

Grade 7 Curriculum Overview

Ratio and Proportional Relationships

- Expand understanding of ratio and use ratios to solve problems.
- Expand understanding of rate and use rates to solve problems.
- Understand proportions and use proportions to solve problems .
- Decide if two ratios are proportional.
- Compute unit rates.
- Compute simple interest.
- Write and calculate percents.
- Solve problems using percents.
- Calculate a slope and know that it is a constant.
- Understand that the slope of a line is the ratio of the rise to the run.

The Number System

- Expand understanding of the order of operations.
- Expand understanding of operations with fractions.
- Represent numbers on a number line.
- Determine that a number is rational.
- Perform the operations on rational numbers.
- Recognize patterns as in an arithmetic sequence.
- Graph an equation on the coordinate system.
- Evaluate absolute values.
- Find common factors and multiples.
- Expand understanding of the commutative, associative, and distributive properties.
- Distinguish between a rational and an irrational number.
- Perform transformations in the coordinate system.
- Perform reflections in the coordinate system.
- Create a table of values and use it to solve problems.
- Find equivalent values for fractions, percents and decimals (e.g. $1/4 = .25 = 25\%$).
- Add with more than two fractions.
- Change improper fractions to mixed numbers.
- Write numbers in expanded notation.
- Estimate numbers using all four functions.
- Order numbers, fractions, percents and decimals from least to greatest.
- Round numbers to the nearest million, hundred thousand, ten thousand, tenth, hundredth.
- Transcribe numerals into words and words into numerals.

Expressions and Equations

- Understand that a number can be substituted for a variable to evaluate an expression.
- Apply the operations to simplify polynomial expressions.
- Solve real life problems using algebraic expressions and equations.
- Translate a word sentence into an algebraic equation.
- Solve word problems using inequalities.
- Solve an equation using the property of reciprocals.
- Solve an equation using the property of opposites.
- Compare numbers and expressions using $<$, $>$, and $=$.

Geometry

- Accurately draw and/or construct geometric figures.
- Determine when certain conditions lead to unique (congruent) figures.

Geometry (continued)

- Know the formulas for the area and circumference of a circle and use them to solve problems.
- Solve problems involving angle measures.
- Solve mathematical problems involving area, volume and surface area for two and three-dimensional figures.
- Create a net as a means for calculating the surface area of a regular three-dimensional figure.
- Solve problems using the Pythagorean Theorem.

Statistics and Probability

- Expand understanding of the measures of central tendency.
- Find the upper extreme, the lower extreme, the upper quartile, and the lower quartile of a data set.
- Find the interquartile range of a data set and explain what it means.
- Understand that a random sample allows for making conclusions about a larger population.
- Determine whether or not a sample set is biased.
- Calculate the probability of an event.
- Make conclusions from a stem-and-leaf plot.
- Use a graph to answer questions.
- Answer problems using theoretical probability.

Measurement

- Convert within a system of measurement.
- Determine the appropriate unit of measurement to use.
- Add, subtract, multiply and divide with money.
- Determine percents with coins (e.g. what percent of a dime is a nickel?).
- Figure simple interest.
- Determine hours as a fraction of a day (e.g. what fraction of a day is 8 hours?).
- Add hours and minutes to a given time.
- Determine time using more than one time zone.

IMPORTANT! **Instructions for Parents**

- To use Summer Math Skills Sharpener, simply tear off a page and have your child complete it. The book is designed to be used 3-4 days per week for 10 weeks.
- Our math books now support the Common Core Curriculum and the Standards of all 50 states. Therefore, some materials may not have been presented to your child. Please allow your child to skip concepts not yet learned. Introduce new concepts only if your child shows readiness.
- Check answers immediately for optimal feedback. An answer sheet and solution pages are provided at the back of the book. (**Solution pages represent only ONE method of solving each problem.**) A Lesson Tracker has been added for your convenience.
- “Help Pages” have been added at the front of the book to clarify certain concepts.
- Allow your child to use a calculator only for those problems marked “Calculator Skill.”
- When solving division problems with remainders, students should use fractions or decimals rounded off to the nearest hundredth.
- When solving fraction problems, students should reduce answers to the lowest possible terms.
- Pages entitled “Brain Aerobics” are located at the back of the book. Have your child complete one page per week for extra practice. The answers to these questions are on the back of each page.
- A “Glossary of Terms” and a “Table of Measurements” are at the back of the book.
- Adjust the program to vacations, etc. Presentation of mixed concepts on every page ensures that all skills are reinforced; therefore, pages may be completed in any order.
- If your child experiences difficulty with concepts that have been already taught, address the problem with his or her teacher in the fall; more consistent problems indicate that a tutor may be needed.

We appreciate your comments. Please send in the enclosed evaluation page before November 1st, after you child has returned to school in the fall and you are able to determine the success of the Summer Math Skills Sharpener.

Dividing a Whole Number by a Fraction

Example: $2 \div \frac{1}{3}$

1st Step $2 = \frac{2}{1}$

Put the *whole number* in fraction form.

2nd Step $\frac{2}{1} \div \frac{1}{3} \leftarrow$ divisor

Locate the divisor and invert.

$\frac{1}{3}$ becomes $\frac{3}{1}$

3rd Step $\frac{2}{1} \times \frac{3}{1} = \frac{6}{1}$

Invert the divisor and multiply.

4th Step $\frac{6}{1} = 6$

Dividing a Fraction by a Whole Number

Example: $\frac{1}{3} \div 2$

1st Step $2 = \frac{2}{1}$

Put the whole number in fraction form.

2nd Step $\frac{1}{3} \div \frac{2}{1} \leftarrow$ divisor

Locate the divisor and invert.

$\frac{2}{1}$ becomes $\frac{1}{2}$

3rd Step $\frac{1}{3} \times \frac{1}{2} = \frac{1}{6}$

Multiply the numerators and denominators.

4th Step $\frac{1}{6}$ is in lowest terms

Simplify (reduce) if necessary.

1. Mental math: $4\frac{1}{3} + 1\frac{2}{3} =$ _____

2. a. $1\frac{7}{8} \times 2\frac{2}{5} =$ _____ b. $\frac{3}{4} \div \frac{1}{8} =$ _____

3. Write this number in expanded form: 4,006,080

example: 1,111 = 1,000 + 100 + 10 + 1

4. a. $12 \overline{) \$414.72}$ b.
$$\begin{array}{r} 12.85 \\ \times 0.34 \\ \hline \end{array}$$

5. What is the prime factorization of the following:

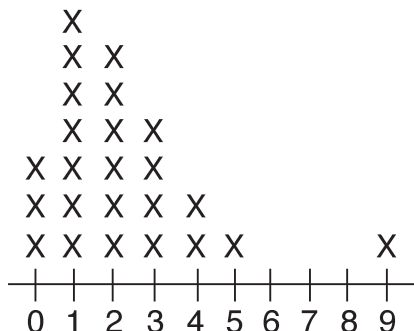
a. 6 b. 10 c. 20

d. What is the least common multiple of 6, 10, and 20? _____

6. Put in order from least to greatest:

$-\frac{1}{3}$ $\frac{2}{5}$ $-\frac{1}{4}$ $\frac{2}{3}$ $\frac{5}{6}$ $\frac{5}{8}$

7. Mrs. Whitney surveyed her class as to the number of pets per family. She used the frequency graph below to record the results.



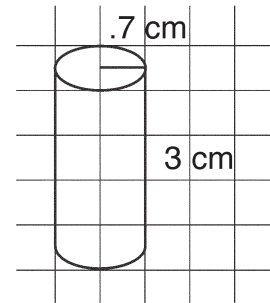
- a. How many families did not own a pet? _____
- b. What is the median number of pets per family? _____
- c. How many families had 3 or more pets? _____
8. Simplify:
- a. $2(3 + 4)^2 =$ _____ b. $2 \times 4^2 - 4 \div 2 =$ _____ c. $\frac{4 - 1}{2 - 1} =$ _____
9. 10,000 lbs = _____ tons
10. What is 150% of 800? _____
11. Karl borrowed \$5,700 from the bank for a year at 9% simple interest. What was the amount he paid back to the bank?
- _____
12. Calculator skill: The sun is approximately 93,000,000 miles from earth. Light travels 186,000 miles per second. How long does it take the light from the sun to reach the earth? (Give your answer in minutes.)
- _____

1. a. $6\frac{3}{4} + 3\frac{3}{4} =$ _____ b. $1\frac{3}{5} \div 5 =$ _____

2. Estimate by rounding to the nearest whole number:

a. $5.11 \times 6.98 \approx$ _____ b. $4.9 - 5.3 + 7.2 \approx$ _____

3. a. Draw the net for the cylinder pictured to the right.



b. Find the surface area. Use $\pi \approx 3.14$ and round

to the nearest tenth. _____

c. Find the volume. Round to the nearest tenth. _____

4. Mental math: Humans dream about 20% of the time they are asleep. If you sleep ten hours per night, how much time would you be dreaming?

5. $4.8 \overline{)478.56}$

6. In a golf tournament, Sol was 2 strokes over par the first day, 5 strokes over par for the second day, even par for the third day and 3 strokes under par for the fourth day. How many strokes was Sol under or over par for the tournament?

7. Mental math: Find each product.

a. $200 \times 30 =$ _____ b. $500 \times 1000 =$ _____

c. $300 \times 600 =$ _____ d. $100 \times 1000000 =$ _____

8. Mental math: $4,700 - 699 =$ _____

9. a. 468 inches = _____ feet = _____ yards

b. 59,000 mm = _____ cm = _____ m

10. Mental math:

a. $\frac{3}{10} \times \frac{1}{2} =$ _____ b. $10 \div \frac{1}{5} =$ _____

11. What is 150% of 1,000? _____

12. Hands on: How many times would you have to fold a piece of paper in half to get 32 equal sections?

1. For problems, a – c, simplify. (Recall that the order of operations is: parentheses, powers, multiplication and division from left to right; addition and subtraction from left to right.)

a. $(2 - 4)^2 / 1 + 1$ b. $8 - 8 / 2 \times 2$ c. $\frac{7 - 1^2}{4 - 2}$

2. A *variable* is a symbol that can be replaced by a number.

Let $a = -2$ $b = -\frac{1}{2}$ $c = \frac{1}{2}$ $d = 2$ Find the following:

a. ab b. a^2 c. $-b^2$

d. $\frac{b}{d}$ e. $-a + d$ f. $abcd$

3. *Expressions* occur when numbers and variables are joined using arithmetic operations. Translate the following into algebraic expressions. Let n =number.

- a. Five more than twice a number _____
- b. Six less than half of a number _____
- c. A number squared plus two _____
- d. The opposite of a number _____

4. A *polynomial* is an expression written as the sum or difference of terms. To simplify a polynomial, combine *like* terms. Simplify the following:

a. $2a + 3b - 6a + b$ b. $4x^2 - x - 3x^2 + x$

5. The mean, median, and mode are measures of *central tendency*. Find the mean, median, and mode for the given number set.

2 2 3 0 2 9 8 8 4 2 3 25 80

a. mean _____ b. median _____ c. mode _____

- d. Which is the best representation of middle or central tendency? Justify.

6. A *ratio* is the quotient of two quantities in the same unit.

The ski club has 12 girls and 7 boys.

a. Find the ratio of girls to boys.

b. Find the ratio of girls to the club membership.

7. For problems a – c, solve for x .

a. $3x + 5 = -4$ b. $\frac{2}{3}x = 6$ c. $-x + 8 = -4$

8. Use the *distributive* property to find the missing number or variable.

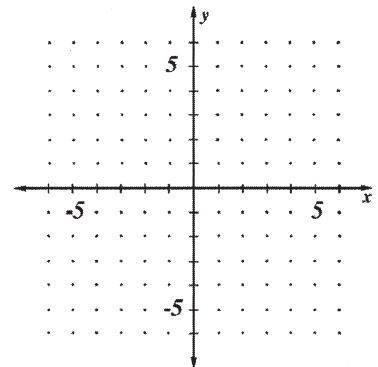
a. $4(x - y) = 4() - 4()$ b. $8a - 16b = ()(a - 2b)$

9. a. Find three pairs of points that satisfy the equation $x + y = 3$.

b. Plot the points on the graph at the right and draw a line through them.

c. The slope or constant rate of change of a linear equation is the ratio of the rise/run. Pick a point on the line and then, reading the graph from left to right, find the rise and run to get to another point on the graph.

d. Substitute your point into the equation to verify that it is on the line.



10. Write each number using scientific notation.

a. 43200 _____

b. 1,000,000 _____

c. .00502 _____

d. 5 _____

BRAIN AEROBICS - WEEK 1

1. What is the sum of all the prime numbers between 10 and 20?

2. Judith is 5 years younger than Trina and 5 years older than Gretchen. The average of their ages is 23. How old is each woman?

3. Pamela can swim under water for 51 seconds without a breath. Lucy can swim $\frac{3}{5}$ minute and Kady .8 minute. Who can stay underwater the longest?

4. Mr. Jackson spends \$500 per month for rent. His new apartment will cost him 10% more than he is paying now. How much is the rent for his new apartment?

5. Find the set of counting numbers which would make this equation true.
 $20 - x > 14$

The Metric Units

Temperature - Celsius

0°C: the freezing point of water
37°C: the normal body temperature
100°C: the boiling point of water

Mass

1000 milligrams (mg) = 1 gram
1000 grams = 1 kilogram (kg)
1000 kilograms = 1 metric ton (t)

Capacity

1000 milliliters (mL) = 1 liter (L)
1000 liters = 1 kiloliter (kL)

Length

10 millimeters (mm) = 1 centimeter
10 centimeters (cm) = 1 decimeter
1000 millimeters (mm) = 1 meter (m)
100 centimeters = 1 meter (m)
10 decimeters (dm) = 1 meter
1000 meters (m) = 1 kilometer (km)

The Customary Units

Temperature - Fahrenheit

32°F: the freezing point of water
98.6°F: the normal body temperature
212°F: the boiling point of water

Weight

1 pound (lb) = 16 ounces (oz)
1 ton = 2,000 pounds

Time

1 minute (min) = 60 seconds (s)
1 hour = 60 minutes
1 day = 24 hours
1 week = 7 days
1 month (mo) = approx. 4 weeks
1 year (yr) = 365 days
52 weeks
12 months
1 decade = 10 years
1 century = 100 years

Capacity

1 cup (c) = 8 fluid ounces (fl oz)
1 pint (pt) = 16 fluid ounces
2 cups
1 quart (qt) = 32 fluid ounces
4 cups
2 pints
1 gallon (gal) = 128 fluid ounces
16 cups
8 pints
4 quarts

Length

1 foot (ft) = 12 inches (in)
1 yard (yd) = 36 inches
3 feet
1 mile (mi) = 5,280 feet
1,760 yards

GLOSSARY OF TERMS AND FORMULAS

a.m.: a way of expressing time between 12:00 midnight and 12:00 noon.

acute angle: an angle measuring less than 90 degrees.

addends: numbers to be added together in an addition problem.

algebraic expression: an expression that uses at least one letter to represent a number.

angle: the measured space between two lines that meet at one point.

area: the measure of a region in square units.

Formulas:

Quadrilateral: $A = \text{length} \times \text{width}$

Triangle: $A = \frac{1}{2} \times \text{base} \times \text{height}$

Circle: $A = \pi r^2$

$\pi \approx 3.14$

$r = \text{radius}$

average: a number obtained by adding a group of numbers together and dividing by the number of addends.

center: the point from which all points on a circle are equally distant.

circle: a closed, curved line. Each point on the circle is the same distance from the center of the circle.

circumference: the distance around a circle.

Formula: $c = 2 \pi r$ $r = \text{radius}$ $\pi \approx 3.14$

common denominator: a multiple of all denominators in a problem.

common factor: a number that is a factor of two other numbers is a **common** factor.

Example: 3 is a common factor of 9 and 12.

common multiple: a number that is a multiple of two other numbers.

Example: 24 is a common multiple of 6 and 4.

complementary angle: the number in degrees given to an angle that when added to another angle will give 90 degrees.

congruent: being the same.

coordinates: number pairs used in graphing. The horizontal axis is listed first and the vertical axis is listed second.

Example: 8, 10

customary measurement: units of measurement used in the United States.

Example: feet, pounds, miles, etc.

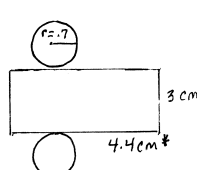
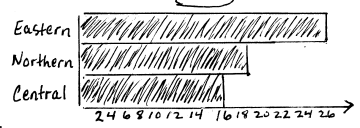
decade: a period of 10 years.

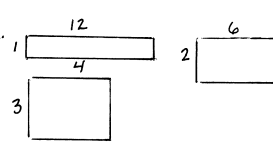
decimal point: a period put just before the decimal fraction such as the periods in .625 and .08

degree: a unit used to measure an angle or temperature.

- 1) a. $4\frac{1}{8} = 3\frac{9}{8}$
 $\frac{-3\frac{6}{8}}{\frac{3}{8}} = 3\frac{6}{8}$
 $\frac{3}{8}$
- b. $\frac{1}{2} + \frac{1}{4} + \frac{1}{8} =$
 $\frac{4}{8} + \frac{2}{8} + \frac{1}{8} = \frac{7}{8}$
- 2) $8.97 - 3.09 \approx$
 $9 - 3 \approx 6$
- 3) a. $100\% - 20\% = 80\%$
 $.8p = 28.80$
 $p = 36$
- b. $\frac{.8}{.8} p = \frac{28.80}{.8}$
 $p = 36$
- 4) $\frac{2}{3} = \frac{4}{6} = \frac{8}{12} = \frac{16}{24}$
- 5) a. $1\frac{3}{5} \div \frac{3}{5} = \frac{8}{5} \div \frac{3}{5}$
 $\frac{8}{5} \times \frac{5}{3} = \frac{8}{3} = 2\frac{2}{3}$
- b. $7\frac{1}{2} \times 3\frac{3}{5} = \frac{15}{2} \times \frac{18}{5} = 27$
- 6) a. $V = S^3$ $V = 1^3 = 1 \text{ in.}^3$
 b. $S = 2$ $V = 2^3 = 8 \text{ in.}^3$
 c. 8 times
- 7) a. $-3x - 7 = 21$ b. $(-\frac{2}{3})(-\frac{3}{10}) = \frac{3}{5}$ c. $-100 \times 40 = \frac{4,000}{4,000}$ d. positive
- 8) (25, 36, 49) 9) $8,000 \div 100 = 80$
- 10) a. $|4| \ominus |-4|$ b. $4^2 \ominus (-4)^2$ c. $2^4 \ominus 4^2$ d. $4' \ominus 4 \times 10'$
- 11) $90\% = \text{decrease past 60 yrs.}$
 $10\% = \text{remaining}$
 $10\% \text{ of } 300,000$
 $\begin{array}{r} 300,000 \\ \times .10 \\ \hline 30,000 \end{array}$
- 12) $81,000 + 7,000 + 10,000 + 3,000 = 101,000$

- 1) a. $18\frac{1}{3} = 18\frac{2}{6} = 17\frac{8}{6}$
 $\frac{-7\frac{5}{6}}{10\frac{3}{6}} = \frac{-7\frac{5}{6}}{10\frac{3}{6}} = 10\frac{1}{2}$
- b. $14\frac{1}{10} = 14\frac{2}{20} = 13\frac{22}{20}$
 $\frac{-2\frac{15}{20}}{20} = \frac{-2\frac{15}{20}}{20} = -2\frac{15}{20}$
 $11\frac{7}{20}$
- 2) a. $\frac{12}{100} = 12\%$
 $\frac{12}{50} \times (\frac{2}{2}) = \frac{24}{100} = 24\%$ or $50 \overline{) 12.00}$
 $\frac{-100}{200}$
- b. $\frac{12}{25} \times (\frac{4}{4}) = \frac{48}{100} = 48\%$ or $25 \overline{) 12.00}$
 $\frac{-100}{200}$
- 3) change to decimals:
 $\frac{47}{5} = 9.4$ $\frac{56}{6} = 9.33$ $\frac{64}{7} = 9.142$
- 4) 2 million blood cells $\cdot \frac{60 \text{ sec.}}{1 \text{ min.}}$
 $2,000,000 \times 60 =$
 $120,000,000 \text{ blood cells min.}$
- 5) $72 \overline{) 394}$
 $\frac{-360}{34}$ or $5\frac{17}{36}$ or 5.47
- 6) $1^3 = 1$ $2^3 = 8$ $3^3 = 27$
 $4^3 = 64$ $5^3 = 125$
- 7) $\frac{64}{8} = 8$ $8n = 24$ $\frac{72}{2} = 36$ $\frac{72}{3} = 24$ $\frac{72}{4} = 18$
 $24 \div 8 = 3$ $(n = 3)$ $\frac{72}{6} = 12$ $\frac{72}{8} = 9$ $\frac{72}{9} = 8$
- 9) $A = \frac{1}{2}bh$ $b = 6 \text{ in}$ $h = 8 \text{ in}$
 $A = \frac{1}{2}(8 \times 6) = A = \frac{1}{2} \times 48$
 $A = 24 \text{ sq in.}$
- 10) a. $\frac{2}{5} \times \frac{3}{10} = \frac{3}{25}$
 b. $5\frac{3}{4} \div 2\frac{1}{4} = \frac{17}{4} \div \frac{9}{4}$
 $\frac{17}{4} \times \frac{4}{9} = \frac{68}{9} = 7\frac{5}{9}$
- 11) $\frac{2}{6} = \frac{17}{18}$ 12) a. $\frac{2500}{720} = \frac{250}{72} = \frac{125}{36} \approx 3.5 \text{ books student}$
 b. NO. They needed to read 4 books each.

- 1) a. $6\frac{3}{4} \div 3\frac{3}{4} =$
 $\frac{27}{4} \div \frac{15}{4} =$
 $\frac{27}{4} \times \frac{4}{15} = \frac{9}{5} = 1\frac{4}{5}$
- b. $1\frac{3}{5} \div 5 =$
 $\frac{8}{5} \div 5 =$
 $\frac{8}{5} \times \frac{1}{5} = \frac{8}{25}$
- 2) a. $5.11 \times 6.98 \approx 5 \times 7 \approx 35$
 b. $4.9 - 5.3 + 7.2 \approx$
 $5 - 5 + 7 \approx 7$
- 3) a. $r = 7$

 $C = 2\pi r$
 $= 2 \times 3.14 \times 7 \approx 4.4$
 b. $SA = 4.4 \times 3 + 2(\pi \times 7^2) \approx 116.3 \text{ cm}^2$
 c. $V = Bh = \pi \times 7^2 \times 3 \approx 4.6 \text{ cm}^3$
- 4) $10 \times 2 = 2 \text{ hours}$
- 5) $4.8 \overline{) 478.56}$
 $\frac{-432}{465}$
 $\frac{-432}{336}$
 $\frac{-336}{0}$
- 6) $2 + 5 + 0 + (-3) = 4 \text{ over par}$
- 7) a. 6,000 b. 500,000
 c. 180,000 d. 100,000,000
- 8) $4,700 - 699 = 4,001$
- 9) a. $12 \text{ in.} = 1 \text{ ft.}$ $3 \text{ ft.} = 1 \text{ yd.}$
 $468 \text{ in.} \cdot 1 \text{ ft.} = 39 \text{ ft.}$ $1 \text{ yd.} = 13 \text{ yds}$
 12 in. 3 ft.
- 10) a. $\frac{3}{10} \times \frac{1}{2} = \frac{3}{20}$
 b. $\frac{10}{1} \div \frac{1}{5} = \frac{10}{1} \times \frac{5}{1} = 50$
- 11) a. This graph makes it look like there is a larger difference than there really is.
 b. Central is much more favorable in the redrawn graph. They would prefer it.
- 

- 1) a. $\frac{1}{3} \times 4\frac{1}{2} =$
 $\frac{1}{3} \times \frac{9}{2} = \frac{9}{6} = 1\frac{1}{2}$
- b. $\frac{1}{4} \times \frac{3}{8} = \frac{3}{32}$
- 2) a. $\frac{3}{9} = \frac{1}{3} = .33\bar{3}$ $\frac{1}{3} = .33\bar{3}$
 b. $(\frac{4}{9}) = .44\bar{4}$ $\frac{1}{2} = .50$
 c. $\frac{6}{9} = \frac{2}{3} = .66\bar{6}$
- 3) b) height of a basketball player
 d) distance from Chicago to Detroit
 a) diameter of a dime
 c) diagonal of a computer screen
- 4) $2 + n + n = 8$
 $2 + 2n = 8$
 $+ -2$ $+ -2$
 $2n = 6$
 $\frac{1}{2} \cdot 2n = 6 \cdot \frac{1}{2}$ $n = 3$
- 5) a. 
 b. $p = 2(1 + 12) = 26 \text{ ft.}$
 $p = 2(2 + 6) = 16 \text{ ft.}$
 $p = 2(3 + 4) = 14 \text{ ft.}$
 c. The 3×4 is the smallest perimeter
- 7) $3 \times 6 \times 2 = 36$ different outfits
- 8) $1 \text{ l} = 1,000 \text{ ml}$, so
 $1 \text{ liter weighs } 1,000 \text{ g.}$
- 9) a. $|-2| = 2$
 b. $(-2)^2 = 4$
 c. $(-(-2))^2 = 2^2 = 4$
- 10) $5.5\% = .055$
 $.055 \times 1,800,000 =$
 $\$99,000$
- 11) c = change in temp. $-7^\circ + c = 11^\circ$
 $c = 18^\circ \text{F}$
- 12) a. (35) b. $\frac{1}{3} = .33$
 c. $\frac{70}{200} = .35$ d. (.35)