

## 6th Grade Curriculum Overview

### Ratio, Rate and Proportion

- Understand ratio and use ratios to solve problems.
- Understand rate and use rates to solve proportions.
- Understand proportions and use proportions to solve problems.
- Understand percent as ratio of a number to 100.
- Solve percent problems.
- Find the unit cost.

### The Number System

- Multiply and divide fractions by fractions.
- Add and subtract fractions and rename in simplest terms.
- Understand fraction division.
- Perform addition, subtraction, multiplication and division using multi-digit numbers.
- Perform addition, subtraction, multiplication and division using decimal numbers.
- Find common factors and multiples.
- Find the least common multiple between two numbers.
- Order numbers from least to greatest or vice versa.
- Evaluate problems using absolute value.
- Graph equations using the coordinate system.
- Create a table of values and use it to solve a problem.
- Write a number using scientific notation.
- Write a number using decimal notation.

### Expressions and Equations

- Use the order of operations to simplify an expression.
- Create and understand algebraic expressions.
- Solve one-variable equations.
- Understand the properties of opposites and reciprocals and use them to solve problems.
- Use the commutative and associative properties to simplify expressions.
- Use the distribution property to simplify an expression.
- Write and evaluate expressions and numbers using whole number exponents.
- Translate a problem into a number sequence.
- Represent a relationship between an  $x$  and a  $y$  variable.
- Compare numbers and expressions using  $>$ ,  $<$ , and  $=$ .
- Extend a pattern.

### Geometry

- Solve problems involving area, surface area, and volume.
- Use a net to find a surface area.
- Accurately draw a perpendicular bisector of a line segment.
- Accurately draw a triangle using given angles and line segment lengths.
- Solve problems using supplementary, complementary, vertical, or adjacent angles.
- Identify parallel and perpendicular lines.
- Identify angles.
- Identify the regular quadrilaterals from their properties.
- Find the area of a polygon by decomposing it into regular angles.

## Statistics and Probability

- Understand how to find the measures of central tendency (mean, median and mode).
- Find the upper extreme, the lower extreme, upper quartile, and the lower quartile of a data set.
- Find the interquartile range of a data set and explain what it means.
- Find the mean absolute deviation and explain what it means.
- Use a stem-and-leaf plot to answer questions.
- Use a box-and-whisker plot to answer questions.
- Understand theoretical probability.
- Understand experimental probability.
- Solve probability problems.
- Use a graph to answer questions.
- Demonstrate the effect of an outlier on a data set.
- Determine whether or not a sample set is biased.

## **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 1<sup>st</sup>, after your 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. a.  $2.32 \times 4.1 =$                       b.  $30.5 \times 0.2 =$

2. List these numbers in order from least to greatest:

2.19                      2.91                      2.9                      2.099                      2.01

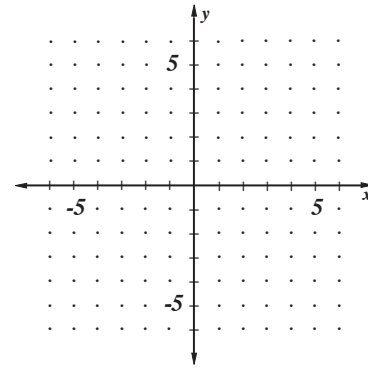
\_\_\_\_\_

3. Mental math: Estimate  $253 \div 50 \approx$  \_\_\_\_\_

4. a. Find three pairs of numbers that satisfy the equation  $x + y = 4$ .

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

c. Find another point on the line. Test it to see if it makes the equation true.



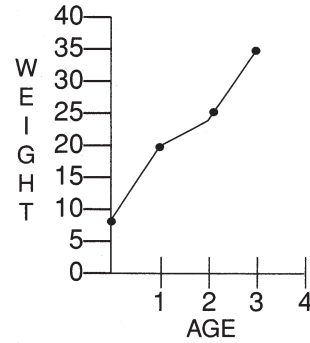
5. Gabrielle has  $6\frac{1}{4}$  yards of fabric. She is making doll dresses. Each requires  $\frac{3}{4}$  yard of fabric. How many dresses can she make?

6. The  $\sqrt{12}$  is between what two whole numbers? \_\_\_\_\_ and \_\_\_\_\_

7. Round to the nearest hundredth.  $4.6 \overline{)68.11}$

8. a. If James weighed 8 pounds at birth, how much did he gain from birth to age one?

b. Between which two years did he have a 40% weight gain?



9. Evaluate and simplify.

a. 
$$\begin{array}{r} 6 \\ -3\frac{3}{8} \\ \hline \end{array}$$

b. 
$$\begin{array}{r} 3\frac{2}{5} \\ +4\frac{1}{10} \\ \hline \end{array}$$

10. a. Write the next three numbers (terms) in the pattern below.

6, 10, 14, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_

b. If the ninth term is 38, what is the tenth? \_\_\_\_\_

11.  $234.81 + 23481 =$

12. Choose the correct symbol ( $>$ ,  $<$ ,  $=$ ) to make each sentence true.

a.  $.232$  \_\_\_\_\_  $.2318$

b.  $\frac{4}{5}$  \_\_\_\_\_  $\frac{5}{6}$

c.  $\frac{1}{3}$  \_\_\_\_\_  $.3$

d.  $-2$  \_\_\_\_\_  $-3$

e.  $1.5$  \_\_\_\_\_  $1.50$

f.  $200\%$  \_\_\_\_\_  $2$

## 1. Evaluate.

a.  $2.35 \times 100 =$

b.  $.005 \times .01 =$

c.  $4329 \times .0001 =$

## 2. Find two ways to determine the number of dimes in \$8.70.

Method 1:

Method 2:

## 3. Suppose one Euro is worth \$1.41 in the U.S. What is the better buy for a book, 8 Euros or \$11.00 U. S? Your work will justify your answer.

4. Use the numbers below to write as many fractions as you can that equal  $\frac{1}{2}$ .

5, 6, 7, 10, 13, 14, 20

5. When two expressions are equal, the number sentence is an *equation*.

Jolie bought 3 hot dogs for \$1.59 each and 3 orders of fries for  $x$  dollars each. She spent \$7.74.

a. Write an equation to represent this.

b. Find the cost of one order of fries.

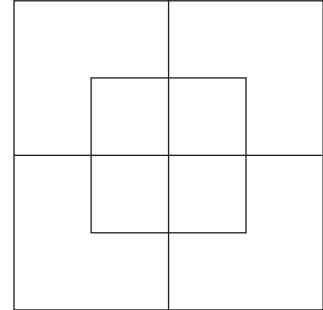
6. The formula for the Area ( $A$ ) of a parallelogram with height ( $h$ ) and base ( $b$ ) is  $A = bh$ .Find the area of a parallelogram with  $b = 4.5$  cm and  $h = 3.5$  cm.

7. Complete the table of powers of 10.

a. $10^0$	_____	$10^1$	_____	$10^2$	_____
		$10^3$	_____	$10^4$	_____
		$10^6$	_____	$10^7$	_____

c. When  $n > 0$ ,  $10^n$  is 1 followed by \_\_\_\_\_ zeros.

8. How many squares are there altogether?



9. I am a number. When you add my two digits together, the answer is the same as when you multiply my two digits together. What am I?

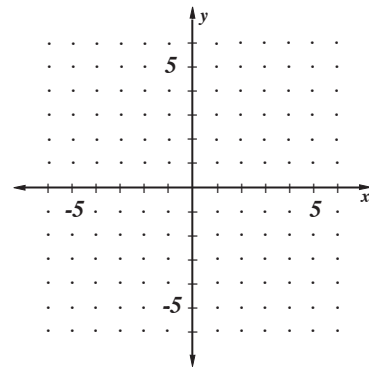
10. a. Find three pairs of numbers that satisfy the equation  $y = 3x$ .

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

c. (optional) *Slope* is the tilt of a line. It is the ratio of the rise over the run.

Place your pencil on a point. Count vertically until you are even with the next point. This is the rise. Count horizontally until you reach your line. This is your run.

The slope of this line is  $\frac{3}{1} = 3$ .





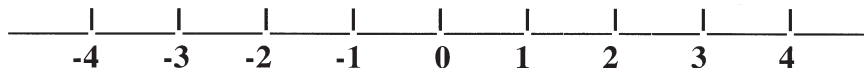
1. For problems, a – c simplify: (Recall that the order of operations is: parentheses, powers, multiplication and division from left to right; addition and subtraction from left to right.)

a.  $1 + 4^2 \times 3$

b.  $16 - 4 / 2 + 3$

c.  $100 / 25 - 2 \times 2$

2. Place the numbers  $50\%$ ,  $3^0$ ,  $\pi$ ,  $\frac{4}{3}$ ,  $-0.75$ ,  $-2^2$  on the number line below.



3. Place in order from least to greatest.

1.91

1.09

1.119

1.19

4. Use  $<$ ,  $>$  or  $=$  to make each sentence true.

a.  $3 \times 4 + 2$  \_\_\_\_\_  $3 + 4 \times 2$

b.  $2 \times 2 - 1$  \_\_\_\_\_  $2 \times (2 - 1)$

c.  $1.0^3$  \_\_\_\_\_  $10^0$

d.  $8 - (8 + 8)$  \_\_\_\_\_  $(8 - 8) + 8$

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

Let  $a = -2$ ,  $b = 3$ ,  $c = 5$  Find each of the following:

a.  $abc$ b.  $a^2$ c.  $c(a + b)$ 

6. Joe Smith hit 12 home runs in his first 15 games of the Triple-A baseball season. His team will play a total of 80 games. If this rate continues, how many home runs can Joe expect to hit?

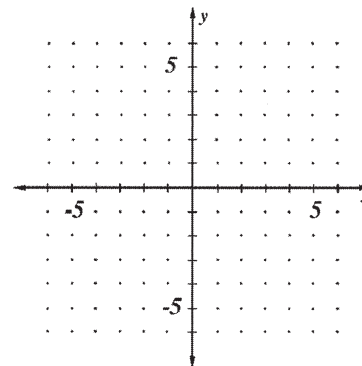
7. a. Plot the following points on the coordinates to the right.

$A = (-3, 1)$ ,  $B = (4, 1)$ ,  $C = (4, -2)$ ,  $D = (-3, -2)$

- b. Connect the points in alphabetical order. Then connect  $D$  to  $A$ .

- c. Identify this figure.

- d. Find the area of this figure.



8. An *expression* occurs when numbers and variables are joined using arithmetic operations. Write each as an algebraic expression. Let  $n$  = the number.

- a. Five times a number \_\_\_\_\_
- b. Eight less than a number \_\_\_\_\_
- c. Three more than twice a number \_\_\_\_\_

9. An *arithmetic sequence* is a number pattern where the difference between consecutive numbers (terms) is constant.

The first four terms of a sequence are 5, 13, 21, 29, ...

- a. Find the next two terms in the sequence. \_\_\_\_\_, \_\_\_\_\_
- b. Find the difference between any two consecutive terms. (next term – previous term) \_\_\_\_\_

This is the constant rate of change.

- c. State a rule to find any terms in this sequence.
- d. Use your rule to find the tenth term in this sequence. \_\_\_\_\_

10. Addison scored 40, 81, 86, 88, and 93 on her math tests. The mean and the median are measures of *central tendency*.

- a. Find the mean of her test scores.
- b. Find the median of her test scores.
- c. Eliminate the score of 40 and recalculate her mean and median. (The 40 is an *outlier*. An outlier is a score that varies widely from the rest of a data set.) Which measure was most affected by the score of 40?
- d. In this class the grading scale is:

85-92 B

78 – 84 C

What should Addison receive for her quarter grade?

**BRAIN AEROBICS - WEEK 1**

1. If it is 12:00 P.M. and you move the minute hand 90 degrees clockwise, what time will it be?

2. Mandy could not decide which was the better bargain for juice boxes for her kindergarten class; 45 boxes for \$10.80, or 15 boxes for \$3.75?

3. Andrea's family loves to eat turkey at Thanksgiving. She plans on  $1\frac{1}{4}$  pounds for each adult in the family and  $\frac{3}{4}$  pound for each child. Andrea expects 14 children and 10 adults. Will a 22 pound turkey be enough to feed her guests?

4. Cheryl drove 125 miles from Ann Arbor, Michigan to Grand Rapids, Michigan. How many miles did she drive if she made two round trips?

5. Arrange these numbers in the boxes below to give the largest possible answer in this subtraction problem. Use each number only once. (7, 9, 3, 4, 0, 1)


## 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  $-(-3) = 3$     ②  $7 - (-2) = 7 + 2 = 9$     ③  $-(-2)^2 = -4$     ④  $8 - 2(-2) = 8 + 4 = 12$
- ⑤ a.  $\frac{1}{3} = .3\bar{3} = 33\bar{3}\%$  or  $33\frac{1}{3}\%$     b.  $\frac{1}{4} = .25 = 25\%$   
 c.  $\frac{1}{10} = .1 = 10\%$     d.  $\frac{17}{10} = 1.7 = 170\%$   
 e.  $\frac{9}{100} = .09 = 9\%$     f.  $\frac{39}{100} = .39 = 39\%$
- ⑥ (5; 10)    (6; 20)
- ⑦ Remember (x, y)  
 A = (2, 3)    B = (4, -2)    C = (-2, -5)    D = (-4, 1)
- ⑧  $\frac{1}{3} \times 899 \approx \frac{1}{3} \times 900 = 300$
- ⑨ a.  $3 \times 2 \times 5$     b.  $2^2 \times 3^2$     c.  $3^3$
- ⑩ a. (30, 246)    b. (207, 003)
- ⑪ a. 3 inches =  $\frac{3}{12} = \frac{1}{4}$  feet    b. 10 inches =  $\frac{10}{12} = \frac{5}{6}$  feet  
 c. 18 inches =  $\frac{18}{36} = \frac{1}{2}$  yard    d. 2 feet =  $\frac{2}{3}$  yard
- ⑫ Increase of 20% means  $100\% + 20\% = 120\%$   
 $120\% \times 10 = 1.2 \times 10 = 12$  words per minute.  
 Increase of 25% means  $100\% + 25\% = 125\%$   
 $125\% \times 12 = 1.25 \times 12 = 15$  words per minute.
- ⑬  $32 \overline{) 107826}$     (14)    (4)

- ① a.  $\frac{3}{10} \div \frac{4}{5} = \frac{3}{10} \times \frac{5}{4} = \frac{3}{8}$     b.  $\frac{5}{6} \times \frac{1}{3} \times \frac{2}{5} = \frac{1}{6}$
- ②  $307 \overline{) 525} = 123$
- ③  $52 \overline{) 1532}$      $52 \overline{) 780}$      $780 \div 7 = 787$
- ④  $54 \div 27 = 2$      $63 \div 21 = 3$     ⑤ 18    ⑥  $-3.3, -3, 3, .33\frac{1}{3}$  ( $\frac{1}{3} = .\bar{3}$ )
- ⑦ a. (113,000,000)    b.  $113,000,000 = 1.13 \times 10^8$
- ⑧  $A = \frac{1}{2}bh$   
 $\frac{1}{2}(2.6)(1.3) = 1.69$  sq. in.
- ⑨ a.  $100\% - 20\%$  discount = 80%  
 $80\% \times 229 = .8 \times 229 = 183.20$   
 b. cost (100%) + tax (6.5%) = 106.5%  
 $106.5\% \times 183.20 = 1.065 \times 183.20 = 195.108 = 195.11$
- ⑩ a. (10 games)    b.  $6 + 2 + 2 + \frac{1}{2}(10) = 15$  games
- ⑪ a. (90)    b. (330)    c. (150)
- ⑫ (\$8.00)

- ① a.  $\frac{232}{24.1} \approx 9.512$     b.  $\frac{30.5}{5.2} \approx 6.10$     ③  $2,190, 2,910, 2,900, 2,099, 2,010$   
 $(2,01, 2,099, 2,19, 2,9, 2,91)$
- ②  $253 \div 50 \approx 250 \div 50 = 5$
- ④ a. (0, 4) (1, 3) (2, 2)    b. c. ex (3, 1)     $3 + 1 = 4 \checkmark$
- ⑤ How many groups of  $\frac{3}{4}$  are in  $6\frac{1}{4}$ ?  
 $6\frac{1}{4} \div \frac{3}{4} = \frac{25}{4} \times \frac{4}{3} = \frac{25}{3} = 8$  or  $8\frac{1}{3}$   
 She can make (8 doll dresses).  
 What does the  $\frac{1}{3}$  represent? Is it  $\frac{1}{3}$  yd. fabric? No. It is  $\frac{1}{3}$  of what is needed to make a dress.  
 $\frac{1}{3} \times \frac{3}{4} = \frac{1}{4}$  yd. fabric
- ⑥ (3 and 4)
- ⑦  $4.6 \overline{) 14.806} \approx 4.81$
- ⑧ a.  $20 - 8 = 12$  pounds  
 b. Age 2 - 25 pounds  
 Age 3 - 35 pounds  
 $140\% \times 25 = 1.4 \times 25 = 35$  pounds  
 From age 2 to age 3
- ⑨ a.  $6 = 5\frac{5}{8}$      $-3\frac{3}{8} = -3\frac{3}{8}$      $2\frac{2}{8}$   
 b.  $3\frac{3}{8} = 3\frac{3}{8}$      $+4\frac{4}{8} = 4\frac{4}{8}$      $7\frac{7}{8} = 7\frac{7}{8}$
- ⑩ a. (6, 10, 14, 18, 22, 26) (plus 4)    b. (4, 2)
- ⑪  $234.81$      $23481$      $23715.81$
- ⑫ a.  $232 > 2318$     b.  $\frac{1}{3} < \frac{5}{6}$   
 c.  $\frac{1}{3} > 3$     d.  $-2 > -3$   
 e.  $1.5 = 1.50$     f.  $200\% = 2$

- ① a.  $\frac{3}{8} \div \frac{1}{3} = \frac{3}{8} \times \frac{3}{1} = \frac{9}{8} = 1\frac{1}{8}$     b.  $3\frac{1}{2} \div \frac{1}{4} = \frac{7}{2} \times \frac{4}{1} = 14$
- ② a.  $2 + 3 \times 4 \geq 2 \times 3 + 4$     b.  $3 \times 3 - 2 \geq 3 \times (3 - 2)$   
 $2 + 12 \geq 6 + 4$      $9 - 2 \geq 3 \times 1$   
 $14 \geq 10$      $7 \geq 3$
- c.  $6 - 2 \times 3 = 0$      $2 \times 3 - 6 = 0$     d.  $3 - (3 + 3) \leq 3 + (3 - 3)$   
 $6 - 6 = 0$      $6 - 6 = 0$      $3 - 6 = -3$      $3 + 0 = 3$
- ③ a.  $30\% \times n = 6$  or  $.3n = 6$     b.  $\frac{30}{3} = \frac{6}{3}$      $n = 20$
- ④ a.  $|-5| = 5$     b.  $|2 - 5| = |-3| = 3$     c.  $|2| - |-5| = 2 - 5 = -3$
- ⑤  $98 + 100 + 88 + 89 + 95 + 90 = 93.3$  (93)
- ⑥ a. (86200)    b. (.00268)    ⑦ (b, c)
- ⑧ a.  $\frac{3}{4} = .75$     b.  $\frac{1}{3} = .\bar{3}$     c.  $\frac{2}{5} = .4$
- ⑨ a.  $x + 7 = 3$     b.  $x + (-8) = 5$     c.  $x + \frac{2}{3} = \frac{1}{4} = \frac{3}{12}$   
 $+ -7$      $+ 8$      $-\frac{2}{3} - \frac{2}{3} = -\frac{4}{3}$   
 $x = -4$      $x = 13$      $y = -\frac{5}{12}$
- ⑩  $-.21, -\frac{1}{4}, -.201, -17\%$      $-\frac{3}{10}$   
 $-.21, -.25, -.201, -.17, -.3$   
 $-.3, -.25, -.21, -.201, -17\%$   
 $-\frac{3}{10}, -\frac{1}{4}, -.21, -.201, -17\%$