

PERCENTS & PROPORTIONS

Math PDFs
5th – 8th Grades



5TH GRADE

56298—Equivalent Ratios
56299—Fractions, Decimals, Percents
56307—Proportional Reasoning

6TH GRADE

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67164—Percents Greater Than 100
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67192—Rates

7TH GRADE

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8TH GRADE

8072-8114—Percents, Fractions, Decimals
8073-8115—Percent Proportions
8074-8116—Sales Tax & Discount
8075-8117—Percent of Increase – Decrease
8076-8118—Ratio, Rate, & Proportion



Equivalent Ratios

Write the term for each definition.

- A. a comparison of two quantities ratio
- B. an equation stating that two ratios are equivalent proportion

Rewrite each ratio three other ways including the word form.

C. $\frac{1}{6}$ 1:6 1 to 6 one to six

D. 7:4 $\frac{7}{4}$ 7 to 4 seven to four

E. 3 to 5 $\frac{3}{5}$ 3:5 three to five

F. $\frac{9}{11}$ 9:11 9 to 11 nine to eleven

G. 8:4 $\frac{8}{4}$ 8 to 4 eight to four

2
19 7

Equivalent Ratios

4
9 18

Using the table to the right, enter each ratio.

H. ratio of eggs to butter 3 eggs:2 sticks butter

I. ratio of flour to eggs 1.75 c. flour:3 eggs

J. ratio of apples to sugar 6 apples:1.5 c. sugar

K. ratio of milk to butter 2 tsp. milk:2 sticks butter

L. ratio of sugar to eggs 1.5 c. sugar:3 eggs

Apple Pie Ingredients

6 apples
2 sticks butter
1.75 c. flour
1.5 c. sugar
3 eggs
2 tsp. milk

Find the missing term in each proportion.

M. $\frac{3}{4} = \frac{a}{8}$ $a = \underline{6}$

$\frac{3}{b} = \frac{5}{20}$ $b = \underline{12}$

$\frac{7}{3} = \frac{h}{9}$ $h = \underline{21}$

N. $\frac{15}{4} = \frac{c}{8}$ $c = \underline{30}$

$\frac{x}{2} = \frac{6}{12}$ $x = \underline{1}$

$\frac{9}{12} = \frac{45}{n}$ $n = \underline{60}$

O. $\frac{l}{8} = \frac{3}{2}$ $l = \underline{12}$

$\frac{5}{d} = \frac{20}{24}$ $d = \underline{6}$

$\frac{5}{p} = \frac{15}{21}$ $p = \underline{7}$



Equivalent Ratios

Solve.

- P. Ten oranges cost \$1.60. How much do 8 oranges cost?

Eight oranges cost \$1.28.

$$\frac{10}{\$1.60} = \frac{8}{x}; 10x = \$12.80; x = \$1.28$$

- Q. At the water bottling company, a machine fills 4 bottles every 6 seconds. How long does it take to fill 12 bottles?

It takes 18 seconds to fill 12 bottles.

$$\frac{4}{6} = \frac{12}{x}; 4x = 72; x = 18$$

- R. A recipe calls for 3 cups of flour and 2 cups of sugar. Marty only has 2.5 cups of flour. To keep the recipe proportional, how much sugar should he use?

Marty should use $1\frac{2}{3}$ cups sugar.

$$\frac{3}{2} = \frac{2.5}{x}; 3x = 5; x = 1\frac{2}{3}$$

- S. A person who weighs 120 pounds on Earth weighs 20 pounds on the Moon. How much would a person weighing 96 pounds on Earth weigh on the Moon?

A person weighing 96 pounds on Earth would weigh 16 pounds on the moon.

$$\frac{120}{20} = \frac{96}{x}; 120x = 1920; x = 16$$



Think About It

Why is it important to keep the units in the proportion consistent when solving a problem? Use an example to explain your thinking.

SAMPLE RESPONSE: *Since a ratio is a comparison of two quantities and a*

proportion is an equation stating that two ratios are equivalent, the ratios in the

proportion must be consistent in order for them to be equivalent. Think of a scale

drawing. If the key states that the map is drawn 1 inch for every 5 miles, then the

proportion should be set up so that inches are compared to miles in each ratio.

Example: $\frac{\text{inches}}{\text{miles}} = \frac{\text{inches}}{\text{miles}}$

The Golden Ratio

The *golden ratio* is the ratio of the length to the width of a *golden rectangle*. This ratio equals approximately 1.6 to 1. Leonardo da Vinci used this ratio in his drawings of the human body. Test da Vinci's thinking by seeing how much of your own body is based on the *golden ratio*. Measure each body part and then calculate the ratios. Circle the ratios that resemble the *golden ratio*.

Measure to the nearest inch.

height _____ waist to floor _____ top of head to waist _____

waist to knee _____ knee to floor _____ shoulder to fingertip _____

elbow to finger tip _____

Calculate ratio to nearest hundredth.

height:waist to floor _____ waist to floor:top of head to waist _____

waist to knee:knee to floor _____ waist to floor:waist to knee _____

shoulder to fingertip:elbow to fingertip _____



Write the term for each definition.

- A. a comparison of two quantities _____
- B. an equation stating that two ratios are equivalent _____

Rewrite each ratio three other ways including the word form.

C. $\frac{1}{6}$ 1:6 1 to 6 one to six

D. 7:4 _____ _____ _____

E. 3 to 5 _____ _____ _____

F. $\frac{9}{11}$ _____ _____ _____

G. 8:4 _____ _____ _____

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K. ratio of milk to butter _____

L. ratio of sugar to eggs _____

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 1.5 c. sugar
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Find the missing term in each proportion.

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$\frac{x}{2} = \frac{6}{12}$ $x = \underline{\hspace{2cm}}$

$\frac{9}{12} = \frac{45}{n}$ $n = \underline{\hspace{2cm}}$

O. $\frac{l}{8} = \frac{3}{2}$ $l = \underline{\hspace{2cm}}$

$\frac{5}{d} = \frac{20}{24}$ $d = \underline{\hspace{2cm}}$

$\frac{5}{p} = \frac{15}{21}$ $p = \underline{\hspace{2cm}}$



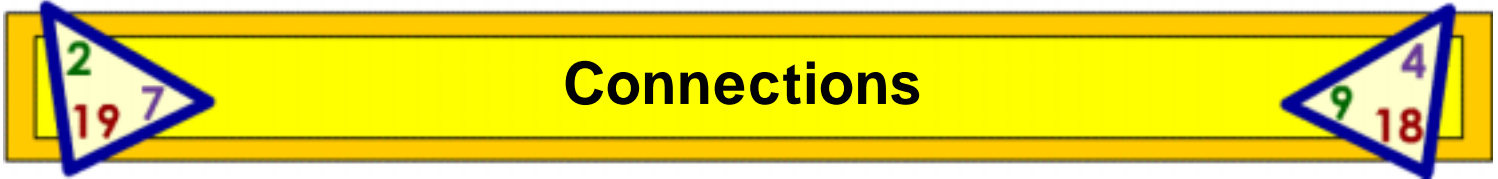
Solve.

P. Ten oranges cost \$1.60. How much do 8 oranges cost?

Q. At the water bottling company, a machine fills 4 bottles every 6 seconds. How long does it take to fill 12 bottles?

R. A recipe calls for 3 cups of flour and 2 cups of sugar. Marty only has 2.5 cups of flour. To keep the recipe proportional, how much sugar should he use?

S. A person who weighs 120 pounds on Earth weighs 20 pounds on the Moon. How much would a person weighing 96 pounds on Earth weigh on the Moon?

**Think About It**

Why is it important to keep the units in the proportion consistent when solving a problem? Use an example to explain your thinking.

The Golden Ratio

The *golden ratio* is the ratio of the length to the width of a *golden rectangle*. This ratio equals approximately 1.6 to 1. Leonardo da Vinci used this ratio in his drawings of the human body. Test da Vinci's thinking by seeing how much of your own body is based on the *golden ratio*. Measure each body part and then calculate the ratios. Circle the ratios that resemble the *golden ratio*.

Measure to the nearest inch.

height _____ waist to floor _____ top of head to waist _____
 waist to knee _____ knee to floor _____ shoulder to fingertip _____
 elbow to finger tip _____

Calculate ratio to nearest hundredth.

height:waist to floor _____ waist to floor:top of head to waist _____
 waist to knee:knee to floor _____ waist to floor:waist to knee _____
 shoulder to fingertip:elbow to fingertip _____

2
19 7

Fractions, Decimals and Percents

4
9 18

Write each decimal as a percent.

A. 0.45 45%

0.23 23%

0.78 78%

B. 0.04 4%

0.8 80%

1.16 116%

Write each percent as a decimal.

C. 98% 0.98

12% 0.12

38% 0.38

D. 7% 0.07

10% 0.1

125% 1.25

Write each fraction as a percent.

E. $\frac{3}{4}$ 75%

$\frac{1}{4}$ 25%

$\frac{2}{10}$ 20%

F. $\frac{3}{8}$ 37.5%

$\frac{1}{2}$ 50%

$\frac{12}{4}$ 300%

Write each percent as a fraction. Simplify your answer.

G. 25% $\frac{1}{4}$

30% $\frac{3}{10}$

150% $1\frac{1}{2}$

H. 45% $\frac{9}{20}$

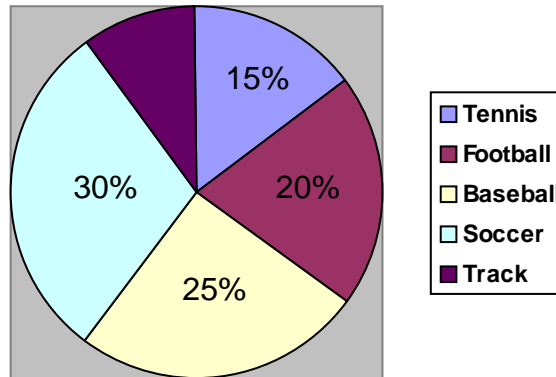
5% $\frac{1}{20}$

225% $2\frac{1}{4}$

Fractions, Decimals and Percents

Using the circle graph, answer the following questions.

AFTER SCHOOL SPORTS



I. What percent of students participate in track?

10% of the students participate in track.

J. What fraction of students plays tennis?

$\frac{3}{20}$ of the students play tennis.

K. What is the decimal amount of students who play soccer?

0.3 of the students play soccer.

L. Which 2 sports represent 50% of the students who play after school sports?

Soccer and football represent 50% of the students who play after school sports.

M. Which sport represents one-fourth of the students who play after school sports?

Baseball represents one-fourth of the students who play after school sports.



Solve.

- N. Todd finished 54% of his homework while Joe finished $\frac{3}{5}$ of his homework. Who finished more of the homework, Todd or Joe?

Joe finished more of the homework.

$$\frac{3}{5} = 60\%$$

$$54\% < 60\%$$

- O. If Joe finished $\frac{3}{5}$ of his homework, what percent does he have left to finish?

Joe has 40% of his homework left to finish.

$$\frac{3}{5} = 60\%$$

$$100\% - 60\% = 40\%$$

- P. Mary Beth used 0.85 of her eye contact solution. What percent does she have left?

Mary Beth has 15% of her eye contact solution left.

$$0.85 = 85\%$$

$$100\% - 85\% = 15\%$$

- Q. According to Mrs. Smith, 25% of her students earned an A on the math test while half of the students earned a B. Only 0.15 of the students earned C's while the rest earned D's on the same test. What percent of the students earned D's on the math test?

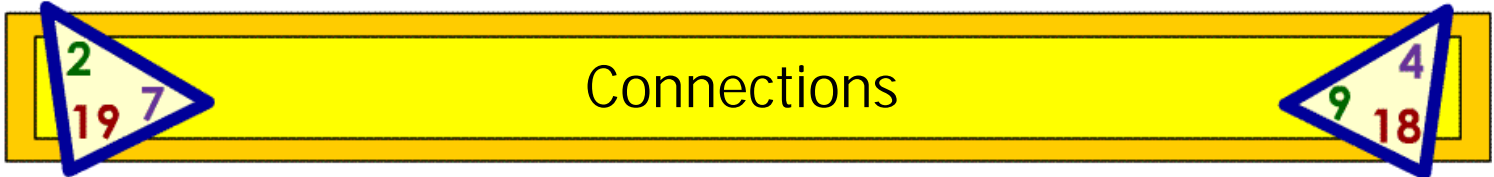
10% of the students earned D's on the math test.

$$A = 25\%$$

$$B = \text{half} = 50\%$$

$$C = 0.15 = 15\%$$

$$D = 100\% - (25\% + 50\% + 15\%) = 100\% - 90\% = 10\%$$



Think About It

Mark conducted a class survey about weekend activities and shared his results with the class. He stated that 32% of the students played sports on the weekend, 44% enjoy going to the movies, 23% like to shop, and 15% of the students read. Does this make sense? Explain your thinking.

SAMPLE RESPONSE: *Although the sum of the percentages is greater than 100%, the results of the survey do make sense. Several students may have selected more than one weekend activity, which would make the total greater than 100%.*

Percent on a Hundreds Chart

A hundreds chart shows the numbers from 1 to 100. Although each number is unique, many of them share characteristics. Find the most popular characteristic by determining the percent of numbers that are:

- 1. Odd numbers 50%
- 2. Even numbers 50%
- 3. Multiples of 3 33%
- 4. Prime numbers 25%
- 5. Numbers > 75 25%
- 6. Factors of 100 9%
- 7. Numbers with a 5 18%
- 8. Multiples of 2 50%
- 9. Numbers < 18 17%

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



Fractions, Decimals and Percents

Write each decimal as a percent.

A. 0.45 _____

0.23 _____

0.78 _____

B. 0.04 _____

0.8 _____

1.16 _____

Write each percent as a decimal.

C. 98% _____

12% _____

38% _____

D. 7% _____

10% _____

125% _____

Write each fraction as a percent.

E. $\frac{3}{4}$ _____

$\frac{1}{4}$ _____

$\frac{2}{10}$ _____

F. $\frac{3}{8}$ _____

$\frac{1}{2}$ _____

$\frac{12}{4}$ _____

Write each percent as a fraction. Simplify your answer.

G. 25% $\frac{1}{4}$ _____

30% _____

150% _____

H. 45% _____

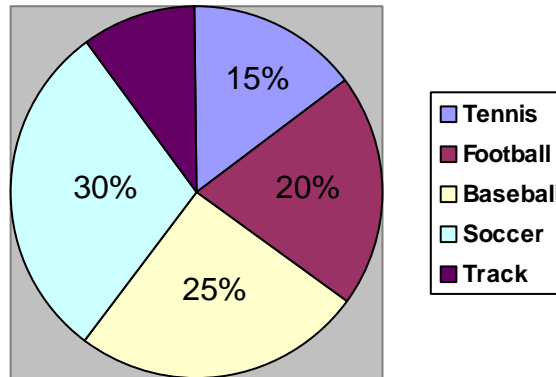
5% _____

225% _____

Fractions, Decimals and Percents

Using the circle graph, answer the following questions.

AFTER SCHOOL SPORTS




- I. What percent of students participate in track?
- J. What fraction of students plays tennis?
- K. What is the decimal amount of students who play soccer?
- L. Which 2 sports represent 50% of the students who play after school sports?
- M. Which sport represents one-fourth of the students who play after school sports?



Fractions, Decimals and Percents

Solve.

- N. Todd finished 54% of his homework while Joe finished $\frac{3}{5}$ of his homework. Who finished more of the homework, Todd or Joe?
- O. If Joe finished $\frac{3}{5}$ of his homework, what percent does he have left to finish?
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Connections



Think About It

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Percent on a Hundreds Chart

A hundreds chart shows the numbers from 1 to 100. Although each number is unique, many of them share characteristics. Find the most popular characteristic by determining the percent of numbers that are:

1. Odd numbers 50%
2. Even numbers _____
3. Multiples of 3 _____
4. Prime numbers _____
5. Numbers > 75 _____
6. Factors of 100 _____
7. Numbers with a 5 _____
8. Multiples of 2 _____
9. Numbers < 18 _____

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



Proportional Reasoning

Complete each proportion.

A. $\frac{1}{5} = \frac{4}{20}$

B. $\frac{3}{2} = \frac{18}{12}$

C. $\frac{6}{7} = \frac{48}{56}$

D. $\frac{5}{14} = \frac{15}{42}$

E. $\frac{4}{5} = \frac{12.8}{16}$

F. $\frac{2}{9} = \frac{7}{31.5}$

Use the recipe to solve questions G – J. Set up a proportion and find the solution.

- G. If only 1 cup of kidney beans is used, how many cups of pinto beans should be used?

$$\frac{3}{2} = \frac{1}{x}; \frac{2}{3} \text{ cups}$$

- H. If only 2 tablespoons of ketchup are used, how many tablespoons of brown sugar should be used?

$$\frac{4}{6} = \frac{2}{x}; 3 \text{ tablespoons}$$

- I. When 3 teaspoons of cumin are added, how much salt should be added?

$$\frac{1}{3} = \frac{3}{x}; 9 \text{ teaspoons}$$

- J. When 1 tablespoon of mustard is added, how many cups of kidney beans should be added?

$$\frac{2}{3} = \frac{1}{x}; 1 \frac{1}{2} \text{ cups}$$

Grandma's Blue Ribbon Beans

3 cups kidney beans

2 cups pinto beans

2 cloves garlic

3 teaspoons salt

1 teaspoon cumin

2 tablespoons mustard

6 tablespoons brown sugar

4 tablespoons ketchup



Proportional Reasoning

Use proportions to solve each problem.

- K. Kenny is 4 feet tall and casts a 2-foot long shadow. Manny is standing nearby and casts a 3-foot long shadow. How tall is Manny?

$$\frac{4}{2} = \frac{x}{3}; 6 \text{ ft.}$$

- L. Five boxes weigh as much as 2 cases. How many cases weigh as much as 7 boxes?

$$\frac{5}{2} = \frac{7}{x}; 2.8 \text{ cases}$$

- M. Six wizzits cost as much as 3 gibbits. How many wizzits equal 5 gibbits?

$$\frac{6}{3} = \frac{x}{5}; 10 \text{ wizzits}$$

- N. A punch recipe calls for 2 liters of lemon lime soda for every 3 liters of fruit punch. How many liters of fruit punch should be added to 3 liters of lemon lime soda?

$$\frac{2}{3} = \frac{3}{x}; 4\frac{1}{3} \text{ liters}$$



Connections

Think About It

A unit rate is a ratio where one quantity is compared to exactly one unit of the other quantity. If the given ratio in a proportion is a unit rate, identify how the proportion could be solved without using cross multiplication.

SAMPLE RESPONSE: When the ratio is a unit rate, it can be used the same way as a conversion factor. To solve the proportion multiply or divide by the rate in the same manner as you would when using a conversion factor. Always determine if you are converting from larger units to smaller units or from smaller units to larger units.

Proportion Shuffle

A 2-player game

Materials

deck of cards, paper, pencil

Rules of Play

- 1) Remove all face cards from the deck. Shuffle the deck thoroughly.
- 2) Player 1 deals three cards and uses them to form a proportion with one unknown. Either a numerator or denominator may be the unknown.
- 3) Player 2 records the proportion on paper and then solves for the missing numerator or denominator.
- 4) Player 1 verifies the answer and awards a point for the correct answer.
- 5) Player 1 and Player 2 switch roles and repeat steps 2 – 4.
- 6) Play continues until each player has solved 6 proportions.

Winning the Game

The winner is the player with the most points.



Proportional Reasoning

Complete each proportion.

A. $\frac{1}{5} = \frac{4}{20}$

B. $\frac{2}{2} = \frac{18}{12}$

C. $\frac{6}{7} = \frac{48}{\quad}$

D. $\frac{5}{\quad} = \frac{15}{42}$

E. $\frac{4}{5} = \frac{\quad}{16}$

F. $\frac{2}{9} = \frac{7}{\quad}$

Use the recipe to solve questions G – J. Set up a proportion and find the solution.

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- H. If only 2 tablespoons of ketchup are used, how many tablespoons of brown sugar should be used?

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- L. Five boxes weigh as much as 2 cases. How many cases weigh as much as 7 boxes?

- M. Six wizzits cost as much as 3 gibbits. How many wizzits equal 5 gibbits?

- N. A punch recipe calls for 2 liters of lemon lime soda for every 3 liters of fruit punch. How many liters of fruit punch should be added to 3 liters of lemon lime soda?

**Think About It**

A unit rate is a ratio where one quantity is compared to exactly one unit of the other quantity. If the given ratio in a proportion is a unit rate, identify how the proportion could be solved without using cross multiplication.

Proportion Shuffle

A 2-player game

Materials

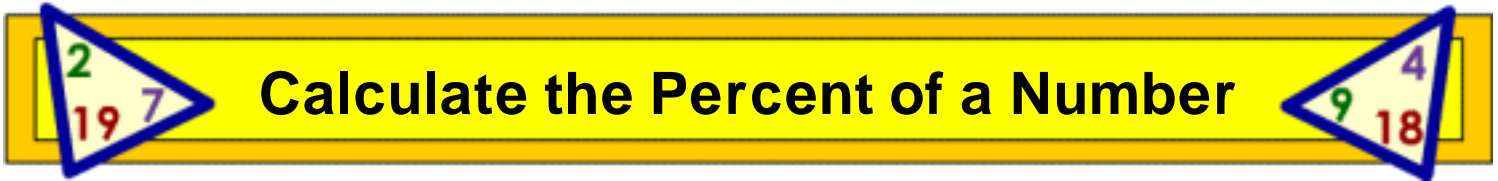
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Calculate the Percent of a Number

Use a decimal to find the percent of each number.

A. 15% of 20 = 3 56% of 125 = 70 9% of 36 = 3.24

B. 30% of 27 = 8.1 85% of 200 = 170 6.5% of 30 = 1.95

Use a fraction to find the percent of each number.

C. 60% of 25 = 15 10% of 350 = 35 75% of 28 = 21

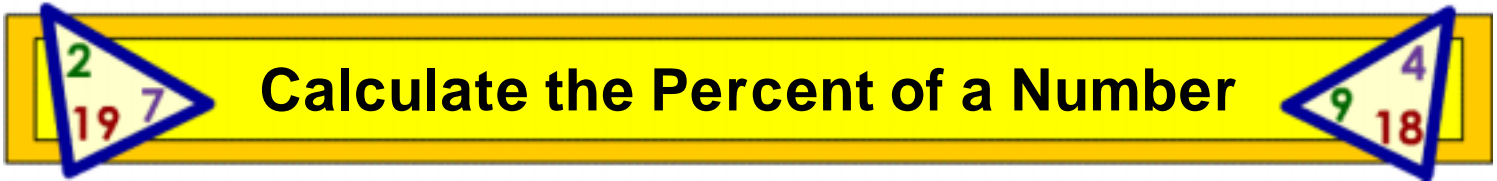
D. 25% of 64 = 16 35% of 400 = 140 5% of 84 = $4\frac{1}{5}$

Circle the greatest amount.

E. 30% of 150 45% of 124 50% of 110 25% of 300 15% of 200

F. 40% of 16 65% of 20 50% of 12 85% of 10 5% of 75

G. 8% of 240 95% of 20 25% of 36 50% of 16 28% of 60



Calculate the Percent of a Number

Solve each problem.

- H. The sporting goods store is having a huge sale with 40% or \$25.00 off a single purchase. Theo wants to purchase a new basketball hoop for \$80.00. Which discount should he take? Explain your thinking.

Theo should take the 40% discount because 40% of \$80.00 provides a greater savings than \$25.00 off.

$$0.4 \times \$80.00 = \$32.00 \text{ savings}$$

- I. The sales tax on a new electric scooter is 6%. Terry has saved \$240.00. How much more money does Terry need to save if the scooter she wants costs \$249.00 plus tax?

Since the scooter will cost \$263.94, Terry needs to save \$23.94.

$$6\% \times \$249.00 = \$14.94$$

$$\$14.94 + \$249.00 = \$263.94$$

$$\$263.94 - \$240.00 = \$23.94$$



Think About It

When finding the percent of a number, which technique or strategy do you prefer? Give an example of it and explain why you prefer it.

SAMPLE RESPONSE: *When finding the percent of a number, I prefer to change the percent to a decimal and then multiply because this saves the trouble of reducing the fraction. For example, to find 75% of 20, I would multiply 0.75 by 20 instead of multiplying $\frac{3}{4}$ by 10. After multiplying $\frac{3}{4}$ by 10, I would need to simplify. The first strategy is shorter.*

Just for Fun

Marcus is purchasing a new football and cleats for a total of \$68.50. The tax is 6%. Marcus claims he can calculate his total cost with a one-step operation. Create an expression that will prove Marcus is correct in his thinking. (Hint: Use the distributive property.)

$$1.06 \times \$68.50 = \$72.61$$

Mini-Crossword Puzzle

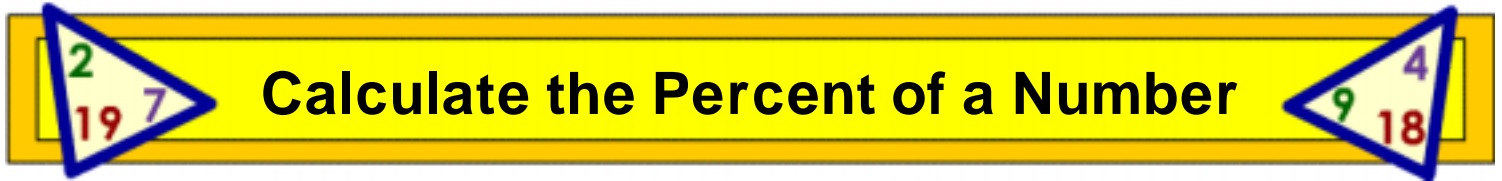
Across

- 1. 30% of 300
- 3. 50% of 100
- 5. 35% of 1,000

Down

- 1. 10% of 920
- 2. 85% of 120
- 4. 25% of 300

1	9	0		2	1
	2		3	5	0
		4	7		2
5	3	5	0		



Use a decimal to find the percent of each number.

A. 15% of 20 = 3 56% of 125 = _____ 9% of 36 = _____

B. 30% of 27 = _____ 85% of 200 = _____ 6.5% of 30 = _____

Use a fraction to find the percent of each number.

C. 60% of 25 = 15 10% of 350 = _____ 75% of 28 = _____

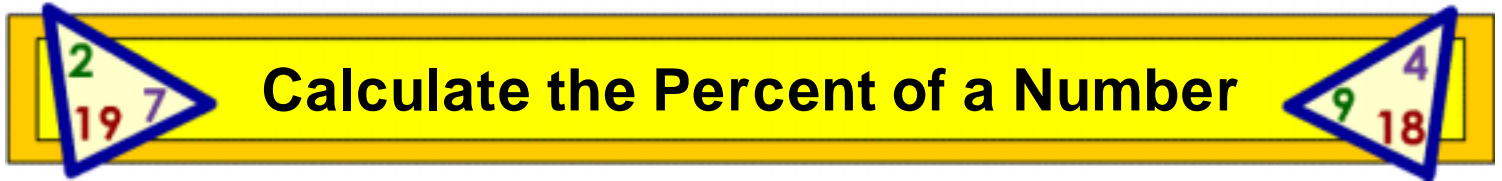
D. 25% of 64 = _____ 35% of 400 = _____ 5% of 84 = _____

Circle the greatest amount.

E. 30% of 150 45% of 124 50% of 110 25% of 300 15% of 200

F. 40% of 16 65% of 20 50% of 12 85% of 10 5% of 75

G. 8% of 240 95% of 20 25% of 36 50% of 16 28% of 60

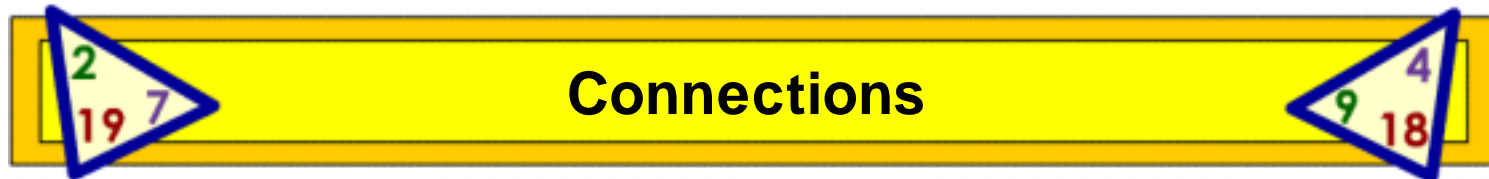
A yellow banner with a blue border. On the left, a blue triangle contains the numbers 2 (green), 19 (red), and 7 (purple). On the right, a blue triangle contains the numbers 4 (purple), 9 (green), and 18 (red).

Calculate the Percent of a Number

Solve each problem.

H. The sporting goods store is having a huge sale with 40% or \$25.00 off a single purchase. Theo wants to purchase a new basketball hoop for \$80.00. Which discount should he take? Explain your thinking.

I. The sales tax on a new electric scooter is 6%. Terry has saved \$240.00. How much more money does Terry need to save if the scooter she wants costs \$249.00 plus tax?



Think About It

When finding the percent of a number, which technique or strategy do you prefer? Give an example of it and explain why you prefer it.

Just for Fun

Marcus is purchasing a new football and cleats for a total of \$68.50. The tax is 6%. Marcus claims he can calculate his total cost with a one-step operation. Create an expression that will prove Marcus is correct in his thinking. (Hint: Use the distributive property.)

Mini-Crossword Puzzle

Across

- 1. 30% of 300
- 3. 50% of 100
- 5. 35% of 1,000

Down

- 1. 10% of 920
- 2. 85% of 120
- 4. 25% of 300

1	9	0		2
			3	
		4		
5				

2
19 7

Percents Greater Than 100

4
9 18

Write each decimal or mixed number as a percent.

A. $6.02 = \underline{602\%}$

$1.7 = \underline{170\%}$

$3.075 = \underline{307.5\%}$

$2 = \underline{200\%}$

B. $5\frac{2}{5} = \underline{540\%}$

$3\frac{3}{4} = \underline{375\%}$

$8\frac{7}{20} = \underline{835\%}$

$4\frac{1}{200} = \underline{400.5\%}$

Write each percent as a decimal and a mixed fraction.

C. $475\% = \underline{4.75, 4\frac{3}{4}}$

$300\% = \underline{3}$

$125\% = \underline{1.25, 1\frac{1}{4}}$

D. $302.5\% = \underline{3.025, 3\frac{1}{40}}$

$108.5\% = \underline{1.085, 1\frac{17}{200}}$

$205\% = \underline{2.05, 2\frac{1}{20}}$

Calculate.

E. $420\% \text{ of } 400 = \underline{1,680}$

$225.5\% \text{ of } 100 = \underline{225.5}$

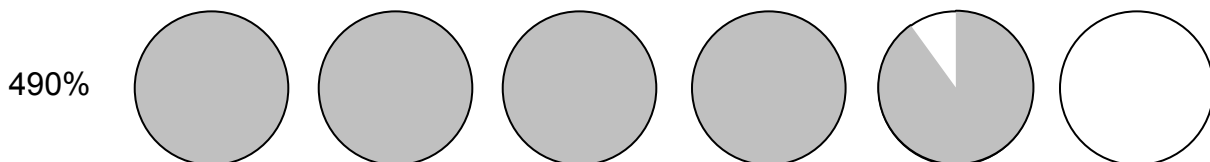
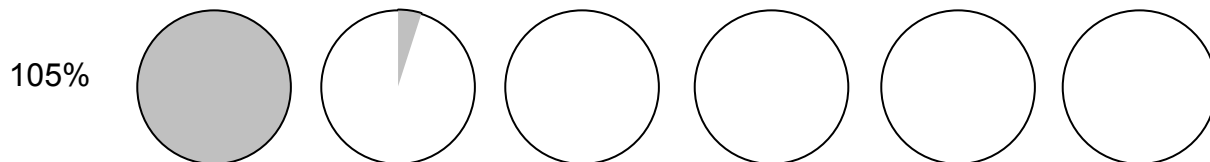
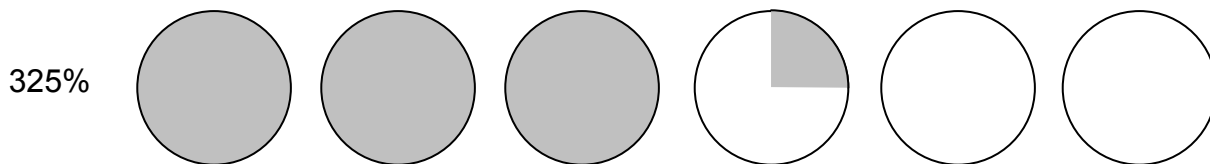
F. $150\% \text{ of } 60 = \underline{90}$

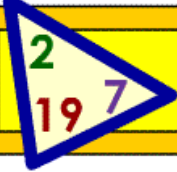
$311.2\% \text{ of } 190 = \underline{591.28}$

G. $105\% \text{ of } 175 = \underline{183.75}$

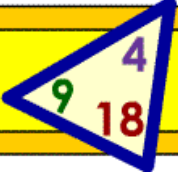
$525\% \text{ of } 25 = \underline{131.25}$

Each circle represents 100%. Shade the circles to show each percent.





Connections



Think About It

The president of the class of 1995 at Morris High School organized a reunion. She claims that, of the 2000 graduating seniors, 110% attended the reunion. Is this claim possible? Explain your thinking.

SAMPLE RESPONSE:

No, the claim is false since 110% would indicate that the number of students in the graduating class increased, which is not possible.

Puzzle

Fill in the missing spaces with single digit-numbers and symbols to complete this puzzle.

3	5	%	=	0	.	3	5			7
	1							3		2
9	+	1	5	=	2	4		3		+
	2		x			+		x		2
	7	x	7	=	4	9		3	=	3
	=		=			=		=		=
	7		3			1	x	9	=	9
1	8	-	5	=	1	3		9		5

2
19 7

Percents Greater Than 100

4
9 18

Write each decimal or mixed number as a percent.

A. $6.02 = \underline{602\%}$ $1.7 = \underline{\hspace{2cm}}$ $3.075 = \underline{\hspace{2cm}}$ $2 = \underline{\hspace{2cm}}$

B. $5\frac{2}{5} = \underline{\hspace{2cm}}$ $3\frac{3}{4} = \underline{\hspace{2cm}}$ $8\frac{7}{20} = \underline{\hspace{2cm}}$ $4\frac{1}{200} = \underline{\hspace{2cm}}$

Write each percent as a decimal and a mixed fraction.

C. $475\% = \underline{4.75, 4\frac{3}{4}}$ $300\% = \underline{\hspace{2cm}}$ $125\% = \underline{\hspace{2cm}}$

D. $302.5\% = \underline{\hspace{2cm}}$ $108.5\% = \underline{\hspace{2cm}}$ $205\% = \underline{\hspace{2cm}}$

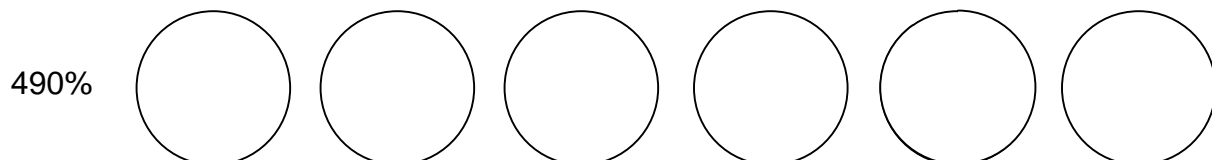
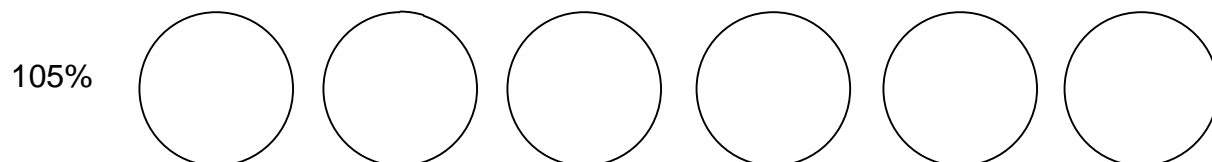
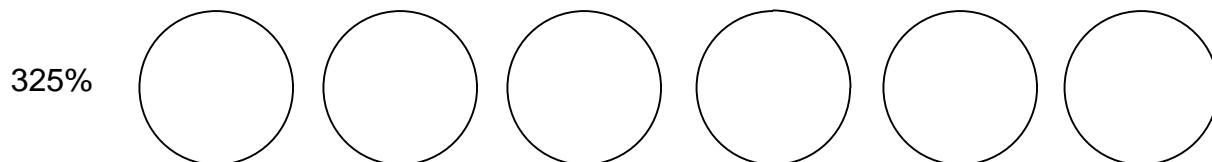
Calculate.


E. 420% of $400 = \underline{1,680}$ 225.5% of $100 = \underline{\hspace{2cm}}$

F. 150% of $60 = \underline{\hspace{2cm}}$ 311.2% of $190 = \underline{\hspace{2cm}}$


G. 105% of $175 = \underline{\hspace{2cm}}$ 525% of $25 = \underline{\hspace{2cm}}$

Each circle represents 100%. Shade the circles to show each percent.





Connections



Think About It

The president of the class of 1995 at Morris High School organized a reunion. She claims that, of the 2000 graduating seniors, 110% attended the reunion. Is this claim possible? Explain your thinking.

Puzzle

Fill in the missing spaces with single digit-numbers and symbols to complete this puzzle.

3		%	=		.	3	5			7
	1									
9				=	2	4				
	2		x					x		2
		x	7		4			3	=	
						=				=
	7		3					9	=	
	8		5		1	3		9		5



Percent Increase and Decrease

Calculate the sales tax for each item and the cost of the item with the tax.

A. Item: video game \$72.50 sales tax: \$5.80 cost with tax: \$78.30
 sales tax: 8%

B. Item: scooter \$129.00 sales tax: \$5.16 cost with tax: \$134.16
 sales tax: 4%

C. Item: radio \$214.00 sales tax: \$13.91 cost with tax: \$227.91
 sales tax: 6.5%

Calculate the sale price for each item.

D. Original price: \$98.00
 Discount: 15%
 Sale price: \$83.30

E. Original price: \$25.00
 Discount: 75%
 Sale price: \$6.25

F. Original price: \$225.00
 Discount: 45%
 Sale price: \$123.75

G. Original price: \$65.00
 Discount: 30%
 Sale price: \$45.50



Percent Increase and Decrease

Solve each problem.

- H. The enrollment at Grove Heights Middle School is 1,350 students. Due to a new housing development, the administration expects the enrollment to increase 20%. What is the anticipated enrollment at the middle school next year?

The anticipated enrollment at the middle school next year is 1,620 students.

$$(1,350 \times 20\%) + 1,350 = 270 + 1,350 = 1,620$$

- I. Jack plans to lose 15% of his total weight before football season starts. Jack weighs 195 pounds. If he reaches his goal, what will be his new weight?

Jack's new weight will be 165.75 pounds.

$$195 - (195 \times 15\%) = 195 - 29.25 = 165.75$$

- J. The local library plans to add 25% more books to the shelves. Currently, the library has 4,400 books. How many books will be available once the new books arrive?

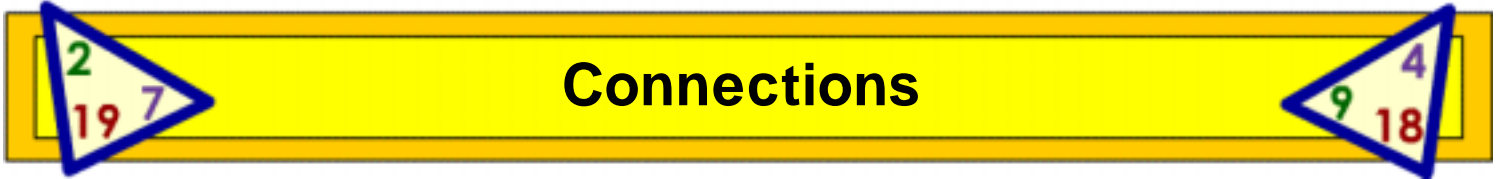
There will be 5,500 books available once the new books arrive.

$$(4,400 \times 25\%) + 4,400 = 1,100 + 4,400 = 5,500$$

- K. Mr. Wallace invested \$1,600 in a technology stock. Since investing, the value of the stock has decrease 12%. What is Mr. Wallace's stock worth now?

Mr. Wallace's stock is now worth \$1,408.

$$\$1,600 - (\$1,600 \times 12\%) = \$1,600 - \$192 = \$1,408$$

**Think About It**

Most often, people find the sale price of an item by taking the percent off of the item and subtracting it from the original price. Is there another method that can be used to find the sale price? Give an example and explain your thinking.

SAMPLE RESPONSE:

Traditional method: $30\% \text{ off of } \$45.00 = \$45.00 - (0.3 \times \$45.00) = \31.50

Another method: $70\% \text{ of } \$45.00 = \31.50

Since the discounted price is 30% off of the original price, the sale price must be

100% – 30%, or 70%, of the original price. The discounted amount plus the sale

price must equal the original price.

$(30\% \text{ of } \$45.00) + (70\% \text{ of } \$45.00) = 100\% \text{ of } \45.00

Puzzling Equations

Do you have a good sense of numbers? Then try your wits at solving these puzzling equations. Use the letters to help you find what the number represent.

Example: $4 = Q$ in a D
 $4 =$ Quarters in a Dollar

1. $18 = H$ in G **$18 = \text{Holes in Golf}$**
2. $360 = D$ in a C **$360 = \text{Degrees in a Circle}$**
3. $12 = B$ on a P **$12 = \text{Buttons on a Phone}$**
4. $200 = D$ for PG in M **$200 = \text{Dollars for Passing Go in Monopoly}$**
5. $5 = D$ in a ZC **$5 = \text{Digits in a Zip Code}$**
6. $8 = S$ on a SS **$8 = \text{Sides on a Stop Sign}$**
7. $9 = P$ in the SS **$9 = \text{Planets in the Solar System}$**
8. $100 = Y$ on a FF **$100 = \text{Yards on a Football Field}$**



Percent Increase and Decrease

Calculate the sales tax for each item and the cost of the item with the tax.

A. Item: video game \$72.50 sales tax: \$5.80 cost with tax: _____
sales tax: 8%

B. Item: scooter \$129.00 sales tax: _____ cost with tax: _____
sales tax: 4%

C. Item: radio \$214.00 sales tax: _____ cost with tax: _____
sales tax: 6.5%

Calculate the sale price for each item.

D. Original price: \$98.00
Discount: 15%
Sale price: \$83.30

E. Original price: \$25.00
Discount: 75%
Sale price: _____

F. Original price: \$225.00
Discount: 45%
Sale price: _____

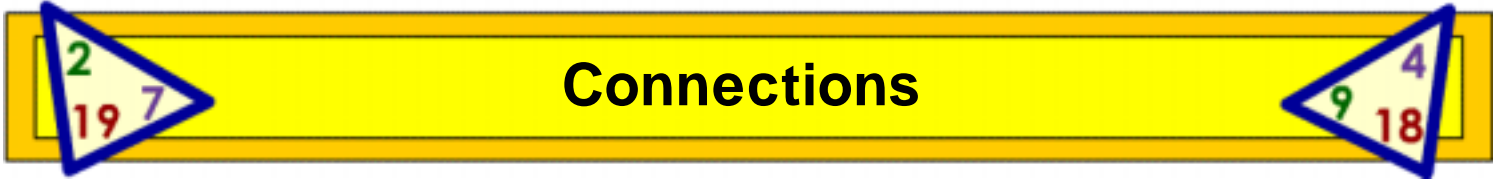
G. Original price: \$65.00
Discount: 30%
Sale price: _____



Percent Increase and Decrease

Solve each problem.

- H. The enrollment at Grove Heights Middle School is 1,350 students. Due to a new housing development, the administration expects the enrollment to increase 20%. What is the anticipated enrollment at the middle school next year?
- I. Jack plans to lose 15% of his total weight before football season starts. Jack weighs 195 pounds. If he reaches his goal, what will be his new weight?
- J. The local library plans to add 25% more books to the shelves. Currently, the library has 4,400 books. How many books will be available once the new books arrive?
- K. Mr. Wallace invested \$1,600 in a technology stock. Since investing, the value of the stock has decrease 12%. What is Mr. Wallace's stock worth now?

**Think About It**

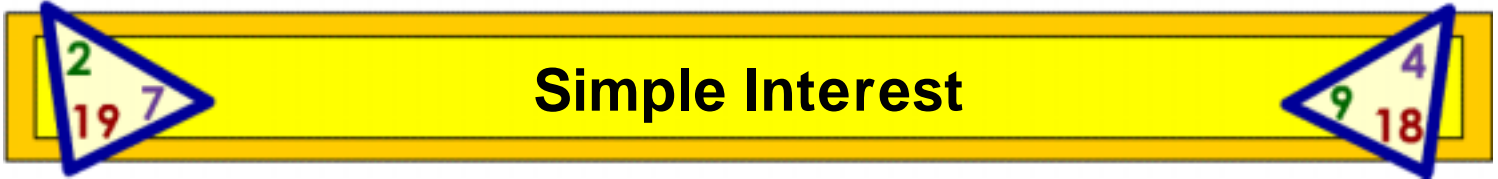
Most often, people find the sale price of an item by taking the percent off of the item and subtracting it from the original price. Is there another method that can be used to find the sale price? Give an example and explain your thinking.

Puzzling Equations

Do you have a good sense of numbers? Then try your wits at solving these puzzling equations. Use the letters to help you find what the number represent.

Example: 4 = Q in a D
4 = Quarters in a Dollar

1. 18 = H in G _____
2. 360 = D in a C _____
3. 12 = B on a P _____
4. 200 = D for PG in M _____
5. 5 = D in a ZC _____
6. 8 = S on a SS _____
7. 9 = P in the SS _____
8. 100 = Y on a FF _____



Simple Interest

Calculate the interest using the formula $I = prt$.

A. Principal: \$1,000
Interest rate: 15%
Time: 5 years

Interest: **\$750**

B. Principal: \$25,000
Interest rate: 5%
Time: 10 years

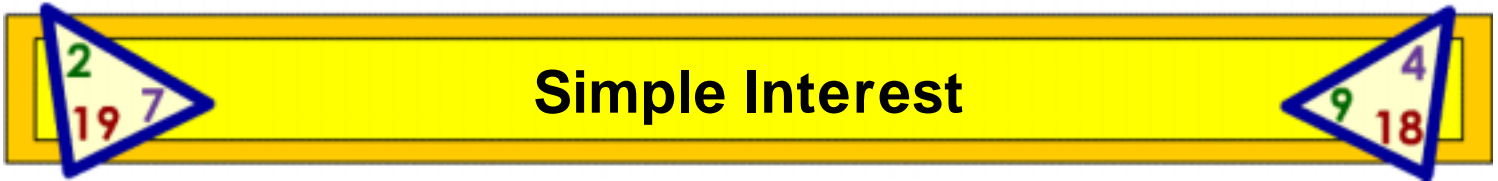
Interest: **\$12,500**

C. Principal: \$1,200
Interest rate: 6.25%
Time: 3 years

Interest: **\$225**

D. Principal: \$850
Interest rate: 4.75%
Time: 4 years

Interest: **\$161.50**



Simple Interest

Solve each problem. Write your answer in a complete sentence.

- E. The local bank is offering a 3.25% interest rate for all investments over \$500. Maurice decides to put \$750 in the investment for 2 years. How much will Maurice earn in interest at the end of the 2 years?

At the end of the 2 years, Maurice will earn \$48.75.

$$750 \times 0.0325 \times 2 = 48.75$$

- F. Mrs. Burns paid \$4,770 for a 5-year loan. The original principal was \$3,600. What was the interest rate on Mrs. Burn's loan?

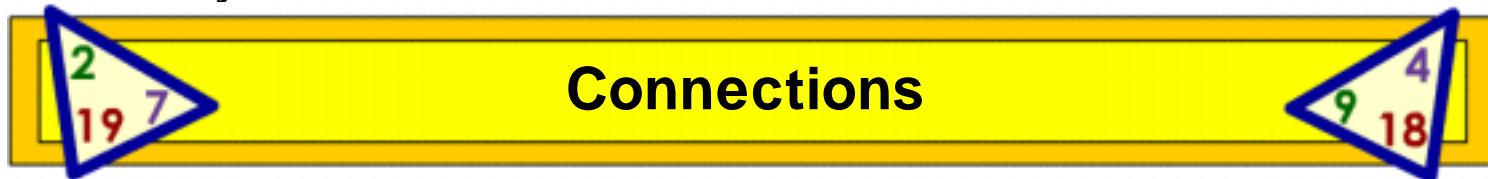
The interest rate on Mrs. Burn's loan was 6.5%.

$$(4,770 - 3,600) \div (3,600 \times 5) = 1,170 \div 18,000 = 0.065$$

- G. The financial officer is promoting a short-term investment with 9% return on any deposit over \$999. Tammy invest \$1,800 and earns \$468. How long did she invest her money?

Tammy invested her money for 3 years.

$$486 \div (1,800 \times 0.09) = 486 \div 162 = 3$$

**Think About It**

Unlike simple interest, compound interest is paid on the principal and the interest that has already been paid. Suppose \$800 is invested with a 6% interest rate that is compounded monthly. Explain how to calculate the total amount in the account at the end of 3 months.

To find the compound interest, determine the length of time by dividing the time

period, 1 month, by 1 year, or 12 months. Then, calculate the interest for the first

month. Add that to the principal and calculate the interest for the second month.

Add that to the principal from the second month and calculate the interest for the

third month. The sum of the interest earned each month is the compound interest.

$$\text{Month 1: } \$800.00 \times 6\% \times \frac{1}{12} \approx \$3.98$$

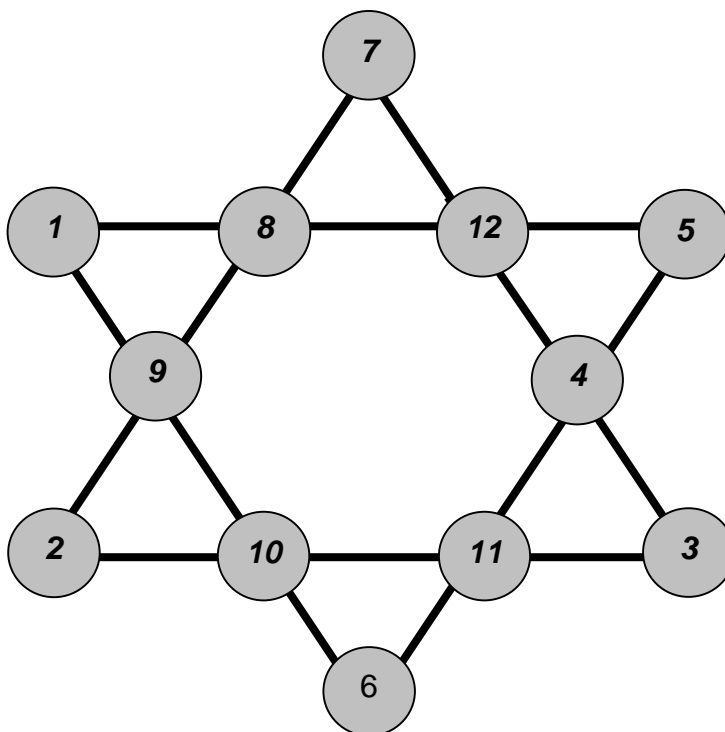
$$\text{Month 2: } \$803.98 \times 6\% \times \frac{1}{12} \approx \$4.00$$

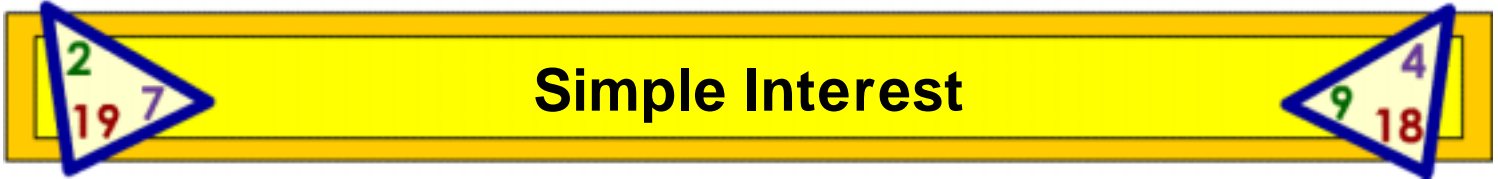
$$\text{Month 3: } \$807.98 \times 6\% \times \frac{1}{12} \approx \$4.02$$

$$\text{Compound Interest: } \$3.98 + \$4.00 + \$4.02 = \$12.00$$

Number Puzzle

Place the numbers 1-12 in the circles so that the sum of the four numbers along each line equals 26. Each number must be used only once.





Calculate the interest using the formula $I = prt$.

A. Principal: \$1,000
Interest rate: 15%
Time: 5 years

Interest: \$750

B. Principal: \$25,000
Interest rate: 5%
Time: 10 years

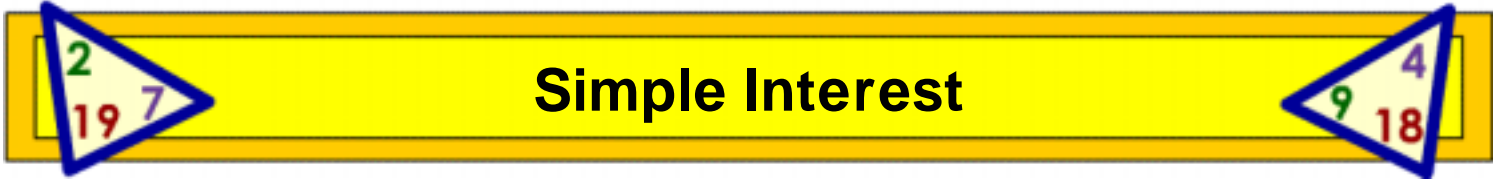
Interest: _____

C. Principal: \$1,200
Interest rate: 6.25%
Time: 3 years

Interest: _____

D. Principal: \$850
Interest rate: 4.75%
Time: 4 years

Interest: _____



Simple Interest

Solve each problem. Write your answer in a complete sentence.

- E. The local bank is offering a 3.25% interest rate for all investments over \$500. Maurice decides to put \$750 in the investment for 2 years. How much will Maurice earn in interest at the end of the 2 years?
- F. Mrs. Burns paid \$4,770 for a 5-year loan. The original principal was \$3,600. What was the interest rate on Mrs. Burn's loan?
- G. The financial officer is promoting a short-term investment with 9% return on any deposit over \$999. Tammy invest \$1,800 and earns \$468. How long did she invest her money?

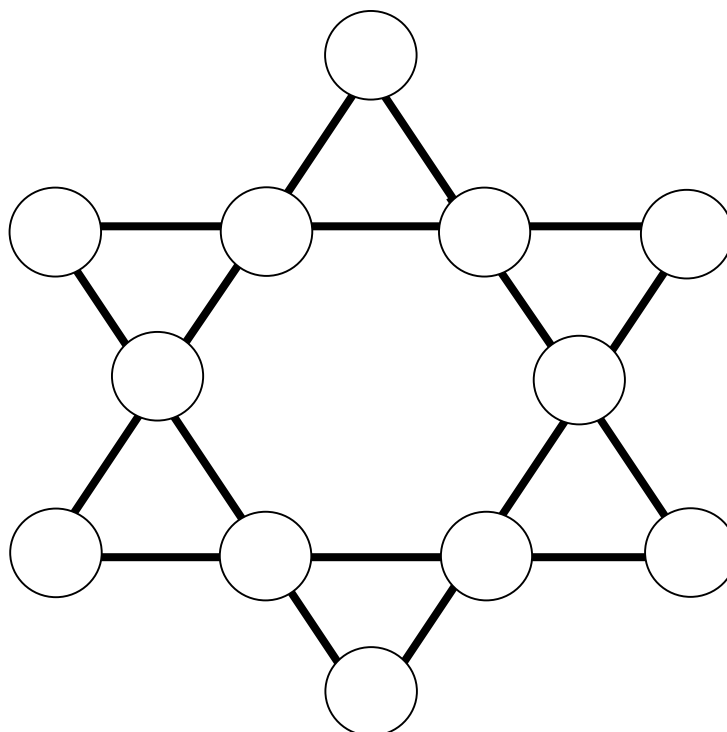
Connections

Think About It

Unlike simple interest, compound interest is paid on the principal and the interest that has already been paid. Suppose \$800 is invested with a 6% interest rate that is compounded monthly. Explain how to calculate the total amount in the account at the end of 3 months.

Number Puzzle

Place the numbers 1-12 in the circles so that the sum of the four numbers along each line equals 26. Each number must be used only once.



Proportional Reasoning

Solve each proportion for the missing measure.

A. $\frac{4 \text{ in.}}{7 \text{ ft.}} = \frac{16 \text{ in.}}{28 \text{ ft.}}$

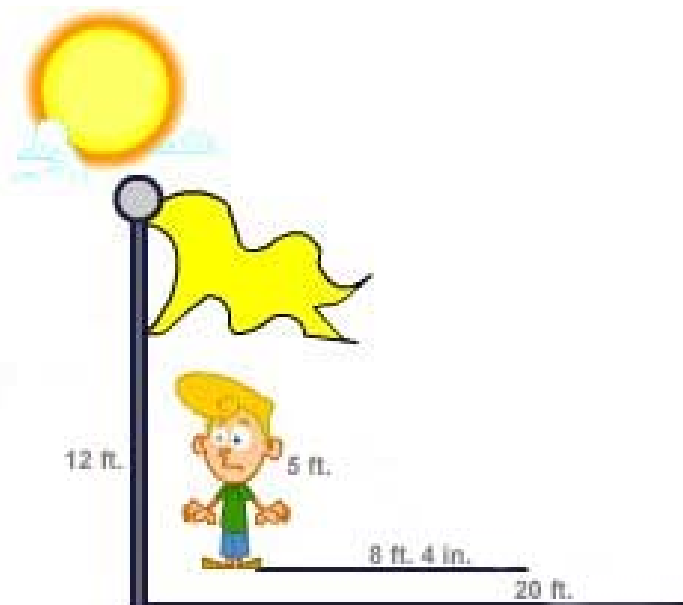
B. $\frac{5 \text{ yd.}}{12 \text{ mi.}} = \frac{20 \text{ yd.}}{48 \text{ mi.}}$

C. $\frac{2 \text{ ft.}}{3 \text{ yd.}} = \frac{12 \text{ ft.}}{18 \text{ yd.}}$

D. $\frac{11 \text{ in.}}{15 \text{ yd.}} = \frac{44 \text{ in.}}{60 \text{ yd.}}$

Write the appropriate proportion for the pictures below.

E.



$$\frac{12 \text{ ft.}}{240 \text{ in.}} = \frac{5 \text{ ft.}}{100 \text{ in.}}$$

F.



$$\frac{50 \text{ ft.}}{120 \text{ ft.}} = \frac{13 \text{ ft.}}{31.2 \text{ ft.}}$$



Proportional Reasoning

Solve each word problem.

- G. Sue has a recipe that calls for 6 cups of flour for every cup of salt. If she uses 4 cups of flour, how much salt does she need to add?

Sue needs to add $\frac{2}{3}$ cup of salt.

$$\frac{6 \text{ cups}}{1 \text{ cup}} = \frac{4 \text{ cups}}{x \text{ cups}}; 6(x) = 1(4); x = \frac{4}{6}; x = \frac{2}{3}$$

- H. When a 3 oz. weight is put in a container of water, the water rises 2 in. If an 11 oz. weight is put in the water, how many inches should the water rise?

The water should rise $7\frac{1}{3}$ inches.

$$\frac{3 \text{ oz.}}{2 \text{ in.}} = \frac{11 \text{ oz.}}{x \text{ in.}}; 3(x) = 2(11); x = \frac{22}{3}; x = 7\frac{1}{3}$$

- I. At a certain time of day, a 5 ft. 4in. person casts a 30 in. shadow. How long of a shadow would a 12 ft. building cast?

The building would cast a 67.5 in. shadow.

$$\frac{5 \text{ ft. } 4 \text{ in.}}{30 \text{ in.}} = \frac{12 \text{ ft.}}{x \text{ in.}}; 5\frac{1}{3}(x) = 30(12); x = 67.5$$

- J. A 7-foot flagpole casts a 3-foot shadow. At the same time of day, a dog casts a 10-inch shadow. How tall is the dog?

The dog is 1 ft. 11 in. tall.

$$\frac{7 \text{ ft.}}{3 \text{ ft.}} = \frac{x \text{ ft.}}{10 \text{ in.}}; 7\left(\frac{5}{6}\right) = 3(x); 1.94 = x$$



Connections

Think About It

Identify three careers that use proportional reasoning or indirect measurement and explain how it is used.

SAMPLE RESPONSE: Paramedics use proportions to adjust medicine dosages.

Carpenters use proportions when building from blueprints. Tree cutters use indirect measurement to measure the height of trees before cutting.

Brain Teaser

You have one 3 oz. glass, one 5 oz. glass, and one 11 oz. glass, with an unlimited amount of water. Explain how you can measure exactly 7oz. of water using only these three glasses.

Possible answer: Fill the 5oz. glass and pour its contents into the 3 oz. glass, leaving 2 oz. in the 5 oz. glass. Pour the 2 oz. into the 11 oz. glass. Refill the 5 oz. glass and pout its contents into the 11 oz. glass. The 11 oz. glass now has a total content of 7 oz.



Proportional Reasoning

Solve each proportion for the missing measure.

A. $\frac{4 \text{ in.}}{7 \text{ ft.}} = \frac{16 \text{ in.}}{28 \text{ ft.}}$

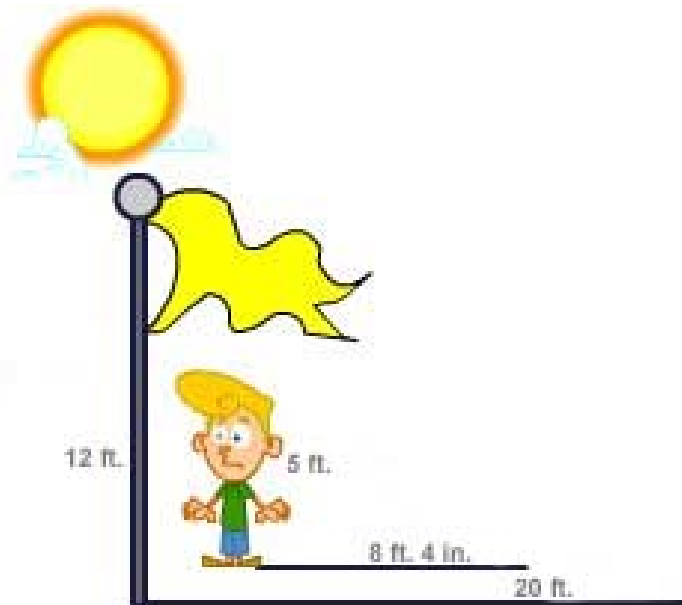
B. $\frac{5 \text{ yd.}}{20 \text{ yd.}} = \frac{48 \text{ mi.}}{48 \text{ mi.}}$

C. $\frac{\quad}{3 \text{ yd.}} = \frac{12 \text{ ft.}}{18 \text{ yd.}}$

D. $\frac{11 \text{ in.}}{15 \text{ yd.}} = \frac{44 \text{ in.}}{\quad}$

Write the appropriate proportion for the pictures below.

E.



F.





Proportional Reasoning

Solve each word problem.

- G. Sue has a recipe that calls for 6 cups of flour for every cup of salt. If she uses 4 cups of flour, how much salt does she need to add?
- H. When a 3 oz. weight is put in a container of water, the water rises 2 in. If an 11 oz. weight is put in the water, how many inches should the water rise?
- I. At a certain time of day, a 5 ft. 4in. person casts a 30 in. shadow. How long of a shadow would a 12 ft. building cast?
- J. A 7-foot flagpole casts a 3-foot shadow. At the same time of day, a dog casts a 10-inch shadow. How tall is the dog?

Connections

Think About It

Identify three careers that use proportional reasoning or indirect measurement and explain how it is used.

Brain Teaser

You have one 3 oz. glass, one 5 oz. glass, and one 11 oz. glass, with an unlimited amount of water. Explain how you can measure exactly 7oz. of water using only these three glasses.



3 oz.



5 oz.



11 oz.



Proportional Reasoning

For each proportion, choose the corresponding cross product from the list on the right.

- A. $\frac{2}{3} = \frac{4}{6}$ 12 12
- B. $\frac{7}{9} = \frac{14}{18}$ 126 20
- C. $\frac{2}{5} = \frac{4}{10}$ 20 60
- D. $\frac{12}{15} = \frac{4}{5}$ 60 120
- E. $\frac{5}{8} = \frac{15}{24}$ 120 126

Solve for the variable in each proportion.

$$\frac{2}{A} = \frac{6}{18} \quad A = \underline{6}$$

$$\frac{E}{5} = \frac{14}{35} \quad E = \underline{2}$$

$$\frac{7}{28} = \frac{T}{4} \quad T = \underline{1}$$

$$\frac{9}{10} = \frac{L}{30} \quad L = \underline{27}$$

$$\frac{20}{30} = \frac{10}{W} \quad W = \underline{15}$$

$$\frac{12}{20} = \frac{3}{I} \quad I = \underline{5}$$

$$\frac{8}{24} = \frac{H}{12} \quad H = \underline{4}$$

$$\frac{M}{11} = \frac{18}{22} \quad M = \underline{9}$$

$$\frac{36}{R} = \frac{9}{10} \quad R = \underline{40}$$

Place the letter of the variable on the line above the corresponding answer in the puzzle below.

What did the boy centipede tell the girl millipede?

<u>H</u>	<u>E</u>	<u>W</u>	<u>I</u>	<u>L</u>	<u>L</u>	<u>“</u>	<u>M</u>	<u>E</u>	<u>T</u>	<u>E</u>	<u>R</u>	<u>”</u>	<u>L</u>	<u>A</u>	<u>T</u>	<u>E</u>	<u>R</u>
4	2	15	5	27	27	9	2	1	2	40	27	6	1	2	40		



Proportional Reasoning

Solve the word problems.

- F. A scale drawing of a stork states that $1 \text{ cm} = 0.5 \text{ m}$. If a stork's wingspan were 2 m , how long would the wingspan be in the picture?

In the picture, the stork's wingspan would be 4 cm long.

- G. While in a car chase, a police car traveled at a speed of 140 km per hour . If the car chase lasted for 30 minutes , how many kilometers did the police car travel?

The police car traveled 70 km during the car chase.

- H. A recipe calls for 150 mL of beans for every 500 mL of rice. If you add 75 mL of beans how much rice do you need to add?

You need to add 250 mL of rice.

- I. A father is 1.5 meters tall and casts a shadow 1 meter long. His daughter is standing next to him and casts a shadow 60 cm long. How tall is the daughter?

The daughter is 90 cm tall.

Connections

Think About It

Scale drawings are not only used to scale down a large object, they can also be used to allow you to see an object that is very small. Name some items for which a scale drawing would be larger than the actual item.

SAMPLE RESPONSE: A scale drawing of a cell would be larger than an actual cell.

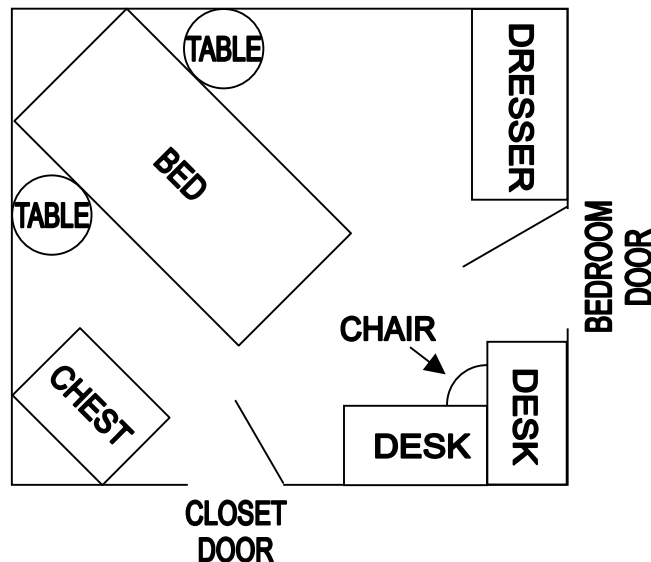
Since you cannot see a cell with the naked eye, a scale drawing would be used to show the structures contained in a cell.

Build a Model

Build a scale model of your bedroom. Make sure to use a metric scale for your model. Do not forget to include your furniture.

Sample Model

Scale: 1 cm = 0.5 m





Proportional Reasoning

For each proportion, choose the corresponding cross product from the list on the right.

A. $\frac{2}{3} = \frac{4}{6}$ 12

12

B. $\frac{7}{9} = \frac{14}{18}$ _____

20

C. $\frac{2}{5} = \frac{4}{10}$ _____

60

D. $\frac{12}{15} = \frac{4}{5}$ _____

120

E. $\frac{5}{8} = \frac{15}{24}$ _____

126

Solve for the variable in each proportion.

$\frac{2}{A} = \frac{6}{18}$ A = 6

$\frac{E}{5} = \frac{14}{35}$ E = _____

$\frac{7}{28} = \frac{T}{4}$ T = _____

$\frac{9}{10} = \frac{L}{30}$ L = _____

$\frac{20}{30} = \frac{10}{W}$ W = _____

$\frac{12}{20} = \frac{3}{I}$ I = _____

$\frac{8}{24} = \frac{H}{12}$ H = _____

$\frac{M}{11} = \frac{18}{22}$ M = _____

$\frac{36}{R} = \frac{9}{10}$ R = _____

Place the letter of the variable on the line above the corresponding answer in the puzzle below.

What did the boy centipede tell the girl millipede?

$\frac{\quad}{4}$ $\frac{\quad}{2}$ $\frac{\quad}{15}$ $\frac{\quad}{5}$ $\frac{\quad}{27}$ $\frac{\quad}{27}$ “ $\frac{\quad}{9}$ $\frac{\quad}{2}$ $\frac{\quad}{1}$ $\frac{\quad}{2}$ $\frac{\quad}{40}$ ” $\frac{\quad}{27}$ $\frac{\mathbf{A}}{6}$ $\frac{\quad}{1}$ $\frac{\quad}{2}$ $\frac{\quad}{40}$



Proportional Reasoning

Solve the word problems.

- F. A scale drawing of a stork states that $1 \text{ cm} = 0.5 \text{ m}$. If a stork's wingspan were 2 m , how long would the wingspan be in the picture?
- G. While in a car chase, a police car traveled at a speed of 140 km per hour . If the car chase lasted for 30 minutes , how many kilometers did the police car travel?
- H. A recipe calls for 150 mL of beans for every 500 mL of rice. If you add 75 mL of beans how much rice do you need to add?
- I. A father is 1.5 meters tall and casts a shadow 1 meter long. His daughter is standing next to him and casts a shadow 60 cm long. How tall is the daughter?

 **Connections**

Think About It

Scale drawings are not only used to scale down a large object, they can also be used to allow you to see an object that is very small. Name some items for which a scale drawing would be larger than the actual item.

Build a Model

Build a scale model of your bedroom. Make sure to use a metric scale for your model. Do not forget to include your furniture.



Ratios

Write the ratio in three different formats.

A. eleven to five

11:5

11 to 5

$\frac{11}{5}$

B. six to nine

6:9

6 to 9

$\frac{6}{9}$

C. one to one

1:1

1 to 1

$\frac{1}{1}$

D. seventeen to three

17:3

17 to 3

$\frac{17}{3}$

Write two equivalent ratios.

Answers may vary.

E. 2:5

4:10

6:15

F. 6 to 5

12 to 10

18 to 15

G. 5:2

10:4

15:6

H. $\frac{1}{6}$

$\frac{2}{12}$

$\frac{3}{18}$



Ratios

Find the missing term that makes the ratios equivalent.

M. 1:3, 5: 15

N. 4:7, 12:21

O. 16:20, 8:10

P. 11 to 12, 33 to 36

Q. 9 2 27 to 6

R. 2 to 5, 12 to 30

S. $\frac{2}{3}, \frac{8}{\underline{12}}$

T. $\frac{15}{4}, \frac{\underline{30}}{8}$

U. $\frac{9}{12}, \frac{45}{\underline{60}}$

Use the information in the table to solve the following questions.

Types of Drinks	Number Served
soda	32
water	54
juice	18

V. What is the ratio of drinks to soda?

104:32 or 13:4

W. What is the ratio of juice drinks to soda?

18:32 or 9:16

X. What is the ratio of soda to water?


32:54 or 16:27

Y. What is the ratio of soda and juice to water?

50:54 or 25:27



Connections



Think About It

Eric wants to make a model of his dad’s 1965 Mustang. His dad suggests he use ratios to help him make the model to scale. Explain how using ratios will help Eric make his model.

SAMPLE RESPONSE: Eric can measure the parts of his father’s car and then use an equivalent ratio to scale it down to the size of his model. For example, if the length of the Mustang is 180 inches, and Eric plans to make the model with a scale of 1:30, he can calculate the length of his model by using the following ratios.

$$\frac{1}{30} = \frac{x}{180}$$

$$30x = 180$$

$$x = 180 \div 30 = 6 \text{ inches}$$

Finding a Golden Rectangle

To find a Golden Rectangle, you must first know about the Golden Ratio. The Golden Ratio is a special number approximately equal to 1.61803 and is referred to by the Greek letter Phi (Φ). The Golden Ratio is found throughout nature and is used extensively by people in the fields of art, architecture, and science.

A Golden Rectangle is a rectangle in which the ratio of the length to the width is the Golden Ratio. For example, a Golden Rectangle with a width of 4 cm has an approximate length of 4 cm x 1.62 or 6.48 cm.

Measure the width and length of several rectangles. Then find the ratio of the length to the width for each rectangle. Are any of the rectangles Golden Rectangles?

Object	Length	Width	Length : Width	Golden Rectangle



Ratios

Write the ratio in three different formats.

A. eleven to five

11:5

11 to 5

$\frac{11}{5}$

B. six to nine

C. one to one

D. seventeen to three

Write two equivalent ratios.

E. 2:5

4:10

6:15

F. 6 to 5

G. 5:2

H. $\frac{1}{6}$



Find the missing term that makes the ratios equivalent.

M. 1:3, 5: 15

N. 4:7, _____:21

O. _____:20, 8:10

P. 11 to 12, 33 to _____

Q. 9 _____ 27 to 6

R. 2 to 5, 12 to _____

S. $\frac{2}{3}$, $\frac{8}{\quad}$

T. $\frac{15}{4}$, $\frac{\quad}{8}$

U. $\frac{9}{12}$, $\frac{45}{\quad}$

Use the information in the table to solve the following questions.


Types of Drinks	Number Served
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Y. What is the ratio of soda and juice to water? _____



Connections



Think About It

Eric wants to make a model of his dad's 1965 Mustang. His dad suggests he use ratios to help him make the model to scale. Explain how using ratios will help Eric make his model.

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Measure the width and length of several rectangles. Then find the ratio of the length to the width for each rectangle. Are any of the rectangles Golden Rectangles?

Object	Length	Width	Length : Width	Golden Rectangle



Proportions

Place an X next to all the proportions that are true.

A. $5:6 = 15:18$ **X**

B. 2 to 7 = 1 to 3

C. $45:25 = 9:5$ **X**

D. $14:24 = 49:84$ **X**

E. 63 to 27 = 7 to 4

F. $3:17 = 9:54$

Find the missing term for each proportion.

G. $2:5 = 6:x$ **$x = 15$**

H. 6 to 5 = n to 45 **$n = 54$**

I. $d:9 = 16:72$ **$d = 2$**

J. $\frac{60}{10} = \frac{75}{n}$ **$n = 12.5$**

K. $\frac{32}{12} = \frac{x}{3}$ **$x = 8$**

L. $\frac{60}{16} = \frac{15}{d}$ **$d = 4$**

Write a proportion to solve each problem.

- M. A man who weighs 150 pounds on Earth will weigh just 25 pounds on the moon. How much will a young girl weigh on the moon if she weighs 75 pounds on Earth?

A young girl will weigh 12.5 pounds on the moon.

$$\frac{150}{25} = \frac{75}{x}, x = 12.5$$

- N. A model car has a ratio of 1:25 to the actual car. If a model is 5 inches long, how long is the actual car?

The actual car is 125 inches long.

$$\frac{1}{25} = \frac{5}{x}, x = 125$$

- O. Soccer balls are on sale at 2 for \$18.00. The coach purchases 5 of them. How much does she pay?

She pays \$45.00 for 5 soccer balls.

$$\frac{2}{18} = \frac{5}{x}, x = 45.00$$

**Think About It**

Suppose you are planning a trip to England. Your travel agent tells you that \$500 is equal to approximately 305 British pounds. Explain how to find the current exchange rate using a proportion.

SAMPLE RESPONSE: Write a ratio that compares 500 dollars to 305 pounds. Set

that ratio equal to another ratio that compares x dollar to 1 pound. Cross multiply.

Then divide to find the value of x .

$$\frac{500 \text{ dollars}}{305 \text{ pounds}} = \frac{x \text{ dollars}}{1 \text{ pound}}$$

$$(305)(x) = (500)(1)$$

$$305x = 500$$

$$x = 1.64 \text{ dollars}$$

A Piece of Pi

Complete the investigation to discover a number called pi.

Materials

paper plate, soup can, lid to a jar, pie pan, string, tape measure

Procedure

Using the string, determine the distance around each object to the closest mm. Next, locate the center of each object and measure its diameter to the closest mm. Then, calculate the ratio of the circumference to the diameter by dividing the measurements. Use the chart below to record your measurements and calculations.

Object	Circumference	Diameter	C/D
paper plate			
soup can			
jar lid			
pie pan			

The decimals in the last column of the chart should be very close to 3.14. Why? Well, the ratio of the circumference to the diameter of a circle is approximately a constant value called pi (π). Pi represents a non-repeating, non-terminating decimal whose value is approximately 3.14285...



Place an X next to all the proportions that are true.

A. $5:6 = 15:18$ **X**

B. 2 to 7 = 1 to 3

C. $45:25 = 9:5$

D. $14:24 = 49:84$

E. 63 to 27 = 7 to 4

F. $3:17 = 9:54$

Find the missing term for each proportion.

G. $2:5 = 6:x$ $x = 15$

H. 6 to 5 = n to 45 _____

I. $d:9 = 16:72$ _____

J. $\frac{60}{10} = \frac{75}{n}$ _____

K. $\frac{32}{12} = \frac{x}{3}$ _____

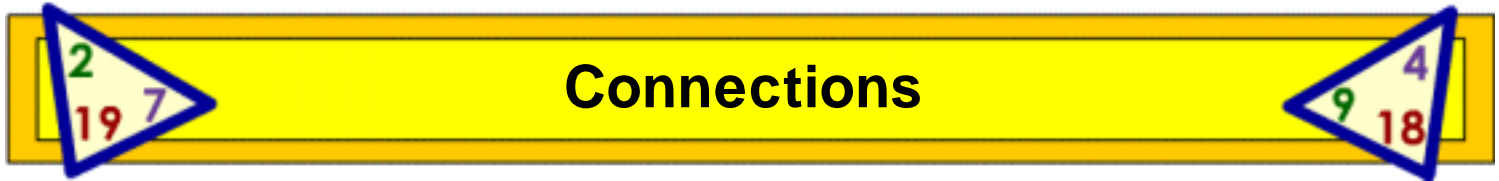
L. $\frac{60}{16} = \frac{15}{d}$ _____

Write a proportion to solve each problem.

M. A man who weighs 150 pounds on Earth will weigh just 25 pounds on the moon. How much will a young girl weigh on the moon if she weighs 75 pounds on Earth?

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Complete the investigation to discover a number called pi.

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paper plate, soup can, lid to a jar, pie pan, string, tape measure

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Using the string, determine the distance around each object to the closest mm. Next, locate the center of each object and measure its diameter to the closest mm. Then, calculate the ratio of the circumference to the diameter by dividing the measurements. Use the chart below to record your measurements and calculations.

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Indirect Measurement

Match each conversion on the left with the correct proportion that completes the conversion on the right.

A. 12 cm → in. 1

1. $\frac{1}{2.54} = \frac{x}{12}$

B. 12 kg → lb. 6

2. $\frac{1}{1.0936} = \frac{4}{x}$

C. 12 g → oz. 4

3. $\frac{1}{1.6093} = \frac{x}{4}$

D. 4 m → yd. 2

4. $\frac{1}{28.3495} = \frac{x}{12}$

E. 4 qt. → L 5

5. $\frac{1}{1.0567} = \frac{x}{4}$

F. 4 km → mi. 3

6. $\frac{1}{2.2046} = \frac{12}{x}$

Solve each of the word problems by using a proportion. Round your answer to the nearest tenth when necessary.

- G. A drink recipe calls for 2 quarts of grape juice for every 3 liters of pineapple juice. If 5 quarts of grape juice is added, how many liters of pineapple juice should be added?

About 7.5 liters of pineapple juice should be added.

$$\frac{2 \text{ qt.}}{3 \text{ L}} = \frac{5 \text{ qt.}}{x \text{ L}}; 2(x) = 3(5); x = 7.5$$

- H. A 33 meter tall building casts a shadow 28 ft long. How tall is a woman standing next to the building if she is casting an 18 in. shadow?

The woman is about 1.8 meters tall.

$$\frac{33 \text{ m}}{28 \text{ ft.}} = \frac{x \text{ m}}{18 \text{ in.}}; 33(1.5) = 28(x); x \approx 1.8$$



Indirect Measurement

- I. A scale drawing of a beluga whale states that 2 cm = 5 ft. If a beluga whale is 23 ft long how long will it be in the drawing?

The whale will be 9.2 cm long in the drawing.

$$\frac{2 \text{ cm}}{5 \text{ ft.}} = \frac{x \text{ cm}}{23 \text{ ft.}}; 2(23) = 5(x); x = 9.2$$

- J. The scale on a map states 3 in. = 4 m. If Shady Acres is 205 m from Clear Pointe, how far apart are they on the map?

Shady Acres is 153.74 in. from Clear Pointe on the map.

$$\frac{3 \text{ in.}}{4 \text{ m}} = \frac{x \text{ in.}}{205 \text{ m}}; 3(205) = 4(x); x = 153.75$$

- K. Carolyn wants to make a scale drawing of a photograph. The original photograph measures 4 in. long by 6 in. wide. What should the width of her scale drawing be if it has a length of 5 cm?

The width of her scale drawing should be 7.5 cm.

$$\frac{4 \text{ in.}}{6 \text{ in.}} = \frac{5 \text{ cm}}{x \text{ cm}}; 4(x) = 6(5); x = 7.5$$

- L. A sculptor is making a scale model of a monarch butterfly. The sculptor is using a scale of 1 cm = 3 in. How large will the sculptor make the butterfly's wingspan if it measures 4 inches?

The sculptor will make the butterfly's wingspan 1.3 cm wide.

$$\frac{1 \text{ cm}}{3 \text{ in.}} = \frac{x \text{ cm}}{4 \text{ in.}}; 1(4) = 3(x); x \approx 1.3$$



Connections

Think About It

A proportion is an equation stating two ratios are equal. Proportions can be written in different ways as long as a common element ties the numerators and denominators together. Based on the information below, write two different proportions about the relationship. Prove the validity of the proportions by finding the cross products.

A 7-foot wide flag is made to hang on a 28-foot long pole. A 6-foot wide flag is made to hang on a 24-foot long pole.

SAMPLE RESPONSE:

$$\frac{7 \text{ ft.}}{28 \text{ ft.}} = \frac{6 \text{ ft.}}{24 \text{ ft.}} \quad \text{and} \quad \frac{7 \text{ ft.}}{6 \text{ ft.}} = \frac{28 \text{ ft.}}{24 \text{ ft.}}$$

$$7(24) = 28(6) \quad 7(24) = 6(28)$$

Try It

On a sunny day, go outside with a friend. Stand still in one spot and have your friend measure the length of your shadow. Next, predict the length of your friend's shadow by solving the proportion below. Enter your measurements into the proportion. After you have made your prediction, have your friend stand in the same spot you were. Measure your friend's shadow. How accurate was your prediction? Why was it different?

$$\frac{\text{your height}}{\text{your shadow length}} = \frac{\text{friend's height}}{\text{friend's shadow length}}$$

Example: You are 5 ft. tall and your shadow was 2 ft. long. Your friend is 5ft. 3in. tall.

$$\frac{60 \text{ in.}}{24 \text{ in.}} = \frac{63 \text{ in.}}{x \text{ in.}} \quad x = 25.2 \text{ in.}$$

Your friend's shadow should be about 2 ft. 3 in. long.



Indirect Measurement

Match each conversion on the left with the correct proportion that completes the conversion on the right.

A. 12 cm → in. $\frac{1}{\quad}$

1. $\frac{1}{2.54} = \frac{x}{12}$

B. 12 kg → lb. _____

2. $\frac{1}{1.0936} = \frac{4}{x}$

C. 12 g → oz. _____

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D. 4 m → yd. _____

4. $\frac{1}{28.3495} = \frac{x}{12}$

E. 4 qt. → L _____

5. $\frac{1}{1.0567} = \frac{x}{4}$

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Solve each of the word problems by using a proportion. Round your answer to the nearest tenth when necessary.

G. A drink recipe calls for 2 quarts of grape juice for every 3 liters of pineapple juice. If 5 quarts of grape juice is added, how many liters of pineapple juice should be added?

H. A 33 meter tall building casts a shadow 28 ft long. How tall is a woman standing next to the building if she is casting an 18 in. shadow?



Indirect Measurement

- I. A scale drawing of a beluga whale states that $2\text{ cm} = 5\text{ ft}$. If a beluga whale is 23 ft long how long will it be in the drawing?
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- K. Carolyn wants to make a scale drawing of a photograph. The original photograph measures 4 in. long by 6 in. wide. What should the width of her scale drawing be if it has a length of 5 cm?
- L. A sculptor is making a scale model of a monarch butterfly. The sculptor is using a scale of $1\text{ cm} = 3\text{ in.}$ How large will the sculptor make the butterfly's wingspan if it measures 4 inches?



Connections

Think About It

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A 7-foot wide flag is made to hang on a 28-foot long pole. A 6-foot wide flag is made to hang on a 24-foot long pole.

Try It

On a sunny day, go outside with a friend. Stand still in one spot and have your friend measure the length of your shadow. Next, predict the length of your friend's shadow by solving the proportion below. Enter your measurements into the proportion. After you have made your prediction, have your friend stand in the same spot you were. Measure your friend's shadow. How accurate was your prediction? Why was it different?

$$\frac{\text{your height}}{\text{your shadow length}} = \frac{\text{friend's height}}{\text{friend's shadow length}}$$

Example: You are 5 ft. tall and your shadow was 2 ft. long. Your friend is 5ft. 3in. tall.

$$\frac{60 \text{ in.}}{24 \text{ in.}} = \frac{63 \text{ in.}}{x \text{ in.}} \quad x = 25.2 \text{ in.}$$

Your friend's shadow should be about 2 ft. 3 in. long.



Rates

Find the unit rate.

A. 12 eggs for 84¢

7¢ per egg

B. 16 pages in 12 hours

45 minutes per page

C. 42 mi on 3 gal

14 mi per gal

D. 5 shirts for \$45.25

\$9.05 per shirt

E. 135 people on 3 buses

45 people per bus

F. 6 fish for \$1.98

33¢ per fish

Circle the best unit price.

G. 100 stamps for \$37.00

5 stamps for \$2.00

8 stamps for \$2.88

H. \$4.50 for 9 apples

12 apples for \$5.76

3 apples for \$1.40

I. 2 pizzas for \$15.50

4 pizzas for \$28.96

1 pizza for \$7.25

J. 8 tickets for \$32.00

\$60.00 for 12 tickets

10 tickets for \$38.00



Rates

Using a rate, write a proportion to solve each problem.

- K. Marcy's van gets 13.5 miles per gallon. She plans to travel 432 miles to visit her family. How many gallons of gas will she need to make the trip?

Marcy will need 32 gallons of gas to make the trip.

$$\frac{13.5}{1} = \frac{432}{x}, x = 32$$

- L. David takes 45 minutes to run 5 miles. How long will it take him to run 1 mile?

It will take David 9 minutes to run 1 mile.

$$\frac{5}{45} = \frac{1}{x}, x = 9$$

- M. Jay buys 2 pounds of grapes for \$3.84. How much will 5 pounds of grapes cost?

It will cost \$9.60 for 5 pounds of grapes.

$$\frac{2}{3.84} = \frac{5}{x}, x = \$9.60$$

- N. At a rate of 65 mph, how long will it take to travel 520 miles?

It will take 8 hours to travel 520 miles.

$$\frac{65}{1} = \frac{520}{x}, x = 8$$

**Think About It**

Mark used the rate 60 minutes per hour to solve a word problem. Lance used the rate 1 hour per 60 minutes to solve the same problem. Both students completed the problem correctly. Explain how two different rates can be used to find the same answer.

SAMPLE RSWPONSE: As long as the ratios are written consistently from numerator to numerator and from denominator to denominator the proportion can be solved correctly.

$$\frac{60 \text{ min}}{1 \text{ h}} = \frac{x \text{ min}}{3 \text{ h}} \qquad \frac{1 \text{ h}}{60 \text{ min}} = \frac{3 \text{ h}}{x \text{ min}}$$

Number Puzzle

How do these word puzzles rate? Use the letters to help you find what the number represents. Then create a few of your own and try them on a friend.

Example: 4 = Q in a D
4 = Quarters in a Dollar

1. 6 = S on a H ***6 = Sides on a Hexagon***
2. 90 = D in a RA ***90 = Degrees in a Right Angle***
3. 60 = S in a M ***60 = Seconds in a Minute***
4. 100 = C in a M ***100 = Centimeters in a Meter***
5. 9 = I in a B G ***9 = Innings in a Baseball Game***
6. 12 = E in a D ***12 = Eggs in a Dozen***
7. 12 = M in a Y ***12 = Months in a Year***
8. 88 = K on a P ***88 = Keys on a Piano***



Rates

Find the unit rate.

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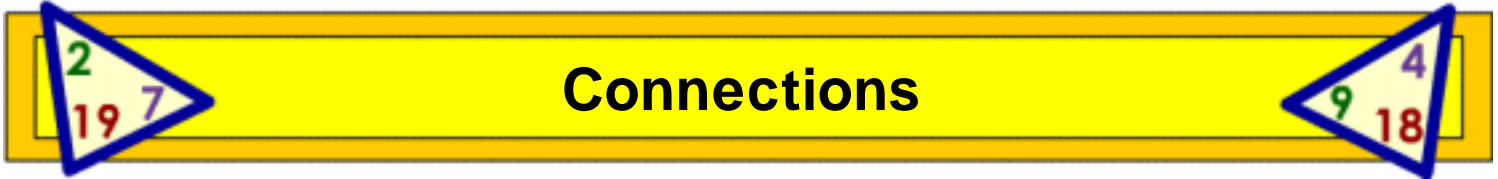
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**Think About It**

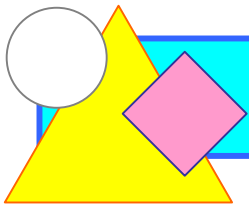
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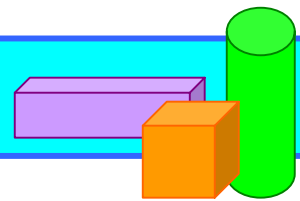
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2. 90 = D in a RA _____
3. 60 = S in a M _____
4. 100 = C in a M _____
5. 9 = I in a B G _____
6. 12 = E in a D _____
7. 12 = M in a Y _____
8. 88 = K on a P _____



Solve Proportions



What is a proportion? Write the definition and give an example.

A proportion is an equation showing that two ratios are equal. Example: $\frac{2}{3} = \frac{6}{9}$.

Explain two ways you can prove that these two ratios are equal: $\frac{2}{3} = \frac{6}{9}$.

1) If you multiply both the numerator and the denominator of $\frac{2}{3}$ by 3, you get the equivalent fraction $\frac{6}{9}$. 2) The cross products are equal: $2 \times 9 = 3 \times 6$.

The music store had CDs on sale at \$12 each. To figure out the price of 5 CDs, Jeremy wrote this proportion: $\frac{\$12}{\$n} = \frac{1 \text{ CD}}{5 \text{ CDs}}$. What mistake did he make? Write the rule he broke, and correct his error.

Jeremy forgot that the labels of both numerators must be the same, and the labels

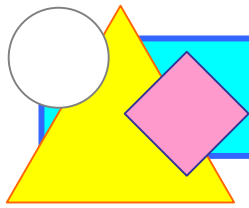
of both denominators must be the same. The correct proportion is $\frac{1 \text{ CD}}{\$12} = \frac{5 \text{ CDs}}{\$n}$.

Explain and show how to solve Jeremy's corrected proportion using cross products.

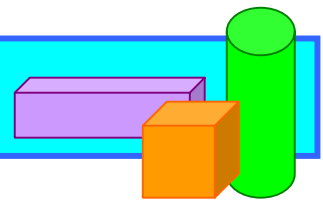
Cross products of a proportion are equal, so $1n = 12 \times 5$. Solve for n : $n = \$60$.

What did Jeremy find out by solving the corrected proportion?

The cost of 5 CDs is \$60.



Solve Proportions



Use cross products to solve these proportions. Show your work.

$$\frac{6}{n} = \frac{18}{24}$$

$$18n = 6 \times 24$$

$$18n = 144$$

$$n = 8$$

$$\frac{3}{7} = \frac{9}{n}$$

$$3n = 7 \times 9$$

$$3n = 63$$

$$n = 21$$

$$\frac{25}{1} = \frac{75}{n}$$

$$25n = 1 \times 75$$

$$n = 75 \div 25$$

$$n = 3$$

Leilani earns \$6.25 per hour working at the music store. How much will she earn if she works 21 hours in a week? Write a proportion and solve it. Then write your conclusion.

$$\frac{\$6.25}{1 \text{ hour}} = \frac{\$n}{21 \text{ hours}}$$

$$1 \times n = \$6.25 \times 21$$

$$n = \$131.25$$

Conclusion: Leilani will earn \$131.25 for working 21 hours.

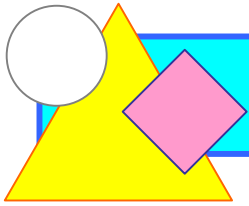
About 32 customers come into the music store each day. About how many customers come into the store in 2 weeks? Write a proportion and solve it.

$$\frac{32 \text{ customers}}{1 \text{ day}} = \frac{n \text{ customers}}{14 \text{ days}}$$

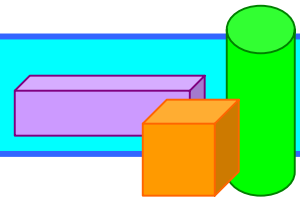
$$1 \times n = 32 \times 14$$

$$n = 448$$

Conclusion: About 448 customers come into the store in 2 weeks.



Solve Proportions



What is a proportion? Write the definition and give an example.

Explain two ways you can prove that these two ratios are equal: $\frac{2}{3} = \frac{6}{9}$.

The music store had CDs on sale at \$12 each. To figure out the price of 5 CDs, Jeremy wrote this proportion: $\frac{\$12}{\$n} = \frac{1\text{CD}}{5\text{ CDs}}$. What mistake did he make? Write the rule he broke, and correct his error.

Explain and show how to solve Jeremy's corrected proportion using cross products.

What did Jeremy find out by solving the corrected proportion?



Use cross products to solve these proportions. Show your work.

$$\frac{6}{n} = \frac{18}{24}$$

$$\frac{3}{7} = \frac{9}{n}$$

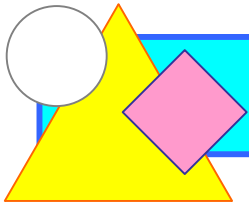
$$\frac{25}{1} = \frac{75}{n}$$

Leilani earns \$6.25 per hour working at the music store. How much will she earn if she works 21 hours in a week? Write a proportion and solve it. Then write your conclusion.

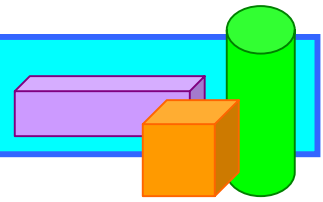
Conclusion: _____

About 32 customers come into the music store each day. About how many customers come into the store in 2 weeks? Write a proportion and solve it.

Conclusion: _____



Sales Tax and Discount



What does “15%” mean? Explain how to write 15% as a ratio.

15% means “15 per hundred.” Write 15 as the numerator and 100 as the denominator: $\frac{15}{100}$.

The Back to Nature camping and backpacking equipment store sells camp stoves for \$75. This week the store is offering a 15% discount on the stoves. Write and solve a proportion to find the amount of the discount.

$$\frac{15}{100} = \frac{n}{75}$$

$$100n = 15 \times 75$$

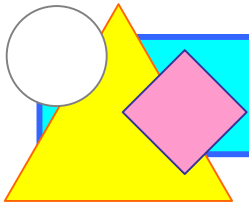
$$100n = 1,125$$

$$n = \$11.25$$

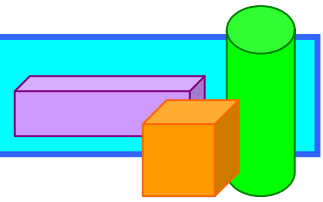
The discount is \$11.25.

Using the discount you just found, calculate the new sale price of the camp stoves.

$$\$75 - \$11.25 = \$63.75$$



Sales Tax and Discount



Bianca wants to buy some backpacking equipment with a total cost of \$47. The sales tax is 6%. Write and solve a proportion to find the amount of the tax.

$$\frac{6}{100} = \frac{n}{47}$$

$$100n = 6 \times 47$$

$$100n = 282$$

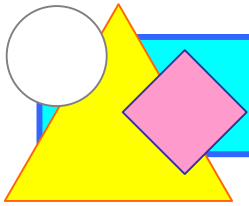
$$n = \$2.82$$

The sales tax for Bianca's backpacking equipment is \$2.82.

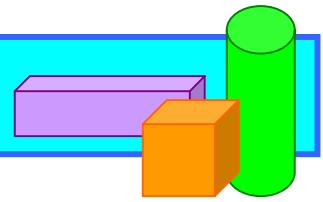
How much will Bianca pay for the backpacking equipment plus tax?

$$\$47 + \$2.82 = \$49.82$$

Bianca will pay \$49.82 for the backpacking equipment plus tax.



Sales Tax and Discount



Jason was planning to buy a two-person dome tent for \$35. When he returned to the camping goods store, the price had been marked up to \$38.50. What do you need to find before you can write and solve a proportion to find the percent of this increase?

Find the *amount* of the increase. Subtract $\$38.50 - \$35 = \$3.50$.

Complete this formula for figuring out the percent of increase or decrease in a price.

$$\frac{\% \text{ increase or decrease}}{100} = \frac{\text{amount of change}}{\text{original amount}}$$

Write and solve a proportion to find the percent of increase in the price for the tent that Jason wants to buy.

$$\frac{n}{100} = \frac{3.50}{35}$$

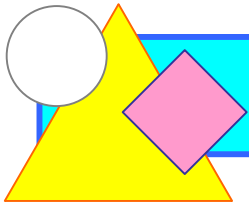
$$35n = 100 \times 3.50$$

$$35n = 350$$

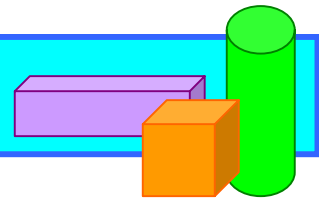
$$n = 10\%$$

State the conclusion you just found about the price for Jason's tent.

The increase in the price of Jason's tent was 10%.



Sales Tax and Discount



Latonya bought a cold-weather sleeping bag. The original price was \$125, but the bags were on sale for 7% off. How much did Latonya pay with the discount? Show your work. (Remember, with money, you round to the nearest cent.)

$$\frac{7}{100} = \frac{n}{125}$$

$$100n = 7 \times 125$$

$$100n = 875$$

$$n = \$8.75 \text{ discount}$$

$$\$125 - \$8.75 = \$116.25$$

The discounted price of the sleeping bag was \$116.25 .

Latonya paid 5% sales tax on the discounted price of the sleeping bag. How much tax did she pay? Show your work.

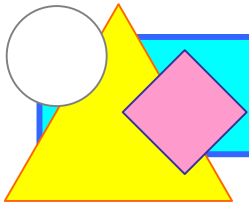
$$\frac{5}{100} = \frac{n}{116.25}$$

$$100n = 5 \times 116.25$$

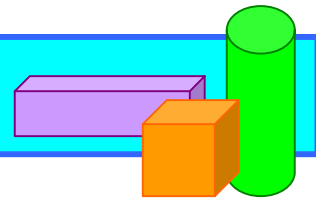
$$100n = 581.25$$

$$n = \$5.81 \text{ tax}$$

Latonya paid \$5.81 in sales tax for the sleeping bag.



Sales Tax and Discount



What was the total cost that Latonya paid for her sleeping bag, with tax?

$$\$116.25 + \$5.81 = \$122.06$$

Latonya paid \$122.06 for her sleeping bag, including the tax.

Find the percent of the discount on a \$48 item that is marked down to \$40.80. Show your work.

$$\frac{n}{100} = \frac{7.20}{48}$$

$$48n = 100 \times 7.20$$

$$48n = 720$$

$$n = 15\%$$

The discount is 15 %.



What does "15%" mean? Explain how to write 15% as a ratio.

The Back to Nature camping and backpacking equipment store sells camp stoves for \$75. This week the store is offering a 15% discount on the stoves. Write and solve a proportion to find the amount of the discount.

The discount is _____ .

Using the discount you just found, calculate the new sale price of the camp stoves.

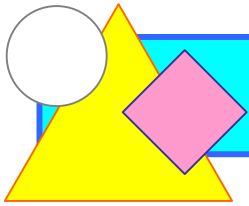


Bianca wants to buy some backpacking equipment with a total cost of \$47. The sales tax is 6%. Write and solve a proportion to find the amount of the tax.

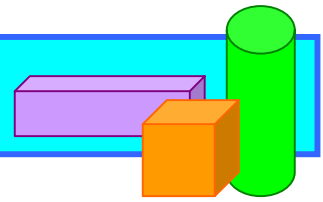
The sales tax for Bianca's backpacking equipment is _____ .

How much will Bianca pay for the backpacking equipment plus tax?

Bianca will pay _____ for the backpacking equipment plus tax.



Sales Tax and Discount



Jason was planning to buy a two-person dome tent for \$35. When he returned to the camping goods store, the price had been marked up to \$38.50. What do you need to find before you can write and solve a proportion to find the percent of this increase?

Complete this formula for figuring out the percent of increase or decrease in a price.

$$\frac{\% \text{ increase or decrease}}{100} = \underline{\hspace{2cm}}$$

Write and solve a proportion to find the percent of increase in the price for the tent that Jason wants to buy.

State the conclusion you just found about the price for Jason's tent.



Latonya bought a cold-weather sleeping bag. The original price was \$125, but the bags were on sale for 7% off. How much did Latonya pay with the discount? Show your work. (Remember, with money, you round to the nearest cent.)

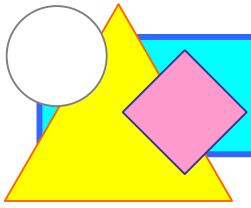
The discounted price of the sleeping bag was _____ .

Latonya paid 5% sales tax on the discounted price of the sleeping bag. How much tax did she pay? Show your work.

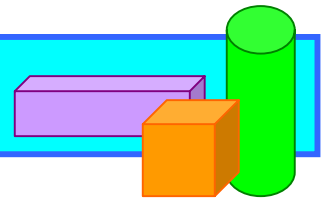
Latonya paid _____ in sales tax for the sleeping bag.

Name _____ Date _____

Number and Operations



Sales Tax and Discount



What was the total cost that Latonya paid for her sleeping bag, with tax?

Latonya paid _____ for her sleeping bag, including the tax.

Find the percent of the discount on a \$48 item that is marked down to \$40.80. Show your work.

The discount is _____ %.



Circle the correct answer.

What is the decimal equivalent of $\frac{1}{8}$? 0.125 0.152 0.18

What percentage does $\frac{1}{8}$ equal? 1.25% 12.5% 1.8%

What is the decimal equivalent of 101%? 0.101 1.01 0.01

What is the decimal equivalent of 9.41%? 0.94 0.941 0.0941

What percentage does $\frac{18}{25}$ equal? 18.1% 25% 72%

Fill in the empty spaces in the chart below.

Percent	Decimal	Fraction
36%	0.36	$\frac{9}{25}$
130%	1.3	$1\frac{3}{10}$
39%	0.39	$\frac{39}{100}$
7%	0.07	$\frac{7}{100}$
825%	8.25	$8\frac{1}{4}$
26%	0.26	$\frac{13}{50}$



In each problem below, first express the percentage as a fraction. Then solve, following the steps for dividing a mixed number by a whole number. Show your work.

$$83\frac{1}{3}\% = \frac{83\frac{1}{3}}{100} = \frac{5}{6}$$

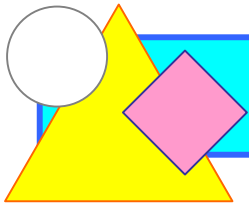
$$83\frac{1}{3} \div 100 = \frac{250}{3} \div \frac{100}{1} = \frac{250}{3} \times \frac{1}{100} = \frac{5}{6}$$

$$9\frac{1}{11}\% = \frac{9\frac{1}{11}}{100} = \frac{1}{11}$$

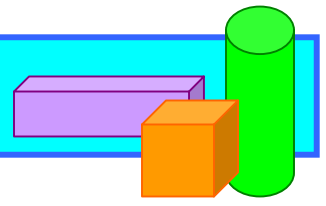
$$9\frac{1}{11} \div 100 = \frac{100}{11} \div \frac{100}{1} = \frac{100}{11} \times \frac{1}{100} = \frac{1}{11}$$

$$22\frac{2}{9}\% = \frac{22\frac{2}{9}}{100} = \frac{2}{9}$$

$$22\frac{2}{9} \div 100 = \frac{200}{9} \div \frac{100}{1} = \frac{200}{9} \times \frac{1}{100} = \frac{2}{9}$$



Percents/Fractions/Decimals



Circle the correct answer.

What is the decimal equivalent of $\frac{1}{8}$?

0.125	0.152	0.18
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What percentage does $\frac{1}{8}$ equal?

1.25%	12.5%	1.8%
-------	-------	------

What is the decimal equivalent of 101%?

0.101	1.01	0.01
-------	------	------

What is the decimal equivalent of 9.41%?

0.94	0.941	0.0941
------	-------	--------

What percentage does $\frac{18}{25}$ equal?

18.1%	25%	72%
-------	-----	-----

Fill in the empty spaces in the chart below.

Percent	Decimal	Fraction
36%	0.36	$\frac{9}{25}$
	1.3	$1\frac{3}{10}$
		$\frac{39}{100}$
	0.07	$\frac{7}{100}$
825%		$8\frac{1}{4}$
		$\frac{13}{50}$



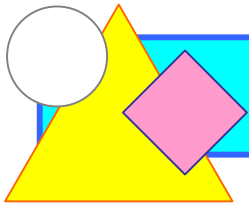
In each problem below, first express the percentage as a fraction. Then solve, following the steps for dividing a mixed number by a whole number. Show your work.

$$83\frac{1}{3}\% = \frac{83\frac{1}{3}}{100} = \frac{5}{6}$$

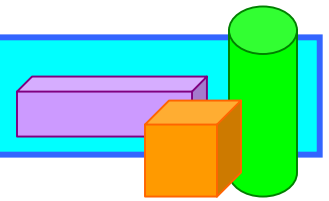
$$83\frac{1}{3} \div 100 = \frac{250}{3} \div \frac{100}{1} = \frac{250}{3} \times \frac{1}{100} = \frac{5}{6}$$

$$9\frac{1}{11}\% =$$

$$22\frac{2}{9}\% =$$



Percent Proportions



Circle the proportion that will help answer each of the questions.

What percent is 82 of 140?

$\frac{n}{140} = \frac{82}{100}$	$\frac{n}{100} = \frac{82}{140}$	$\frac{n}{100} = \frac{140}{82}$
----------------------------------	----------------------------------	----------------------------------

What number is 24% of 136?

$\frac{24}{100} = \frac{n}{136}$	$\frac{n}{100} = \frac{24}{136}$	$\frac{24}{100} = \frac{136}{n}$
----------------------------------	----------------------------------	----------------------------------

72 is 45% of what number?

$\frac{n}{100} = \frac{72}{45}$	$\frac{45}{100} = \frac{n}{72}$	$\frac{45}{100} = \frac{72}{n}$
---------------------------------	---------------------------------	---------------------------------

Fill in the numerators and denominators of the following proportions. Use the variable n if a value is unknown. Then solve the proportions, showing your work.

a. Find 35% of 155.

$$\frac{35}{100} = \frac{n}{155}$$

$$35 \times 155 = 100 \times n$$

$$5,425 = 100 \times n$$

$$\frac{5,425}{100} = \frac{100 \times n}{100}$$

$$54.25 = n$$

54.25 is 35% of 155.

b. 145 is $33\frac{1}{3}\%$ of what number?

$$\frac{1}{3} = \frac{145}{n}$$

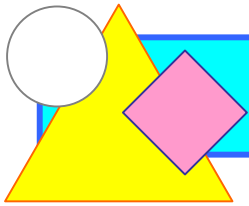
$$3 \times 145 = 1 \times n$$

$$435 = 1 \times n$$

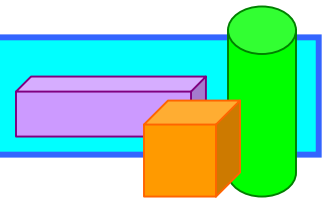
$$\frac{435}{1} = \frac{1 \times n}{1}$$

$$435 = n$$

145 is $33\frac{1}{3}\%$ of 435.



Percent Proportions



c. What percent is 44 of 160?

$$\frac{n}{100} = \frac{44}{160}$$

$$100 \times 44 = 160 \times n$$

$$4,400 = 160 \times n$$

$$\frac{4,400}{160} = \frac{160 \times n}{160}$$

$$27.5 = n$$

44 is 27.5 percent of 160.

d. Find $26\frac{1}{4}\%$ of 400.

$$\frac{26.25}{100} = \frac{n}{400}$$

$$26.25 \times 400 = 100 \times n$$

$$10,500 = 100 \times n$$

$$\frac{10,500}{100} = \frac{100 \times n}{100}$$

$$105 = n$$

105 is $26\frac{1}{4}\%$ of 400.

e. 62 is $16\frac{2}{3}\%$ of what number?

$$\frac{1}{6} = \frac{62}{n}$$

$$6 \times 62 = 1 \times n$$

$$372 = 1 \times n$$

$$\frac{372}{1} = \frac{1 \times n}{1}$$

$$372 = n$$

62 is $16\frac{2}{3}\%$ of 372.

f. What percent is 140 of 700?

$$\frac{n}{100} = \frac{140}{700}$$

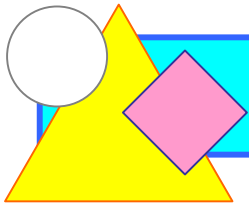
$$100 \times 140 = 700 \times n$$

$$14,000 = 700 \times n$$

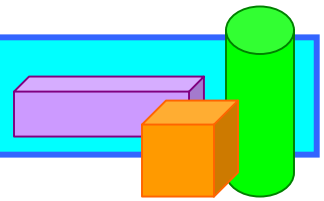
$$\frac{14,000}{700} = \frac{700 \times n}{700}$$

$$20 = n$$

140 is 20 percent of 700.



Percent Proportions



To learn about political process, Angela Martinez ran for Student Council president. In the election, she received 45% of the votes. If 600 students voted, how many votes did Angela receive? Show your work.

What number is 45% of 600? Set up the proportion: $\frac{45}{100} = \frac{n}{600}$

$$45 \times 600 = 100 \times n \quad (\text{Cross multiply})$$

$$27,000 = 100 \times n$$

$$\frac{27,000}{100} = \frac{100 \times n}{100}$$

$$270 = n$$

Angela received 270 votes.

Jamie McAllister also ran for Student Council president. He received 120 of 600 votes. What percent of the votes did he receive? Show your work.

120 is what percent of 600? Set up the proportion: $\frac{n}{100} = \frac{120}{600}$

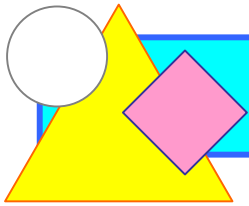
$$100 \times 120 = 600 \times n \quad (\text{Cross multiply})$$

$$12,000 = 600 \times n$$

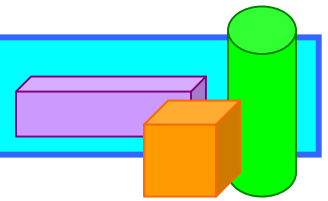
$$\frac{12,000}{600} = \frac{600 \times n}{600}$$

$$20 = n$$

Jamie received 20 % of the votes.



Percent Proportions



Circle the proportion that will help answer each of the questions.

What percent is 82 of 140?

$\frac{n}{140} = \frac{82}{100}$	$\frac{n}{100} = \frac{82}{140}$	$\frac{n}{100} = \frac{140}{82}$
----------------------------------	----------------------------------	----------------------------------

What number is 24% of 136?

$\frac{24}{100} = \frac{n}{136}$	$\frac{n}{100} = \frac{24}{136}$	$\frac{24}{100} = \frac{136}{n}$
----------------------------------	----------------------------------	----------------------------------

72 is 45% of what number?

$\frac{n}{100} = \frac{72}{45}$	$\frac{45}{100} = \frac{n}{72}$	$\frac{45}{100} = \frac{72}{n}$
---------------------------------	---------------------------------	---------------------------------

Fill in the numerators and denominators of the following proportions. Use the variable n if a value is unknown. Then solve the proportions, showing your work.

a. Find 35% of 155.

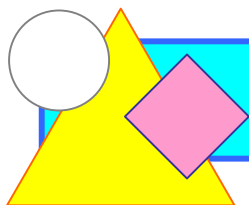
_____ = _____

b. 145 is $33\frac{1}{3}\%$ of what number?

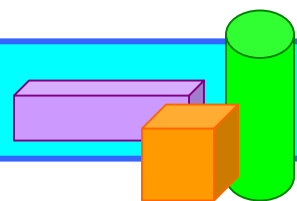
_____ = _____

_____ is 35% of 155.

145 is $33\frac{1}{3}\%$ of _____.



Percent Proportions



c. What percent is 44 of 160?

_____ = _____

44 is _____ percent of 160.

d. Find $26\frac{1}{4}\%$ of 400.

_____ = _____

_____ is $26\frac{1}{4}\%$ of 400.

e. 62 is $16\frac{2}{3}\%$ of what number?

_____ = _____

62 is $16\frac{2}{3}\%$ of _____ .

f. What percent is 140 of 700?

_____ = _____

140 is _____ percent of 700.

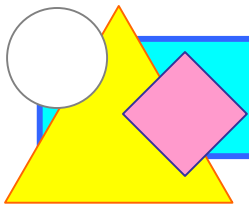


To learn about political process, Angela Martinez ran for Student Council president. In the election, she received 45% of the votes. If 600 students voted, how many votes did Angela receive? Show your work.

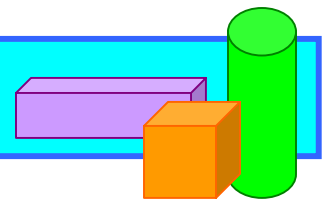
Angela received _____ votes.

Jamie McAllister also ran for Student Council president. He received 120 of 600 votes. What percent of the votes did he receive? Show your work.

Jamie received _____ % of the votes.



Sales Tax and Discount



Jennifer has \$200 and wants to buy a digital camera. The original price of the digital camera that she wants to buy is \$249.00. The camera is now on sale for 25% off the original price. Jennifer will also have to pay an additional 6% sales tax on the discounted price. Does she have enough money to buy the camera? First, write and solve a proportion to find the amount of the discount on the digital camera. Then, write and solve a proportion to find the amount of the sales tax. Show your work.

$$\frac{25}{100} = \frac{n}{249}$$
$$100n = 25 \times 249$$
$$100n = 6,225$$
$$n = \$62.25$$

The discount on the digital camera is \$62.25 .

Using the discount you just found, calculate the sale price of the digital camera.

$$\$249.00 - \$62.25 = \$186.75$$

The sale price of the digital camera is \$186.75 .

Now, calculate the amount of the sales tax. (Remember, when you calculate dollars, round to the nearest cent.)

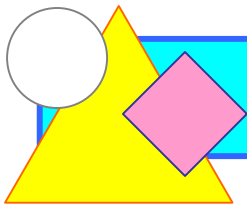
$$\frac{6}{100} = \frac{n}{186.75}$$
$$100n = 6 \times 186.75$$
$$100n = 1120.5$$
$$n = \$11.21$$

The sales tax on the discounted camera is \$11.21 .

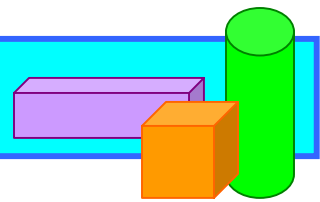
What is the final cost for the digital camera, including sales tax?

$$\$186.75 + \$11.21 = \$197.96$$

The total cost for the digital camera is \$197.96 .



Sales Tax and Discount



Does Jennifer have enough money to buy the discounted digital camera? Explain your answer.

Yes, Jennifer has enough money. The sale price of the camera is \$186.75. The sales tax of 6% for the camera is \$11.21. The total cost for the camera is \$197.96, which is less than \$200.00.

Fariba was planning to buy a flat-screen computer monitor for \$375. When she returned to the computer store, the price had been marked up to \$431.25. What do you need to find before you can write and solve a proportion to find the percent of this increase?

Find the *amount* of the increase. Subtract $\$431.25 - \$375 = \$56.25$.

Use this formula to calculate the percent of increase or decrease in a price.

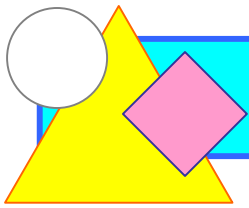
$$\frac{\% \text{ increase or decrease}}{100} = \frac{\text{amount of change}}{\text{original amount}}$$

Write and solve a proportion to find the percent of increase in the price for the flat-screen computer monitor that Fariba wants to buy.

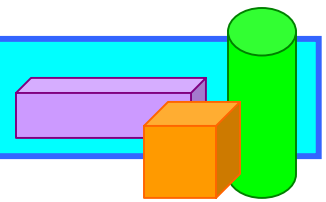
$$\begin{aligned}\frac{n}{100} &= \frac{56.25}{375} \\ 375n &= 100 \times 56.25 \\ 375n &= 5625 \\ n &= 15\%\end{aligned}$$

State the conclusion you found about the new price for the flat-screen monitor Fariba wanted to buy.

The increase in the price of flat screen computer monitor is 15%.



Sales Tax and Discount



Ms. Garza wants to buy a scanner for the school's computer lab. Scanners usually cost \$139.00. Store A has the scanners on sale for 33% off. Store B has them for \$40.00 off. At which store will Ms. Garza get the best discount? Write and solve a proportion to find the rate of discount for \$40.00. Show your work. Round the rate to the nearest percent.

$$\frac{n}{100} = \frac{40}{139}$$

$$139n = 40 \times 100$$

$$139n = 4,000$$

$$n = 29\% \text{ discount (rounded to the nearest percent)}$$

\$40.00 off is approximately the same as a 29% discount.

Which discount is greater? Circle the correct answer.

\$40.00

33%

Using the greatest discount, calculate what Ms. Garza would have to pay for the scanner *before* sales tax. Write and solve a proportion to find the rate of discount. Show your work.

$$\frac{33}{100} = \frac{n}{139}$$

$$100n = 33 \times 139$$

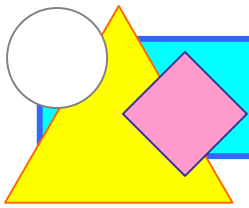
$$100n = 4587$$

$$n = \$45.87 \text{ discount}$$

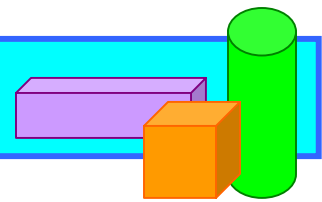
What is the discounted price for the scanner *before* sales tax? Show your work.

$$\$139.00 - \$45.87 = \$93.13$$

The discounted price for the scanner is \$93.13 .



Sales Tax and Discount



Find the percent of the discount on a \$978.00 computer that is marked down to \$635.70. Show your work.

First, find the *amount* of the decrease. Subtract $\$978.00 - \$635.70 = \$342.30$.

$$\frac{n}{100} = \frac{342.30}{978}$$

$$978n = 100 \times 342.30$$

$$978n = 34,230$$

$$n = 35\%$$

The discount on a \$978.00 computer marked down to \$635.70 is 35 %.



Jennifer has \$200 and wants to buy a digital camera. The original price of the digital camera that she wants to buy is \$249.00. The camera is now on sale for 25% off the original price. Jennifer will also have to pay an additional 6% sales tax on the discounted price. Does she have enough money to buy the camera? First, write and solve a proportion to find the amount of the discount on the digital camera. Then, write and solve a proportion to find the amount of the sales tax. Show your work.

The discount on the digital camera is _____ .

Using the discount you just found, calculate the sale price of the digital camera.

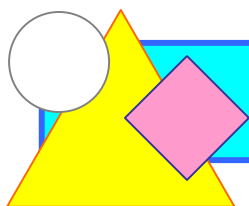
The sale price of the digital camera is _____ .

Now, calculate the amount of the sales tax. (Remember, when you calculate dollars, round to the nearest cent.)

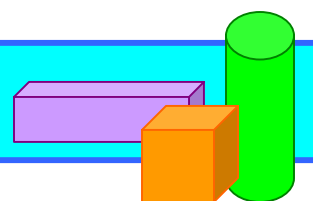
The sales tax on the discounted camera is _____ .

What is the final cost for the digital camera, including sales tax?

The total cost for the digital camera is _____ .



Sales Tax and Discount



Does Jennifer have enough money to buy the discounted digital camera? Explain your answer.

Fariba was planning to buy a flat-screen computer monitor for \$375. When she returned to the computer store, the price had been marked up to \$431.25. What do you need to find before you can write and solve a proportion to find the percent of this increase?

Use this formula to calculate the percent of increase or decrease in a price.

$$\frac{\% \text{ increase or decrease}}{100} = \frac{\text{amount of change}}{\text{original amount}}$$

Write and solve a proportion to find the percent of increase in the price for the flat-screen computer monitor that Fariba wants to buy.

State the conclusion you found about the new price for the flat-screen monitor Fariba wanted to buy.



Ms. Garza wants to buy a scanner for the school's computer lab. Scanners usually cost \$139.00. Store A has the scanners on sale for 33% off. Store B has them for \$40.00 off. At which store will Ms. Garza get the best discount? Write and solve a proportion to find the rate of discount for \$40.00. Show your work. Round the rate to the nearest percent.

\$40.00 off is approximately the same as a _____ discount.

Which discount is greater? Circle the correct answer.

\$40.00

33%

Using the greatest discount, calculate what Ms. Garza would have to pay for the scanner *before* sales tax. Write and solve a proportion to find the rate of discount. Show your work.

What is the discounted price for the scanner *before* sales tax? Show your work.

The discounted price for the scanner is _____ .

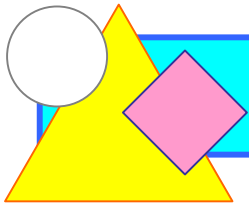
Name _____ Date _____

Number and Operations

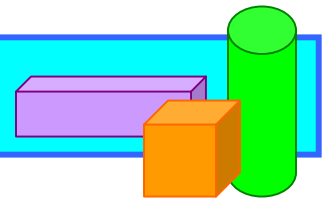


Find the percent of the discount on a \$978.00 computer that is marked down to \$635.70.
Show your work.

The discount on a \$978.00 computer marked down to \$635.70 is _____ %.



Percent of Increase/Decrease



In the following problems, calculate the percent of increase or decrease based on the information given. Use the proportion below as a guide for your calculations. If necessary, round your answers to the nearest tenth.

$$\frac{\% \text{ of change}}{100} = \frac{\text{amount of change}}{\text{original amount}}$$

On Thursday, Roberta had 21 golf balls. By Saturday evening, she had 7 fewer golf balls than she did on Thursday.

What is the amount of change? 7

What was the original amount? 21

Fill in the proportion: $\frac{n}{100} = \frac{7}{21}$ $100 \times 7 = 110 \times n$ $\frac{700}{21} = \frac{21 \times n}{21}$ $n = 33.3$

The number of golf balls changed by 33.3% .

Was this change an increase or a decrease? decrease

Stereo Price	
Last year	\$753
This year	\$892

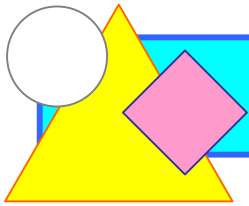
What is the amount of change? 139

What was the original amount? 753

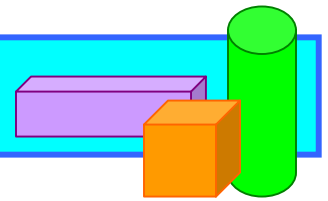
Fill in the proportion: $\frac{n}{100} = \frac{139}{753}$ $100 \times 139 = 753 \times n$ $\frac{13,900}{753} = \frac{753 \times n}{753}$ $n = 18.5$

The price of stereos changed by 18.5% .

Was this change an increase or a decrease? increase



Percent of Increase/Decrease



On Sunday, the Eastside Soup Kitchen served 110 hot meals. On Monday, they served 17 more hot meals than they did on Sunday.

What is the amount of change? 17

What was the original amount? 110

Fill in the proportion: $\frac{n}{100} = \frac{17}{110}$ $100 \times 17 = 110 \times n$ $\frac{1,700}{110} = \frac{110 \times n}{110}$ $n = 15.5$

The number of hot meals served changed by 15.5% .

Was this change an increase or a decrease? increase

Average Miles per Gallon	
Year 2000	37
Year 2003	32

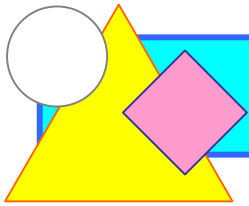
What is the amount of change in the average miles per gallon from 2000 to 2003? 5

What was the original amount? 37

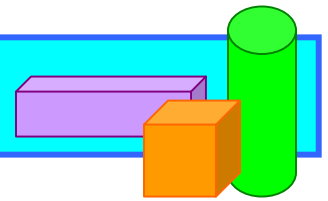
Fill in the proportion: $\frac{n}{100} = \frac{5}{37}$ $100 \times 5 = 37 \times n$ $\frac{500}{37} = \frac{37 \times n}{37}$ $n = 13.5$

The average miles per gallon changed by 13.5% .

Was this change an increase or a decrease? decrease



Percent of Increase/Decrease



At a local department store, the price of a flat-screen TV increased by 20%. If the original price was \$325, what is the new price of the flat-screen TV? Set up the proportion and then solve. Show your work.

The new price of the flat-screen TV is \$390 .

Since the percent of change is given in this problem, solve for the amount of change, and then add that amount to the original price of the TV.

$$\frac{20}{100} = \frac{n}{325} \quad 20 \times 325 = 100 \times n \quad \frac{6,500}{100} = \frac{100 \times n}{100} \quad 65 = n \quad 325 + 65 = 390$$

A store sells posters featuring popular musicians. Each poster measures 40 inches long and 28 inches wide. The store also sells reduced versions of the posters, which are 25% shorter in both length and width. What are the dimensions of the smaller posters? Set up the proportions and then solve. Show your work.

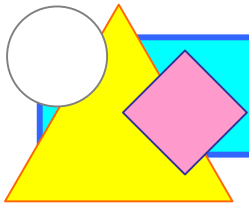
The smaller posters are 30 inches long and 21 inches wide.

Since the percent of change is given in this problem, solve for the amount of change, and then subtract that from the original length and width of the larger poster. First, determine the length of the smaller poster:

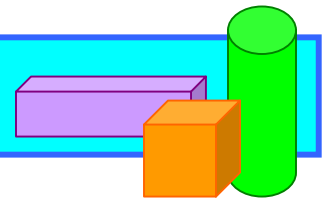
$$\frac{25}{100} = \frac{n}{40 \text{ in.}} \quad 25 \times 40 = 100 \times n \quad \frac{1,000}{100} = \frac{100 \times n}{100} \quad 10 = n \quad 40 - 10 = 30 \text{ inches}$$

Then, determine the width of the smaller poster:

$$\frac{25}{100} = \frac{n}{28 \text{ in.}} \quad 25 \times 28 = 100 \times n \quad \frac{700}{100} = \frac{100 \times n}{100} \quad 7 = n \quad 28 - 7 = 21 \text{ inches}$$



Percent of Increase/Decrease



In the following problems, calculate the percent of increase or decrease based on the information given. Use the proportion below as a guide for your calculations. If necessary, round your answers to the nearest tenth.

$$\frac{\% \text{ of change}}{100} = \frac{\text{amount of change}}{\text{original amount}}$$

On Thursday, Roberta had 21 golf balls. By Saturday evening, she had 7 fewer golf balls than she did on Thursday.

What is the amount of change? _____

What was the original amount? _____

Fill in the proportion: $\frac{\quad}{100} = \frac{7}{21}$

The number of golf balls changed by _____ .

Was this change an increase or a decrease? _____

Stereo Price	
Last year	\$753
This year	\$892

What is the amount of change? _____

What was the original amount? _____

Fill in the proportion: $\frac{n}{100} =$

The price of stereos changed by _____ .

Was this change an increase or a decrease? _____



Percent of Increase/Decrease

On Sunday, the Eastside Soup Kitchen served 110 hot meals. On Monday, they served 17 more hot meals than they did on Sunday.

What is the amount of change? _____

What was the original amount? _____

Fill in the proportion: $\frac{n}{100} =$

The number of hot meals served changed by _____ .

Was this change an increase or a decrease? _____

Average Miles per Gallon	
Year 2000	37
Year 2003	32

What is the amount of change in the average miles per gallon from 2000 to 2003? _____

What was the original amount? _____

Fill in the proportion: $\frac{n}{100} =$

The average miles per gallon changed by _____ .

Was this change an increase or a decrease? _____

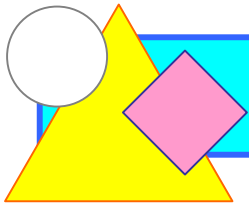


At a local department store, the price of a flat-screen TV increased by 20%. If the original price was \$325, what is the new price of the flat-screen TV? Set up the proportion and then solve. Show your work.

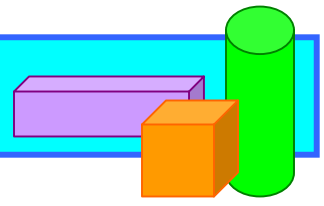
The new price of the flat-screen TV is _____ .

A store sells posters featuring popular musicians. Each poster measures 40 inches long and 28 inches wide. The store also sells reduced versions of the posters, which are 25% shorter in both length and width. What are the dimensions of the smaller posters? Set up the proportions and then solve. Show your work.

The smaller posters are _____ inches long and _____ inches wide.



Ratio, Rate, and Proportion



Fill in the blanks.

Ratios compare two quantities of the same kind.

Rates compare quantities of different kinds.

The unit rate is the amount per single unit .

An equation which states that two ratios are equivalent is called a proportion .

Use cross products to solve these proportions. Show your work.

$$\frac{62}{2} = \frac{124}{n}$$

$$n = \underline{4}$$

$$\frac{1,500}{2} = \frac{n}{5}$$

$$n = \underline{3,750}$$

$$\frac{4.6}{n} = \frac{1.84}{6.32}$$

$$n = \underline{15.8}$$

$$62n = 2 \times 124$$

$$1,500 \times 5 = 2n$$

$$4.6 \times 6.32 = 1.84n$$

$$\frac{62n}{62} = \frac{248}{62}$$

$$\frac{7,500}{2} = \frac{2n}{2}$$

$$\frac{29.072}{1.84} = \frac{1.84n}{1.84}$$

A truck driver pays \$43.00 for 20 gallons of gasoline. What is the unit rate?
Show your work.

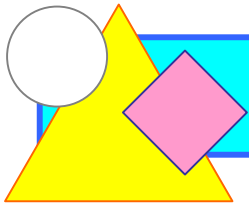
$$\begin{array}{l} \text{price} \leftarrow \frac{43.00}{20} = \frac{n}{1} \rightarrow \text{price} \\ \text{gallons} \leftarrow \quad \rightarrow \text{gallons} \end{array} \quad 43.00 \times 1 = 20n \quad n = \$2.15 \text{ per gallon}$$

The unit rate is \$2.15 per gallon.

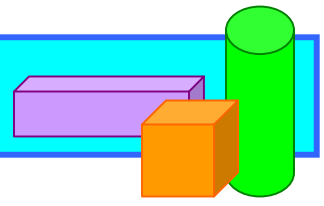
Paul is the fastest backstroke swimmer on his school's swim team. His record for swimming 100 meters is 80 seconds. What is his rate per second? Show your work.

$$\begin{array}{l} \text{meters} \leftarrow \frac{100}{80} = \frac{n}{1} \rightarrow \text{meters} \\ \text{second} \leftarrow \quad \rightarrow \text{second} \end{array} \quad 100 \times 1 = 80n \quad n = 1.25 \text{ meters}$$

Paul's rate is 1.25 meters per second.



Ratio, Rate, and Proportion



If Antonia averages a speed of 65 mph on the freeway, how long will it take her to travel 1,300 miles? Circle the correct proportion. Then solve the problem. Show your work.

$$\frac{65}{1,300} = \frac{1}{n}$$

$$\frac{65}{1} = \frac{1,300}{n}$$

$$\frac{1}{1,300} = \frac{65}{n}$$

$$\begin{array}{l} \text{miles} \leftarrow \frac{65}{1,300} = \frac{1}{n} \rightarrow \text{miles} \\ \text{hours} \leftarrow \frac{1}{1,300} = \frac{65}{n} \rightarrow \text{hours} \end{array}$$

$$65 \times n = 1,300 \times 1$$

$$n = 20 \text{ hours}$$

It will take Antonia 20 hours to travel 1,300 miles.

Last year, 2 out of 10 racecar drivers failed the pre-race inspection. If there are 105 drivers, how many passed inspection? Show your work.

$$\begin{array}{l} \text{total drivers} \leftarrow \frac{10}{8} = \frac{105}{n} \rightarrow \text{total drivers} \\ \text{drivers who pass} \leftarrow \frac{10}{8} = \frac{105}{n} \rightarrow \text{drivers who pass} \end{array}$$

$$10 \times n = 105 \times 8$$

$$n = 84 \text{ drivers will pass the test}$$

84 racecar drivers will pass inspection.

In 2 minutes, Joel can skate 600 meters. At that rate, how far could Joel skate in 5 minutes? Show your work.

$$\begin{array}{l} \text{meters} \leftarrow \frac{600}{2} = \frac{n}{5} \rightarrow \text{meters} \\ \text{minutes} \leftarrow \frac{600}{2} = \frac{n}{5} \rightarrow \text{minutes} \end{array}$$

$$600 \times 5 = 2n$$

$$n = 1,500 \text{ meters}$$

Joel could skate 1,500 meters in 5 minutes.



Ratio, Rate, and Proportion

Fill in the blanks.

_____ compare two quantities of the same kind.

_____ compare quantities of different kinds.

The _____ is the amount per single unit .

An equation which states that two ratios are equivalent is called a _____ .

Use cross products to solve these proportions. Show your work.

$$\frac{62}{2} = \frac{124}{n}$$

$$n = \underline{\hspace{2cm}}$$

$$\frac{1,500}{2} = \frac{n}{5}$$

$$n = \underline{\hspace{2cm}}$$

$$\frac{4.6}{n} = \frac{1.84}{6.32}$$

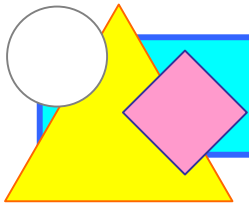
$$n = \underline{\hspace{2cm}}$$

A truck driver pays \$43.00 for 20 gallons of gasoline. What is the unit rate?
Show your work.

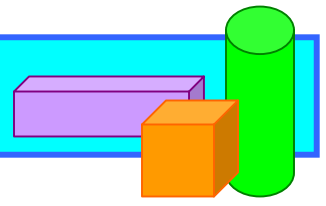
The unit rate is _____ per gallon.

Paul is the fastest backstroke swimmer on his school's swim team. His record for swimming 100 meters is 80 seconds. What is his rate per second? Show your work.

Paul's rate is _____ meters per second.



Ratio, Rate, and Proportion



If Antonia averages a speed of 65 mph on the freeway, how long will it take her to travel 1,300 miles? Circle the correct proportion. Then solve the problem. Show your work.

$$\frac{65}{1,300} = \frac{1}{n}$$

$$\frac{65}{1} = \frac{1,300}{n}$$

$$\frac{1}{1,300} = \frac{65}{n}$$

It will take Antonia _____ hours to travel 1,300 miles.

Last year, 2 out of 10 racecar drivers failed the pre-race inspection. If there are 105 drivers, how many passed inspection? Show your work.

_____ racecar drivers will pass inspection.

In 2 minutes, Joel can skate 600 meters. At that rate, how far could Joel skate in 5 minutes? Show your work.

Joel could skate _____ meters in 5 minutes.