Use any method to answer the following questions (use mental math when possible and round off as needed).

1. A farm truck can haul 9.1 tons of grain. A farmer must pay the trucking company $.20 per bushel to haul wheat. Due to its density, there are 36.7 bushels per ton of wheat. Find the cost for one truckload.

2. In 1794, Eli Whitney invented the cotton gin, which could clean 50 pounds of cotton in 10 hours. The Spinning Jenny, invented by James Hargreaves in 1764, could make 8 skeins of yarn at once, each weighing about ¼ pound, in 5 hours.
    a. How many pounds of cotton can one spin into yarn in 10 hours?

    b. Which machine processes cotton faster?

    c. If a cotton farm has 2 cotton gins, how many Spinning Jennys will they need to process cotton at the same rate?

Quiz 3 Name_____

Use any method to answer the following questions (use mental math when possible and round off as needed). Use a calculator when appropriate.

1. To glaze a clay pot requires 3.4 ounces of glaze. We have 25.9 ounces of glaze remaining. How many clay pots can we glaze?

2. The cost to make political campaign phone calls is six cents per minute. The calls each take 4 minutes per phone call. The campaign chairperson plans to make 30 calls on each of the next 5 days. Find the total cost of the political campaign phone calls.

3. The Johnsons are planning a car trip of 400 miles. The cost of gas is $3.20 per gallon. The car can travel 20 miles per gallon. Find the gasoline cost for the trip.

4. A landscaper is planning to fertilize an area that is 60 feet by 40 feet. Each 25-pound bag of fertilizer will cover 500 square feet and costs $22. How many bags will the landscaper need and what will the cost be?

Weighted Average – distances and times given

Name_____

We know that to find the speed (for example, miles per hour) we take distance divided by time (for example, miles divided by hours).

Sometimes there is a trip with two parts of a trip—a fast part and a slower part. The average speed for the entire trip is called a weighted average. The *length of time* we spent driving at each speed will affect the overall average, as we see in the following example.

Example problem: Karl drove for 240 miles in 4 hours. He then drove into another state which had a higher speed limit. He drove 70 more miles in one hour. We want to find his average speed for the trip.

First, we find the total distance traveled and the total time.

240 miles + 70 miles = 310 miles 4 hours + 1 hour = 5 hours

Then, to find miles per hour we divide miles by hours.

$$\frac{310 \text{ miles}}{5 \text{ hours}} = 62 \frac{\text{miles}}{\text{hour}}$$

The average speed is 62 mph.

The speed in the first portion of the trip was 60 mph (240÷4) and the speed of the second portion was 70 mph. Notice that *the average speed was not 65 mph*. *Why?*

Answer the following questions (use mental math when possible and round off as needed).

1. The Wilsons took a 3 hour car trip. The first two hours they drove 100 miles. Then they drove 65 miles in one hour. Find the average speed?

2. Pat drove 90 miles in 1.7 hours. He then drove 198 miles in 4.7 hours. Find the average speed?

3. An athlete runs 360 meters in 1 minute, then 600 meters in 2 minutes, and then 1,200 meters in 5 minutes. Find the average speed in meters per minute.

Weighted Average – rates and times given

Name_____

Suppose a 6-hour car trip is as follows: The car travels at a speed of 60 mph for the first 2 hours. The car then travels at a rate of 51 mph for 4 hours. We wish to find the average speed.

The average speed will be a "weighted average." The time of each part of the trip (the "weights") will affect the overall speed. Since the second part of the trip is longer, the average speed will be closer to 51 mph than to 60 mph.

As always, to find miles per hour we take total distance divided by total time.

First, we find the total distance traveled and the total time.

$$60 \frac{\text{miles}}{\cancel{\text{hour}}} \times 2 \cancel{\text{hours}} = 120 \text{ miles} \qquad 51 \frac{\text{miles}}{\cancel{\text{hour}}} \times 4 \cancel{\text{hours}} = 204 \text{ miles}$$

$$120 \text{ miles} + 204 \text{ miles} = 324 \text{ miles}$$

$$2 \text{ hours} + 4 \text{ hour} = 6 \text{ hours}$$

Then, to find miles per hour we divide miles by hours.

$$\frac{324 \text{ miles}}{6 \text{ hours}} = 54 \frac{\text{miles}}{\text{hour}}$$

The average speed is 54 mph.

Answer the following questions (use mental math when possible and round off as needed).

1. The Bensons took a 4 hour car trip. The first 2½ hours their speed was 40 mph. Then they drove 1½ hours at 48 mph. Find the average speed?

2. Jan drove 3 hours at 30 km/hr. Then she drove 3 hours at 40 km/hr. What is her average speed?

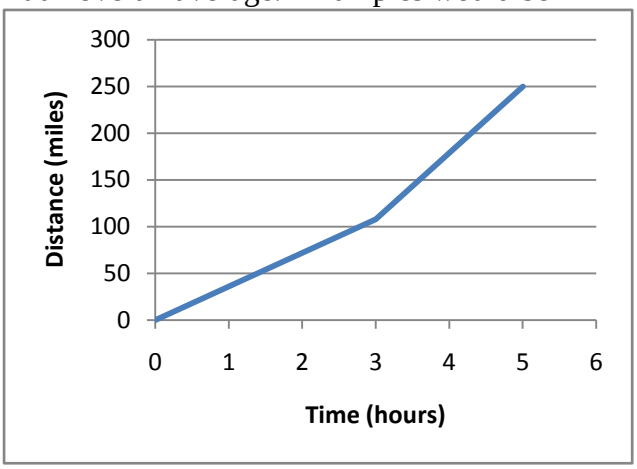
A snail creeps for 1.3 minutes at a rate of 4 inches/minute. The snail then speeds up and creeps 3.3 minutes at a rate of 5 inches/minute. Find the average speed in inches per minute.

Weighted Average from a Graph

Name_____

Sometimes we do an activity at different rates and we want an overall average. Examples would be different parts of a trip, working out, or buying things.

For example, consider the graph at the right which shows time and distance for a trip. Find the average speed for the trip.



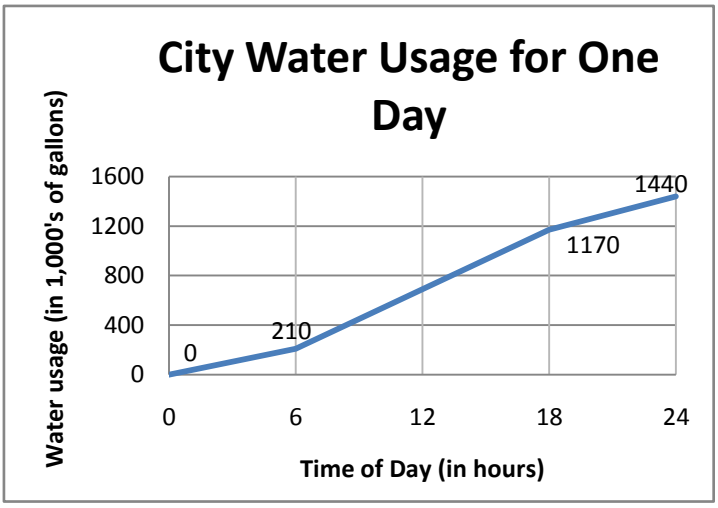
We want miles per hour, so we need to divide miles by hours. The total distance traveled is 250 miles, in a time of 5 hours.

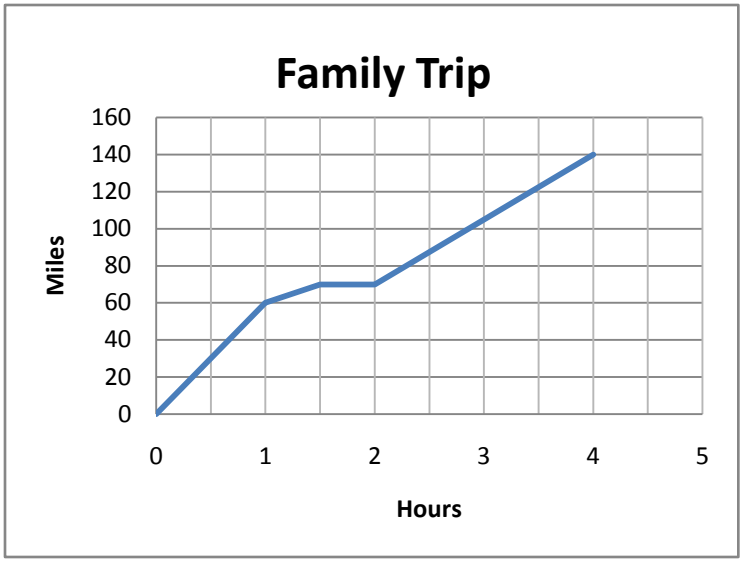
$$\frac{250 \text{ miles}}{5 \text{ hours}} = 50 \frac{\text{miles}}{\text{hour}}$$

The average speed is 50 mph (mph = miles per hour).

Answer the following questions (use mental math when possible and round off as needed).

1. The City Water Department supplies water to the residents. The graph shows the number of gallons used for a 24-hour day (note the units on the vertical axis are 1000's of gallons). Find the average number of gallons used per hour.





2. Your family goes on a trip. The graph shows the distance covered as a function of time.

a. What is the average speed of the trip?

b. Can you *write the story* of the trip? That is, describe what is happening in the four sections of the trip.

Day: 12.3 ~ Obj.: 8.c

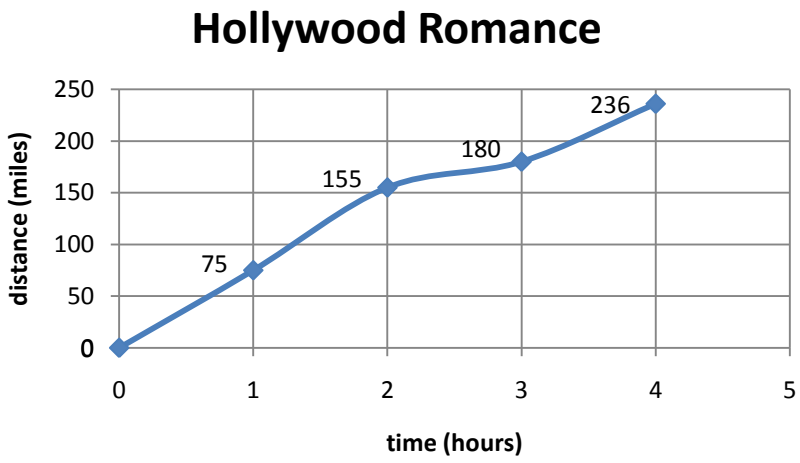
Mixed Practice 7 Name_____

Use any method to answer the following questions (use mental math when possible and round off as needed).

1. A rich and famous movie star decides on a whim that she simply MUST marry her musician boyfriend RIGHT AWAY. She pulls up to his Hollywood apartment in her Hummer and ferries him off to Vegas.
    a. Before they head to Vegas, they zoom 25 miles to Long Beach to pick up her best friend, Lindsey. This takes only 30 minutes. As Lindsey hops in the car, she reminds the lovebirds that they BOTH need to have their driver's licenses in order to get a marriage license. This means they have to go back to Hollywood. This time, there is so much traffic that it takes an entire hour. What is the average speed in miles per hour for this trip?

    b. After picking up his license, the rockstar wants to go pick up his brother in San Bernadino to be his best man. They drive for 40 minutes at 75 miles per hour. Lindsey, unable to stand it any longer, socks the movie star in the shoulder until she stops speeding. They drive the remaining 10 minutes at 60 miles per hour. What was their average speed in miles per hour to San Bernadino?

2. The graph at the right shows the final leg of their journey to Las Vegas. What is their average speed from San Bernadino to the Drive-In-Chapel where they finally say "I do?"



Day: 13.1 ~ MP7

Weighted Average

Name_____

Sometimes we do a similar activity multiple times and we want an overall average. Examples would be three babysitting jobs, different parts of a workout in the gym, buying things.

For example, let's say you do three different baby-sitting jobs. The first job is for three hours at $5.00 per hour. The second job is for two hours for $6.00 per hour. The third is for five hours for $7.00 per hour. We'd like to find the average pay per hour. To find the rate, dollars per hour ($/hr.), we need to take the total amount of money ($) divided by the total number of hours.

First we find the total amount of money and the total number of hours.

$$3 \text{ hours} \cdot \frac{\$5}{\text{hour}} + 2 \text{ hours} \cdot \frac{\$6}{\text{hour}} + 5 \text{ hours} \cdot \frac{\$7}{\text{hour}} = \$15 + \$12 + \$35 = \$62$$

$$3 \text{ hours} + 2 \text{ hours} + 5 \text{ hours} = 10 \text{ hours}$$

$$\text{To find the rate we divide: } \frac{\$62}{10 \text{ hours}} = \frac{\$6.20}{\text{hour}} = 6.20 \text{ dollars per hour}$$

Answer the following questions (use mental math when possible and round off as needed).

1. If you recycle 12 pounds of aluminum cans for $.60 per pound and 8 pounds of aluminum cans for $.70 per pound, what the average price per pound that you were paid?

2. You are in the gym working out. You lift weights for 20 minutes. Then you run on the treadmill for 30 minutes. Weight-lifting burns 210 calories per hour. Running on a treadmill burns 600 calories per hour.
   a. What is the total number of calories you burn?

   b. Find the average number of calories burned per hour?

2. You are making a stew with potatoes, carrots, and meat. You use 3 pounds of potatoes at $1.04 per pound; 3 pounds of carrots at $1.20 per pound; and 2 pounds of meat for $3.60 per pound. What is the average cost per pound of the stew?

Solving Problems Involving Starting Amounts and Rates

Name_____

Many real-world situations involve a starting amount (such as an entrance fee or a flat shipping charge) followed by additional amounts, based on a rate (such as cost per ride or cost per ounce).

For example, the SummerFest Amusement Park charges a $5 admission fee to get in and charges $1.50 per ride.

Q: If Sam rides 7 rides, what is the total cost?

A: $1.50 /ride × 7 rides = $10.50. $10.50 + $5 = $15.50. Total cost is $15.50.

Q: If Pat has $20, how many rides can she ride?

A: $20 - $5 = $15. $15 ÷ $1.50 = 10 rides. Pat can ride 10 rides.

Answer the following questions (use mental math when possible and round off as needed).

1. A mini-van can has a Class I trailer hitch which can pull up to 2,000 pounds. The empty trailer weights 800 pounds. The trailer holds six refrigerators each weighing 170 pounds. Can the mini-van pull this trailer?

2. When ordering from a catalog there is a $4 initial shipping and handling charge for all packages. In addition, there is a $.25 per ounce charge. How much will it cost to ship a 2 pound package?

Day: 13.3 ~ Obj.: 9.a

Mixed Practice 8 Name_____

Use any method to answer the following questions (use mental math when possible and round off as needed).

1. You are making *potatis korv*, a traditional Swedish potato sausage. You put in 2 pounds of beef, which costs $2.50 per pound, 3 pounds of pork, which costs $3.00 per pound, and ***half*** of the 6 lb bag of potatoes you purchased for $4. What is the average cost per pound of sausage?

2. Piper gets $100 for Christmas. She decides to use it to pay for her haircuts. She gets one $20 haircut every two months, starting on January first. How much money does she have left in the middle of May?

3. A window washer spends 6 minutes cleaning 8 windows. How long will it take him to clean 28 windows?

4. A gardener is planning to plant cabbage in an area that is 15 feet by 30 feet. Each packet of seeds will cover 90 square feet and costs $2.30. How many packets of seeds will the gardener need and what will the cost be?

Mixed Practice 9 Name_____

Use any method to answer the following questions (use mental math when possible and round off as needed).

1. Rice Costs for a Restaurant
    a. Determine the unit cost of each variety of rice to complete the table.

Rice Costs			
Variety	Weight (lbs)	Cost ($)	Unit Cost ($/lb)
Long Grain	2	$1.44	
Sushi	5	$7.15	
Jasmine	3	$4.14	

    b. A restaurant manager is in charge of restocking his kitchen. How much will it cost for him to buy 200 pounds of jasmine rice?

    c. The manager is under explicit orders to spend no more than $500 on sushi rice. How many pounds can he buy?

2. Francis needs to make a scale model map of Wyoming for social studies class. The scale of the map is 1 inch = 40 miles. Casper and Cheyenne are 140 miles apart. How far apart will they be on Francis' map?

Day: 14.2 ~ MP9