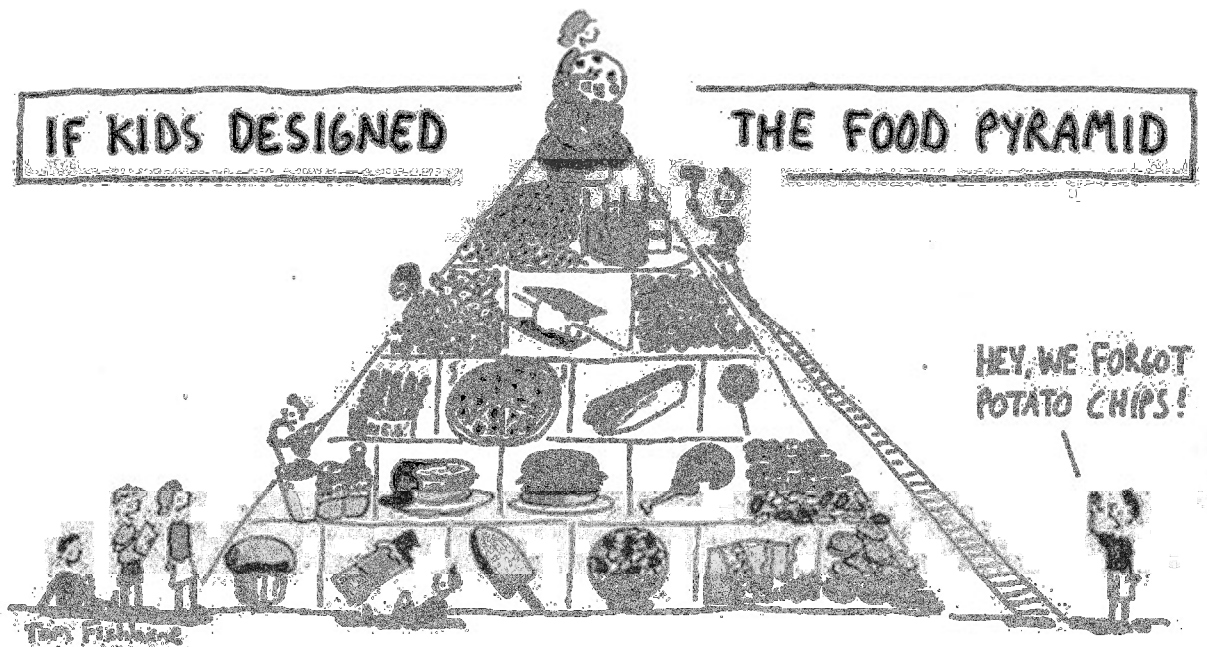


SIXTH GRADE MATHEMATICS

CHAPTER 5A

FOOD AND RESTAURANTS



TOPICS COVERED:

- ❖ Ratios, Rates, and Unit Rates
- ❖ Proportions
- ❖ Proportions and Scale Drawings

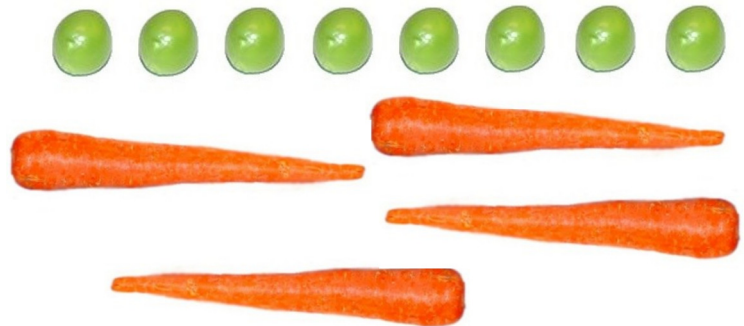
“We go together like peas and carrots.” – *Forrest Gump*

A ratio makes a comparison.

Forrest has 4 carrots and 8 peas.

You can write the ratio of carrots to peas in three different ways:

4 to 8	4:8	$\frac{4}{8}$
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The ratio of peas to carrots is 8 to 4, 8:4, or $\frac{8}{4}$.

You can write a ratio in simplest form the same way you write a fraction in simplest form. The ratio of carrots to peas in simplest form is:

1 to 2	1:2	$\frac{1}{2}$
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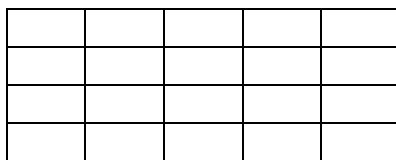
While not used as frequently, a ratio can compare more than two items. If there are 3 cakes, 4 cookies, and 5 brownies, you can write this ratio as 3:4:5.

For each phrase circle the answer that expresses the ratio in simplest form.

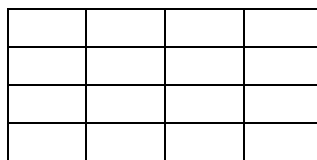
- 75 hamburgers to 90 french fries 75:90 5:6 90:15
- 4 apples to 52 oranges 48:4 4:52 1:13

Create a drawing below which represents a ratio of 3 clams to 9 shrimp. You may not draw exactly 3 clams.

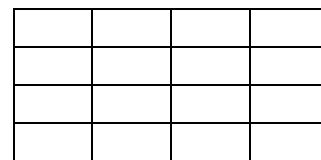
Place X's in the grids below so that they form the following ratios.



1 x to 5 small rectangles



2 x's to 4 small rectangles



1 x to 1 small rectangle

Complete each ratio table.

1.

Pounds of peanut butter	5	10	15		50
Pounds of jelly	1	2		5	

2.

Cost	\$0.50	\$1.00	\$2.00	\$8.00	
Pounds of macaroni	1	2			12

3.

Pounds of lettuce	12	24	60		
Pounds of tomato	1	2		8	10

4.

Ounces of syrup	1			11	16
Pancakes	10	40	80		

5.

Cookies	1	4	7		
Cost	\$0.05			\$1.20	\$4.00

6.

Cups of BBQ sauce	4		16	28	
Wings	12	24			144

7.

Pizzas	1	3		8	
Large pepperonis	7		28		63

8.

Desserts	1		7		
Little Debbie's	6	18		78	900

A rate is a ratio that compares quantities that are measured in different units.

A unit rate compares a quantity to one unit of another quantity.

Example: Ms. Johnsen can cook 135 cookies in 5 hours.

Expressed as a rate: $\frac{135 \text{ cookies}}{5 \text{ hours}}$

Expressed as a unit rate: $\frac{135 \text{ cookies}}{5 \text{ hours}} = \frac{27 \text{ cookies}}{1 \text{ hour}}$

Ratios: Express each ratio in simplest form in one of the three ways.

Within 10 miles of Mr. Mangham’s house there are: 31 McDonalds, 14 Burger Kings, 10 Wendy’s, 12 KFC’s					
1.	McDonalds to BKs		2.	Wendys to McDonalds	
3.	KFCs to BKs		4.	All 4 to McDonalds	
5.	BKs to McDonalds and KFCs		6.	Wendys and KFCs to BKs	
7.	All 4 to The Top 3		8.	The Top 2 to All 4	
9.	BKs to The Top 2		10.	All 4 to McDonalds, Burger Kings, Wendys, and KFCs	

Rates and Unit Rates: Express each rate as a unit rate.

	Rate	Unit Rate		Rate	Unit Rate
11.	$\frac{105 \text{ peas}}{3 \text{ minutes}}$		12.	$\frac{\$38}{2 \text{ steaks}}$	
13.	$\frac{2800 \text{ calories}}{7 \text{ days}}$		14.	$\frac{72 \text{ Little Debbies}}{24 \text{ wrappers}}$	
15.	$\frac{\$375}{5 \text{ days at Kroger}}$		16.	$\frac{\$315}{15 \text{ hamburgers}}$	

17.	The ratio of females to males in the restaurant is 6 to 5. If four females and six males leave, the ratio is 10 to 7. How many customers originally are in the restaurant?	
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Using the letters of the phrase “LEMON LOLLIPOP,” write the ratios comparing the numbers of letters. Simplify.

18.	L to I		19.	I to O		20.	P to L	
21.	E to M		22.	O to L		23.	P to E	
24.	I to N		25.	vowels to consonants				

Write three ratios equal to the given ratio (using different numbers, not just written a different way).

1.	$\frac{1}{8}$		2.	2:40	
3.	$\frac{144}{288}$		4.	$\frac{200}{300}$	
5.	3 to 17		6.	$\frac{2}{11}$	
7.	1.6: 4		8.	2.25 to 6	

Express each ratio as a fraction in simplest form.

9.	read 75 pages out of 90		10.	4 aces in a deck of 52 cards	
11.	36 black keys out of 88 piano keys		12.	9 caramels in a box of 48 chocolates	
13.	325 full-sized cars out of 500 cars		14.	16 male teachers out of 40 teachers	
15.	35 sopranos in an 84 member chorus		16.	18 goldfish in a tank of 48 fish	

Using the letters of the phrase “STATE OF MASSACHUSETTS,” write the ratios comparing the numbers of letters.

17.	A to T		18.	M to E		19.	E to S	
20.	F to A		21.	T to S		22.	H to T	
23.	E to A		24.	vowels to consonants				

Calculate the unit rates or unit prices for the problems below. Show all your work!

25.	Gasoline to fill a 5-gallon gas can costs \$6.25. Find the unit price of each gallon.	
26.	The labor charge at Angie’s repair shop is \$60 an hour. Tony charges \$25 a half hour. Which shop charges less?	
27.	A case of 4 bottles of windshield washer fluid costs \$3.88. Find the unit price of each bottle.	
28.	Archie bought 15 gallons of gas for \$23.85. Joe bought 16 gallons of gas for \$24.88. Who paid less per gallon?	
29.	Andy drove 264 miles using 12 gallons of gas. Rita drove 315 miles using 15 gallons of gas. Who got more miles per gallon?	
30.	If a 12 oz. bottle of transmission fluid costs \$1.80 and a bottle containing 14 oz. costs \$1.96, which is a better buy?	

Chandler and her three cousins drove 165 miles to visit their grandmother for Thanksgiving dinner. Their car got 24 miles per gallon during the trip. They drove at an average rate of 55 miles per hour and the gasoline for the trip cost \$8.94.

Calculate each of the following. Use may use a calculator. Round all numbers to the nearest hundredth (or penny).

1.	Gallons of gasoline used		7.	Total passenger miles*	
2.	Hours of travel		8.	Passenger miles per gallon	
3.	Dollars per hour		9.	Dollars per passenger mile	
4.	Dollars per passenger		10.	Dollars per passenger hour	
5.	Dollars per mile		BONUS	Average feet per second	
6.	Dollars per gallon				

* A passenger mile represents one passenger traveling one mile.

11.	Two cars travel the same route to a town that is 200 miles from where they started and then return, by the same route, to where they started. Car A averages 50 mph one way and 40 mph on the return trip. Car B averages 45 mph both ways. Do the cars travel the total distance in the same amount of time?	
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Calculate the unit rates or unit prices for the problems below. Show all your work!

12.	5 gallons of water costs \$6.25. Find the unit price of each gallon.	
13.	Albertsons charges \$60 for a 20 pound turkey. Tom Thumb charges \$25 for a 10 pound turkey. Which store charges less per pound?	
14.	Four bottles of Gatorade costs \$3.88. Find the unit price of each bottle.	
15.	Archie bought 15 gallons of whip cream for \$23.85. Joe bought 16 gallons of whip cream for \$24.88. Who paid less per gallon?	
16.	Andy drove 264 miles using 12 gallons of gas to get to McDonalds. Rita drove 315 miles using 15 gallons of gas to get to Wendys. Who got more miles per gallon?	
17.	If a 12 oz. bottle of Mr. Pibb Xtra costs \$1.80 and a bottle containing 14 oz. costs \$1.96, which is a better buy?	

What are the fire safety rules in your school building? What if a fire were to happen in a restaurant? Would so many people be able to exit safely? Mr. Mangham is interested in fire prevention and safety. He knows that if rooms are too crowded, everyone might not be able to leave quickly.

The maximum occupancy of a room is the number of people that can be evacuated safely in 1 minute.

Do you know the maximum occupancy of your classroom or other rooms in your school? You can determine the maximum safe occupancy of your classroom, your cafeteria, or your school.

1. Have everyone in your class exit through the classroom door in an orderly fashion. Time how long this takes.

Number of students	Time to leave classroom (min.)	Rate (Students:Minute)	Unit Rate (Students:Minute)	Width of door (in.)

2. Make an estimate of the rate at which people can exit the cafeteria and the entire building through the doors.

Unit Rate in Cafeteria (Students:Minute)	Unit Rate of Building (Students:Minute)

3. Taking your yardstick, check the number and size of the cafeteria doors. Then calculate the rate at which people can exit the cafeteria through all its doors. Complete the same exercise for the school as a whole.

	Number of doors	Total width of all doors (in.)	$\frac{\text{Total width of all doors}}{\text{Width of classroom door}}$	Unit Rate* (Students:Minute)
Cafeteria				
School				

* The unit rate can be determined by taking the answer to the width division and multiplying this by the unit rate you calculated for your classroom. The unit rate is equal to the maximum occupancy.

4. Can your class safely evacuate your classroom?

5. Estimate the number of students in the cafeteria at lunch. Could the students safely evacuate the cafeteria?

6. At a local Chili's the maximum occupancy is listed as 120. What would the total width of all doors need to be? If each door was 3 feet, how many exit doors are needed?

“My momma always said, ‘Life was like a box of chocolates. You never know what you're gonna get.’” – *Forrest Gump*



Determine the cost per ounce for each of the items below.

When necessary, round to the nearest penny.

	Rate	Unit Rate		Rate	Unit Rate
Whitman’s Sampler Assorted Chocolates					
1.	\$10 for 12 oz.		2.	\$14 for 16 oz.	
3.	\$19 for 24 oz.		4.	\$26 for 32 oz.	
5.	\$30 for 40 oz.		6.	\$5 for 6 oz.	
7.	\$3.40 for 4 oz.		8.	\$2 for 2 oz.	
Russell Stover Assorted Chocolates					
9.	\$5.50 for 6 oz.		10.	\$17 for 24 oz.	
11.	\$9 for 12 oz.		12.	\$1.80 for 2 oz.	
13.	\$25 for 36 oz.		14.	\$50 for 5 lbs.	

Express each ratio as a rate and a unit rate. Round to the nearest penny.

	Ratio	Rate	Unit Price or Unit Rate
15.	\$2.80 for 64 ounces of orange juice	$\frac{\$2.80}{64 \text{ oz.}}$	\$0.04 per ounce
16.	\$28.45 for 5 pounds of roast beef		
17.	\$0.50 for 16 ounces of spaghetti		
18.	\$7.60 for 24 cans of dog food		
19.	\$19.87 for 7 kg of chicken		
20.	\$1.60 for 6 ounces of tuna		
21.	\$2.20 for 2 L of cola		
22.	\$8.88 for 12 pairs of socks		

Activity 5-8: **Unit Rates with Cereal**

Name: _____

Visit Walmart.com or another website that sells cereal. Choose 8 of your favorite cereals (cereals at least someone in your house has eaten). write down their names, prices, and weight (ounces). Then calculate the unit rate for each one.

	Cereal Name	Price (\$)	Weight (oz)	Unit Rate $\left(\frac{\text{cents}}{\text{oz}}\right)$
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				

Next assign each cereal a value from one (best) to five (worst) for its “Nutrition and Taste Index.” You determine this number based on how nutritious each cereal is and how good it tastes (if you have not tried the cereal ask someone who has).

	Cereal Name	Nutrition/Taste Index	Adjusted Unit Rate	Ranking (lowest # = 1, highest # = 8)
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				

Activity 5-9: **Pizza Proportions**

Name: _____

Pizza Restaurant Name	
Owner of the restaurant	
Cook	
Cashier	
Trash person	
Hours of operation	
Number of pizzas made in 2 hours	
Special pizza sale	
Amount of trash	

Proportion to solve the number of pizzas made each day:

Proportion to solve the cost of the birthday pizzas:

Proportion to solve the total amount of trash:

Use red and yellow chips to explore proportions in this activity.

1. Set up 4 red counters and 8 yellow counters. Write the ratio of red counters to yellow counters.
2. Separate the red counters into two equal groups. Do the same with the yellow counters. Write the ratio of red to yellow in each group.
3. Repeat step #2, but divide each set of counters into four equal groups.
4. How are the ratios you modeled related?
5. You can use the ratios $\frac{4}{8}$ and $\frac{2}{4}$ to write the proportion $\frac{4}{8} = \frac{2}{4}$. What other proportions can you write with the ratios you modeled?
6. Model the ratio 8 red counters and 12 yellow counters. Then model as many equivalent ratios as you can. What proportions can you write?
7. Double the number of red and yellow counters. Use this ratio and an equivalent ratio to write a proportion.
8. With counters, model $\frac{2}{3}, \frac{8}{12}$, and $\frac{9}{16}$. Place the first two models side by side. Separate $\frac{8}{12}$ into groups of $\frac{2}{3}$ if you can. Place the first and third models side by side. Separate $\frac{9}{16}$ into groups of $\frac{2}{3}$ if you can.
9. Can $\frac{2}{3}$ and $\frac{8}{12}$ be used to write a proportion? Explain.
10. Can $\frac{2}{3}$ and $\frac{9}{16}$ be used to write a proportion? Explain.

A proportion is an equation that shows two ratios are equivalent. To determine if a pair of ratios form a proportion, you can find their cross products. If the cross products are equal, then the ratios form a proportion.

Example 1: Is $\frac{5}{6} = \frac{12}{18}$? $5 \cdot 18 = 90$ $6 \cdot 12 = 72$

Therefore, $\frac{5}{6}$ and $\frac{12}{18}$ do not form a proportion.

Use cross products to determine whether each pair of ratios forms a proportion.

1.	$\frac{8}{12}, \frac{5}{10}$		2.	$\frac{12}{30}, \frac{2}{5}$	
3.	$\frac{8}{24}, \frac{6}{18}$		4.	$\frac{10}{24}, \frac{5}{8}$	
5.	$\frac{12}{15}, \frac{3}{4}$		6.	$\frac{4}{5}, \frac{20}{25}$	

Proportions can be solved utilizing the BUTTERFLY method.

Example 2: Emily baked 60 cookies in 4 hours. How many cookies can she bake in 6 hours?

$$\frac{60 \text{ cookies}}{4 \text{ hours}} = \frac{x \text{ cookies}}{6 \text{ hours}}$$

$$60 \cdot 6 = 4 \cdot x$$

$$\frac{360}{4} = \frac{4x}{4}$$

$$90 \text{ cookies} = x$$

Solve each proportion using the Butterfly Method.

7.	$\frac{8}{15} = \frac{m}{45}$		8.	$\frac{9}{12} = \frac{6}{c}$	
9.	$\frac{5}{p} = \frac{3}{9}$		10.	$\frac{v}{21} = \frac{4}{6}$	
11.	$\frac{14}{8} = \frac{x}{4}$		12.	$\frac{9}{r} = \frac{27}{30}$	
13.	$\frac{10}{4} = \frac{m}{20}$		14.	$\frac{1}{c} = \frac{12}{24}$	

Use cross products to determine whether each pair of ratios forms a proportion.

1.	$\frac{4}{9}, \frac{12}{27}$		2.	$\frac{5}{6}, \frac{25}{36}$	
3.	$\frac{5}{12}, \frac{7}{18}$		4.	$\frac{2}{7}, \frac{16}{36}$	

Solve each proportion using the Butterfly Method.

5.	$\frac{6}{7} = \frac{a}{56}$		6.	$\frac{27}{x} = \frac{3}{8}$	
7.	$\frac{0.4}{m} = \frac{2}{4.5}$		8.	$\frac{18}{9} = \frac{h}{6}$	
9.	$\frac{10}{24} = \frac{c}{264}$		10.	$\frac{88}{d} = \frac{72}{9}$	
11.	$\frac{0.6}{11} = \frac{s}{88}$		12.	$\frac{2}{3} = \frac{x}{18}$	
13.	$\frac{4.5}{y} = \frac{5}{10}$		14.	$\frac{0.25}{5} = \frac{m}{80}$	
15.	$\frac{4}{6} = \frac{x}{27}$		16.	$\frac{12}{4} = \frac{27}{x}$	
17.	$\frac{3}{5} = \frac{x}{35}$		18.	$\frac{10}{20} = \frac{x}{50}$	
19.	$\frac{16}{28} = \frac{c}{35}$		20.	$\frac{w}{30} = \frac{4}{20}$	

Use ratios and proportions to answer the following questions.

21.	Each turnstile can admit 36 people per 2 minutes. There are 8 turnstiles at entrance A. How many people can enter the park at this entrance in one minute?	
22.	Each student was given an amusement park drink cup for attending as a group. Each time it is filled, the beverage cost 6 cents per ounce. How much does it cost to fill your 16 oz. cup four times?	
23.	The Whip-A-Round spins five times every 3 seconds. If you go on the minute-and-a-half ride how many times have you spun around?	
24.	The Cliff Drop can accommodate 720 people per hour. There are 444 people in front of you. How long until you get to ride?	
25.	One gear on the Spiral Coaster turns 7 revolutions every 2 seconds. How many revolutions are on each minute and a half ride?	

(Taken from Connect to NCTM Standards 7th Grade)

Read each problem. Decide whether or not you can use a proportion to solve it. Solve the problems for which there is a proportion.

		Proportion (Y/N)	If a proportion, write the proportion and solve.
1.	A game board is 20 inches wide by 50 inches long. You want to make a smaller version of the board with a width of 12 inches. How long should the board be?		
2.	You have a square with an 8-inch side. You want to draw a triangle with a base 3 times greater than a side of the square. What is the altitude of the triangle?		
3.	The recipe calls for milk and flour in a 3 to 4 ratio. How many cups of flour do you need if you use 8 cups of milk?		
4.	A map shows that 1 inch represents 50 miles. How many miles does 8 inches represent?		
5.	If it snows 3 inches in 1 hour, how much snow does the Department of Public Services have to remove?		
6.	The warmest day last summer was 106 degrees Fahrenheit and the coldest was 50 degrees Fahrenheit. What was the average high temperature last summer?		
7.	The painter mixed the green paint using a 2 to 5 ratio of blue to yellow paint. How much yellow paint is there in 1 gallon of green paint?		
8.	There are 345 students in the school. There are 2 boys for every 3 girls. How many girls are in the school?		

Write a proportion to solve each problem. Then solve.

		Proportion	Answer
9.	If 18 plums weigh 54 ounces, then 27 plums weigh x ounces.		
10.	If 40 nails hold 5 rafters, then 96 nails hold r rafters.		
11.	If 32 addresses are on 2 pages, then a addresses are on 9 pages.		
12.	If 360 inches of tape are on 3 spools. Then t inches are on 10 spools.		
13.	If 60 mushrooms are on 4 pizzas, then m mushrooms are on 15 pizzas.		
14.	If a heart beats 98 times per minute, then it beats y times per hour.		

Use the tables on the next page to write a proportion that can be used to solve the problem. Solve with the Butterfly Method. Show all work on a separate sheet of paper. Label.

1.	How many calories will a person expend (use) in 3.5 hours of walking?	
2.	Fred expended 990 calories playing basketball. How long did he play?	
3.	Laura stretched for 0.25 hours. How many calories did she expend?	
4.	George expended 55 calories doing yard work before he gave up. How long did he work?	
5.	How much would 9 24-packs of water cost?	
6.	Chris bought 3.9 pounds of baby back ribs. <i>Estimate</i> how much he spent.	
7.	To the nearest penny, how much would 5 12-packs of Coke cost?	
8.	Mr. Mangham decided to have a shrimp feast and bought 5.2 pounds of wild shrimp and 4.6 pounds of gulf brown shrimp. What was his total bill?	
9.	How many teaspoons of sugar would be in a 20 oz. glass of chocolate milk?	
10.	If Carlee ate 45.5 teaspoons of sugar, all from M&Ms, how many bags did she eat?	
11.	How many teaspoons of sugar would be in a 2.4 oz. muffin?	
12.	Larry had Jell-O and an ice tea for lunch. If his total sugar was 34 teaspoons and he had 2 cups of Jell-O, how much tea did he drink?	
13.	How many Lucky Charms commercials would a kid see in 6 months? (nearest whole number)	
14.	If Bart Simpson saw 154 Corn Pop commercials, how long has he been watching TV?	
15.	How many more Cocoa Puffs commercials than Froot Loops commercials would you expect to see in 2 years?	
16.	If Michael watches TV twice as much as a normal kid, in what month will he see his 40 th Frosted Flakes commercial?	

Survey of 20 students' favorite and least favorite colors

Color	Least favorite	Favorite
Blue	4	7
Green	3	2
Purple	11	8
Red	1	1
Orange	1	2

17. If 30 students were surveyed, how many students would choose blue as their least favorite color?

18. If 120 students were surveyed, how many students would choose green as their favorite?

19. If 120 students were surveyed, how many students would NOT choose green as their favorite?

20. Write three interesting word problems using the data tables on the next page. The problems must use a least one proportion to be solved. The problems should be at the level of difficulty (or higher) as problems #1-16 above.

Calories Expended per hour for an “average” person

Hiking	370	Bicycling (>10 mph)	590
Light gardening	330	Swimming	510
Dancing	330	Aerobics	480
Golf (walking)	330	Fast walking	460
Bicycling	290	Heavy yard work	440
Walking	280	Running/jogging	590
Weight lifting	220	Basketball	440
Stretching	180	Tennis	408

Grocery Store Ads

Water, 24 pk	2 for \$5	Kraft Shredded Cheese, 12 oz.	3 for \$5
Coke, 12 pk.	3 for \$11	Sirlion Steak	\$2.99/lb.
Angus Ground Chuck	\$1.99/lb.	Baby Back Ribs	\$2.99/lb.
Salmon Fillets	\$4.99/lb.	Peaches	\$0.77/lb.
Tombstone Pizza	4 for \$10	Tuna Steaks	\$7.99/lb.
Wild shrimp	\$6.00/lb.	Gulf Brown Shrimp	\$7.00/lb.

Sugar Content of some foods (teaspoons)

Coke, 12oz.	10	M&Ms, 1.7 oz bag	7
Iced Tea, sweetened, 12 oz.	8	Muffin, large 4oz.	6
Chocolate milk, 12 oz.	6	Chocolate Chip cookie, 1 oz.	2
Honey Smacks cereal, 1 oz	4	Donut, iced	6
Popcorn, caramel, cup	3.5	Apple pie, 1 piece	7
Chocolate bar, 1.5 oz.	6	Jell-O, 1 cup	9
Jam, 1 tbsp.	2.5	Syrup, maple 1 tbsp	3

The 10 Cereals with the Most Ads Targeted toward kids

	Views	Health Score		Views	Health Score
Cinnamon Toast Crunch	82	37	Frosted Flakes	58	43
Honey Nut Cheerios	80	44	Fruity/Cocoa Pebbles	54	38
Lucky Charms	78	36	Reese’s Puffs	52	34
Cocoa Puffs	68	39	Corn Pops	44	36
Trix	58	38	Froot Loops	43	38

Views represent the number of ads seen by an average 6-11 yr old over a 15 month period. The health score is on a scale of 1-100 with over 62 considered healthy.

Do you know what all those labels on items in the grocery store mean? What is the difference between a “good source of fiber” and “high fiber”? How about “low fat” and “reduced fat”?

Here is a label dictionary you can use the next time you go to the grocery store:

Low calorie	4 calories or less
Reduced calories	at least 25% fewer calories than normal
Light	33% fewer calories or 50% less fat
Sugar free	less than 0.5 grams of sugars
Reduced sugar	at least 25% less sugars than normal
Fat free	less than 0.5 grams of fat
Low fat	3 grams or less of fat
Reduced fat	at least 25% less fat than normal
Cholesterol free	less than 2mg cholesterol and 2g or less of saturated fat
Low cholesterol	20 mg or less of cholesterol and 2g or less of saturated fat
Sodium free	less than 5 mg sodium
Very low sodium	35 mg or less sodium
Low sodium	140 mg or less sodium
High fiber	5g or more
Good source of fiber	2.5 to 4.9 g fiber

A scale gives the relationship between the measurements on the scale drawing or model and the measurements of the real object.

Example: A map shows a scale of 1 inches = 12 miles. The distance between Southlake and Ft. Worth on the map is 3.5 inches. What is the actual distance?

$$\frac{1 \text{ inch}}{12 \text{ miles}} = \frac{3.5 \text{ inches}}{x \text{ miles}}$$

$$x = 12 \cdot 3.5$$

$$x = 42 \text{ miles}$$

On a set of architectural drawings for an office building, the scale is 1 inches = 20 feet. Find the actual length of each room.

1.	Lobby	1.6 in		2.	CEO Office	1.35 in	
3.	Copy Room	0.55 in		4.	Secretary Office	0.6 in	
5.	VP Office	0.9 in		6.	Library	1.5 in	
7.	Storage Area	2 in		8.	Manager Office	0.625 in	
9.	Conference Room	1.75 in		10.	Cafeteria	2.3 in	
11.	Kitchen	2 in		12.	Mail Room	2.25 in	

On a set of architectural drawings for a new school building, the scale is 1 inch = 8 feet . Find the missing lengths in the table.

13.	Principal's Office	1.25 in	
14.	Library		16 ft
15.	School Room	3 in	
16.	Science Lab	1.5 in	
17.	Cafeteria		48 ft
18.	Music Room	4 in	
19.	Gym		56 ft
20.	Teacher's Lounge	1.75 in	

Using the City of Southlake map, complete the following problems. Measure “as the crow flies” to the nearest quarter of an inch. All work may be completed on this paper.

1.	What is the listed scale for the map?	
2.	Write a proportion that can be used to find the distance from DIS to EIS.	
3.	Solve your proportion using the butterfly method.	
4.	Write a proportion that can be used to find the distance from RES to JES.	
5.	Solve your proportion using the butterfly method.	
6.	Write a proportion that can be used to find the distance from Bob Jones Park to the Southlake Senior Center.	
7.	Solve your proportion using the butterfly method.	
8.	Write a proportion that can be used to find the distance from CES to the Clariden School.	
9.	Solve your proportion using the butterfly method.	
10.	Write a proportion that can be used to find the distance from Florence Elementary School to the Public Works Facility.	
11.	Solve your proportion using the butterfly method.	
12.	What is the ratio of the distance between RES-JES and the distance between DIS-EIS.	
13.	Estimate the real-life area of the Carroll ISD.	
14.	Write a proportion that can be used to find the distance from your house to DIS.	
15.	Solve your proportion using the butterfly method.	

Ratio – a comparison of two numbers by division.

Four out of five cars were red. This ratio can be written in three different ways:

$$4 \text{ to } 5 \qquad 4:5 \qquad \frac{4}{5}$$

Rate – a ratio of two measurements with different units.

Mr. Mangham ran 400 yards in 80 seconds. $\frac{400 \text{ yards}}{80 \text{ seconds}}$ is a rate.

Unit Rate – a rate in which the denominator is 1.

In the example above, Mr. Mangham's unit rate = $\frac{50 \text{ yards}}{1 \text{ second}}$ or 50 yards/second.

Proportion – an equation that shows that two ratios are equivalent.

Fred got two out of every three questions right. If there were six questions, Fred got four questions correct.

$$\frac{2}{3} = \frac{4}{6} \text{ is a proportion}$$

Proportions can be solved utilizing the BUTTERFLY method.

Problem: Emily baked 60 cookies in 4 hours. How many cookies can she bake in 6 hours?

$$\frac{60 \text{ cookies}}{4 \text{ hours}} = \frac{x \text{ cookies}}{6 \text{ hours}}$$

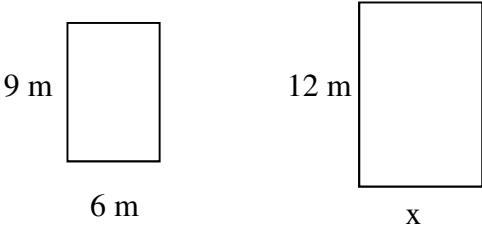
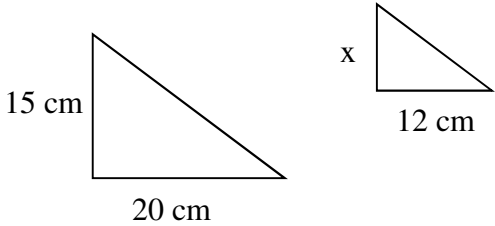
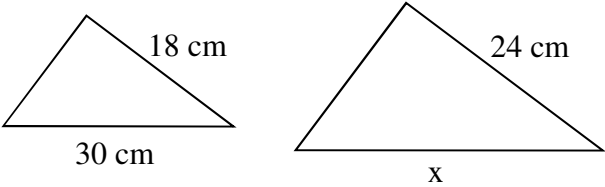
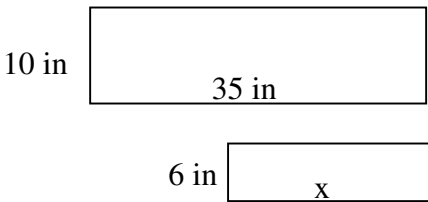
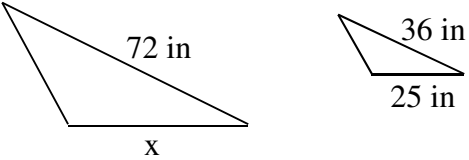
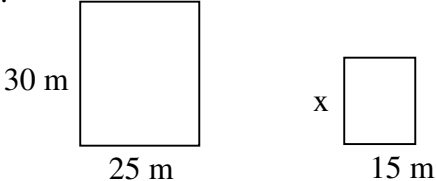
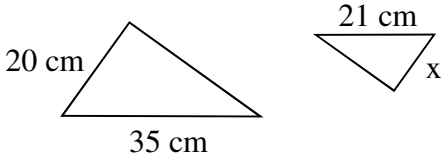
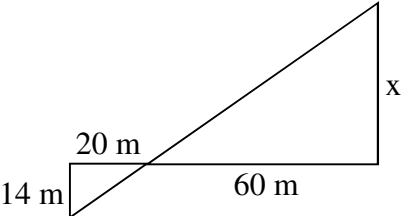
$$60 \cdot 6 = 4 \cdot x$$

$$\frac{360}{4} = \frac{4x}{4}$$

$$90 = x$$

$$x = 90 \text{ cookies}$$

For each pair of similar figures write a proportion and use the proportion to find the length of x . Use a separate sheet of paper.

<p>1.</p> 	<p>2.</p> 	
<p>3.</p> 	<p>4.</p> 	
<p>5.</p> 	<p>6.</p> 	
<p>7.</p> 	<p>8.</p> 	
<p>9.</p>	<p>A flagpole casts a shadow 10 ft long. If a man 6 ft tall casts a shadow 4 ft long at the same time of day, how tall is the flagpole?</p>	
<p>10.</p>	<p>A photograph is 25 cm wide and 20 cm high. It must be reduced to fit a space that is 8 cm high. Find the width of the reduced photograph.</p>	

CREATING A SCALE DRAWING

- Introduce scale drawings:
 - What is a scale drawing?
 - What are scale drawings used for? What people/professions use them?
- **GOAL:** Produce a scale drawing of your cartoon 64 times larger than the original one.

PROCEDURE:

1. Select cartoon. The “cell” should be no longer than 3.5 inches to properly fit on the posterboard. Sunday comics work best since they are color. There are many Calvin & Hobbes (or Peanuts or Garfield) books available at bookstores that work very well.
2. Photocopy the original comic so everyone can remember the order the cells go in once finished.
3. Each student gets one (or two if they are small) cells from the original comic. If a group is working to complete one entire comic, it may be a good idea upfront to determine which cells are not as necessary. That way the finished comic still makes sense even if you don’t use all the cells.)
4. Tape the cutout cell on a piece of computer paper.
5. Grid the original cartoon.
 - What size grid should we use? What if it is too big/too small? (Use $\frac{1}{4}$ in. for the cartoons)
 - Using a ruler place equidistant marks across the top and bottom and connect them with lines. Place equidistant marks across the sides and connect them with lines.
6. Grid the construction paper.
 - What size grid should we use? What if it is too big/too small? (Use 2 in. for the posterboard)
 - Using a ruler place equidistant marks across the top and bottom and connect them with lines. Place equidistant marks across the sides and connect them with lines.
7. Copy box for box. The students need to place their **SCALE** somewhere on the new drawing to indicate to others how it compares to the original (i.e. Scale: $\frac{1}{4}$ in.= 2in.) Cut out any extra boxes around the comic.
8. Color with markers, etc. A good idea is to have the first students who color to start listing the colors they use on the board so that the whole group will use a common set of colors for items that are the same.
9. Tape the original cartoon somewhere on the front of the posterboard.
10. Grade is based on both neatness and accuracy.

CREATING A SCALE DRAWING

- What is a scale drawing? What are scale drawings used for? What people/professions use them?
- **GOAL** Produce a scale drawing of a cartoon _____ times larger than the original one.

PROCEDURE

1. Grid the original cartoon.
 - Starting at the top, left corner, place marks every _____ across the top.
 - Starting at the bottom, left corner, place marks every _____ across bottom.
 - Connect the top marks and the bottom marks with lines.
 - Starting at the top, left corner, place marks every _____ across the left side.
 - Starting at the bottom, left corner, place marks every _____ across right side.
 - Connect the left and right marks with lines.
2. Grid the posterboard.
 - Repeat above procedure with marks every _____ .
3. Copy each box on the original to each box on your posterboard.
4. Place the SCALE somewhere on the new drawing to indicate to others how it compares to the original
(i.e. Scale: $\frac{1}{4}$ in. = 2 in.)
5. Color with markers, etc.
6. Tape the original cartoon on the front side of the posterboard.
7. Grade is based on both neatness and accuracy.