Key

Math 6H

Colonial School District

Summer Math Packet 2008-2009

The concepts included in this packet will help reinforce key skills your child has encountered in math this year. Please encourage them to complete as many activities as possible as it will lead to greater success next year. The answer key to this packet is available on the district website (www.colonialsd.org).

Key

Translating Word Problems to Equations

Directions for #1-#6:
Write an equation for each sentence. Solve. Show your work.

1. A number b plus 5 equals 15.

$$B + 5 = 15$$
$$-5 \quad -5$$
$$B = 10$$

2. A number r minus 2 is 8.

$$r - 2 = 8$$
$$+2 \quad +2$$
$$r = 10$$

3. A number w added to 7 is 32.

$$7 + W = 32$$
$$-7 \quad -7$$
$$W = 25$$

4. If 4 is added to the product of 6 and a number t, the result is 76.

$$6t + 4 = 76$$
$$-4 \quad -4$$
$$\frac{6t}{6} = \frac{72}{6}$$
$$t = 12$$

5. Rebecca completes four addition problems each minute. How many minutes will it take her to complete 12 problems?

$$\frac{4m}{4} = \frac{12}{4}$$
$$m = 3 \text{ minutes}$$

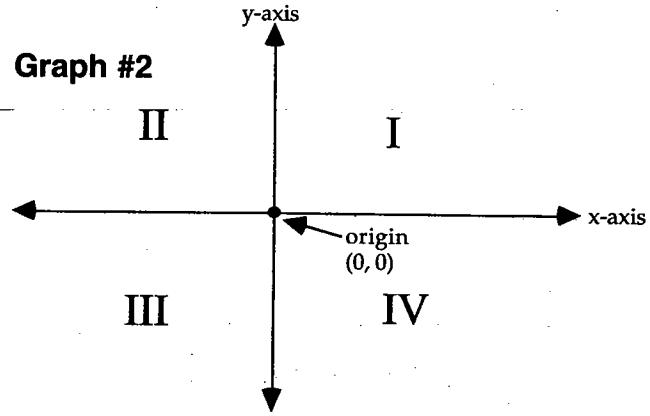
6. Melissa spent three hours each day painting her house. She spent a total of 27 hours painting. How many days did she paint?

$$\frac{3d}{3} = \frac{27}{3}$$
$$d = 9 \text{ days}$$

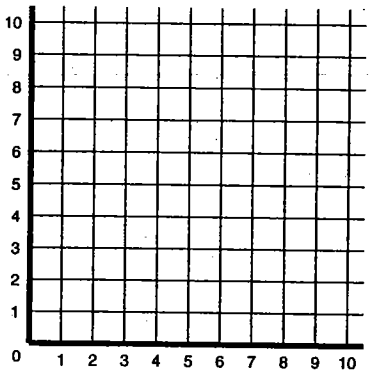
Coordinate Plane

You have been graphing on a portion of the coordinate plane for many years. The coordinate plane you have used for graphing is shown to the right below (Graph #1). This is an appropriate graph to use when you are strictly dealing with positive numbers. In many problem solving situations, this is all that is needed. Since you have been introduced to negative numbers, you can now use the entire coordinate plane. The expanded coordinate plane is shown below (Graph #2). With this coordinate plane, you can graph all the real numbers. Even though only integers are shown on each axis, fractions and decimals can be approximated.

Graph #2

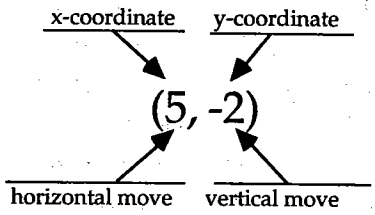


Graph #1

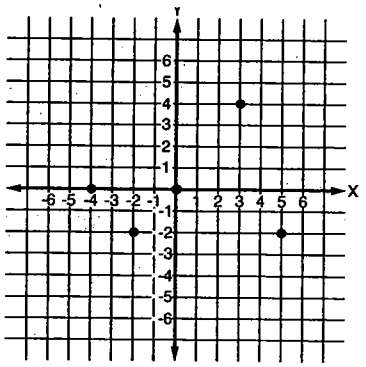


Each section of the coordinate plane is labeled with a Roman numeral. These sections are called quadrants. You are most familiar working with quadrant I which includes all positive numbers.

The first thing you learned to do with graphing is to plot points. Points are described by ordered pairs such as (0, 0), (3, 4), (5, -2), (-4, 0), or (-2, -2). These points are shown on Graph #3.



Graph #3



The first number in the ordered pair is called the x-coordinate; the second number is called the y-coordinate. The pair of numbers is a set of directions to a specific point. The directions always start from the origin, the point where the two axes intersect. The sign on a number tells in which direction to move. When a number is positive, move in a positive direction—to the right on the x-axis or up on the y-axis. When a number is negative, move in a negative direction—to the left on the x-axis or down on the y-axis. So, to get to the point described by the ordered pair (5, -2), start at the origin (0). Move 5 units to the right and 2 units down. You should land in quadrant IV.

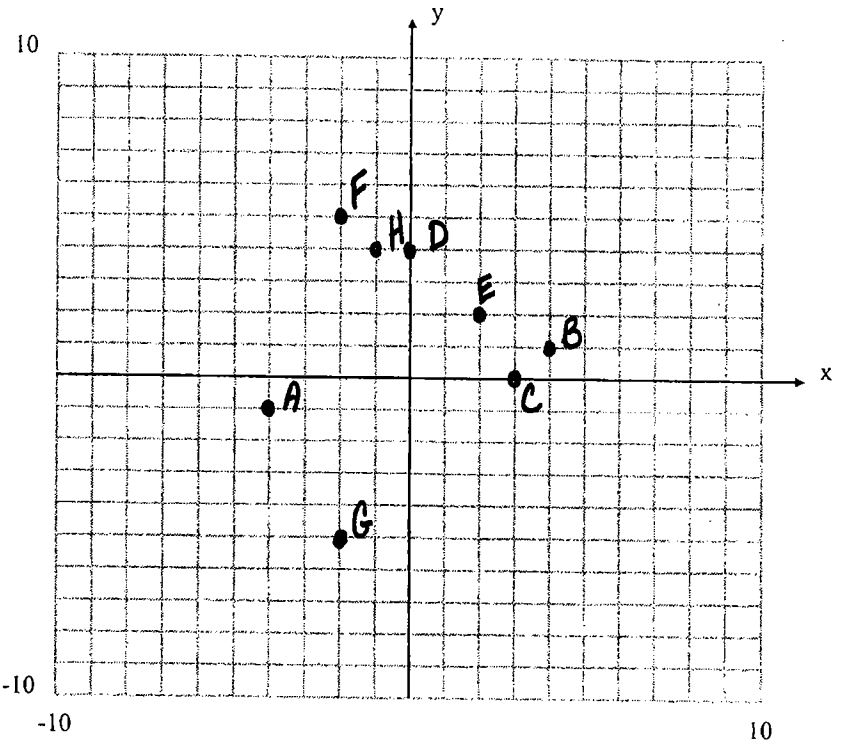
Key

Graphing on the Coordinate Plane

Directions for #1-#8:

- Identify the quadrant or axis where the point is located.
- Graph each ordered pair on the coordinate grid.
- Write the letter next to the point.

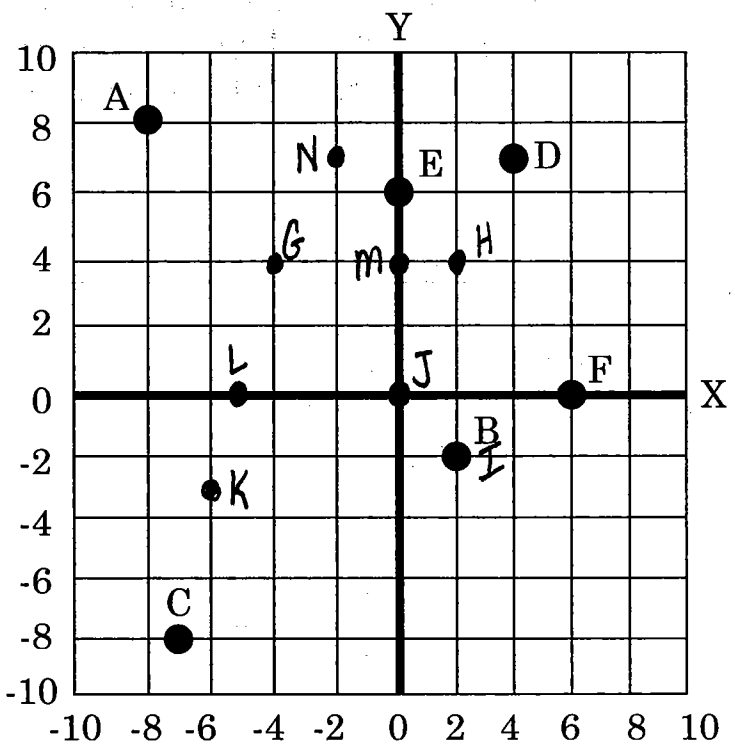
1. A (-4, -1) III
2. B(4, 1) I
3. C(3, 0) x-axis
4. D(0, 4) y-axis
5. E(2, 2) I
6. F(-2, 5) II
7. G(-2, -5) III
8. H(-1, 4) II



Geometry: Coordinate Planes Name Key

Part I: Naming Points on a Graph. Name the coordinates of the points. Use the coordinate system below. Remember: the first coordinate is the distance from 0 on the x-axis and the second coordinate is the distance from 0 on the y-axis.

1. A (-8, 8)
2. B (2, -2)
3. C (-7, -8)
4. D (4, 7)
5. E (0, 6)
6. F (6, 0)

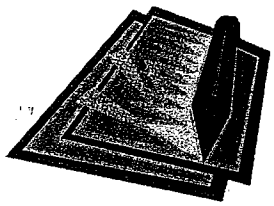


Part II: Graphing Points. On graph paper, draw a coordinate plane. Then graph each set of points. Label each point.

7. G (-4, 4)
8. H (2, 4)
9. I (2, -2)
10. J (0, 0)
11. K (-6, -3)
12. L (-5, 0)
13. M (0, 4)
14. N (-2, 7)

see grid

THINK ABOUT IT!



15. List five ordered pairs which lie on the same horizontal line. What generalization can you make about the y-coordinates of points that lie on the same horizontal line? Repeat this exercise for a vertical line.

Horiz.: (-4, -4) (-2, -4) (0, -4) (2, -4) (4, -4) The y-coordinate is the same for points on a horizontal line.

Vertical: (8, 10) (8, 8) (8, 6) (8, 4) (8, 2) The x-coordinate is the same for points on vertical line.

Key

Ratio, Rates, Proportions

A ratio is the comparison of two numbers by division. (5 to 2, 5:2, or $\frac{5}{2}$)

A rate is a ratio that compares two measurements with different units. (50 miles per hour)

A proportion is an equation that shows two ratios are equivalent. ($\frac{2}{5}=\frac{6}{15}$)

Using cross products to solve. $\frac{2}{5}=\frac{6}{n}$

$2n=5\times 6$

$2n=30$

$n=15$

#1-4 Express each ratio as a fraction in simplest form.

1. 9 to 12

$\frac{9}{12}=\frac{3}{4}$

2. 5:20

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

3. \$2.50 for 5 notepads

$\frac{2.50}{5}=\frac{250}{500}=\frac{5}{10}=\frac{1}{2}$

4. \$7 to rent 2 videos

$\frac{7}{2}$

#5-7 Express each ratio as a unit rate.

5. $\frac{120 miles}{2 hours}$

60 mi/hr

6. $\frac{300 feet}{5 \sec}$

60 ft/sec

7. $\frac{800 pounds}{40 sq.inches}$

20 lb/in^2

#8-10 Use cross products to solve each proportion.

8. $\frac{5}{8}=\frac{x}{40}$

$5\cdot 40=8x$

$\frac{200}{8}=\frac{8x}{8}$

$25=x$

9. $\frac{6}{3}=\frac{10}{t}$

$6t=3\cdot 10$

$\frac{6t}{6}=\frac{30}{6}$

$t=5$

10. $\frac{n}{5}=\frac{42}{7}$

$7n=5\cdot 42$

$\frac{7n}{7}=\frac{210}{7}$

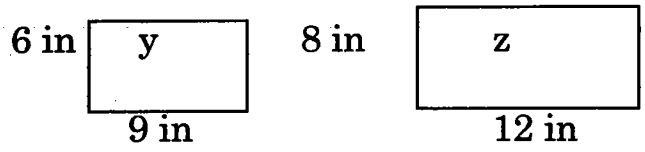
$n=30$

Ratio & proportion: Problem Solving

Name Key

Solve each problem.

1. Use the rectangles below to complete the following:
   a. Write ratios comparing the widths, the lengths, and the perimeters of rectangle y to z.
   b. Show whether or not these ratios are equivalent.



2. Caroline found that 6 students out of 18 students she surveyed liked sushi. Josh found that 9 students out of 24 students he surveyed liked sushi. Which result shows a greater preference for sushi?

3. The band has 5 days to sell 195 tickets to ensure a sellout at their fall concert. At what rate must they sell the tickets?

4. If a race car uses 323 liters of gasoline in a 500 kilometer race, about how many liters were used for each kilometer?

5. A supermarket has soda on sale, 6 cans for $1.95. Each can sold separately costs $0.35. How much do you save buying the 6 cans on sale?

6. Creek Middle School has 1,000 students, 40 teachers, and 5 administrators. If the school grows to 1,200 students and the ratios are maintained, find the number of teachers and administrators that will be needed.

(a.) (b.)

1. 6 to 8 = 3 to 4
   9 to 12 = 3 to 4
   They all simplify to 3 to 4 so they are equivalent.

Perimeter of $y = 2(6)+2(9) = 12+18 = 30$
Perimeter of $z = 2(8)+2(12) = 16+24 = 40$
30 to 40 = 3 to 4

2. $\frac{6}{18} = \frac{1}{3}$ $\frac{9}{24} = \frac{3}{8}$

$\frac{3}{8} > \frac{1}{3}$ therefore Josh's survey shows a greater preference to sushi.

3. $195 \div 5 =$ 39 tickets per day

4. $323 \div 500 =$ 0.646 liter/km

5. $6 \times 0.35 =$ \$2.10 for 6 seperate
   $- \$1.95$
   \$0.15 saved

6. Teachers: $\frac{1000}{40} = \frac{1200}{x}$ Administrators: $\frac{1000}{5} = \frac{1200}{x}$

$\frac{1000x}{1000} = \frac{48000}{1000}$ $\frac{1000x}{1000} = \frac{6000}{1000}$

$x = 48$ teachers $x = 6$ administrators

Integers

Key

Adding

RULE	EXAMPLES
SAME SIGNS 1. Add. 2. Sum is positive if both are positive; negative if both are negative.	5 + 8 = 13 −5 + −8 = −13
DIFFERENT SIGNS 1. Subtract the absolute values. 2. Answer is sign of the integer with the greater absolute value.	5 + −8 = −3 −5 + 8 = 3

Find each sum.

1. −4 + −8

   −12

2. 14 + 16

   30

3. −43 + −12

   −55

4. −16 + 11

   −5

5. 28 + −42

   −14

6. 75 + −5

   70

7. −49 + −32

   −81

8. 23 + −23

   0

9. 86 + −18

   68

Integers

Key

Subtracting

RULE	EXAMPLES	
1. Change the minus sign to a plus. 2. Find the opposite of the 2nd number. 3. Add; using your rules for adding integers.	5 − 8 = 5 + −8 = −3	−9 − −12 = −9 + 12 = 3

Find each difference.

1. 4 − 7

4 + −7

−3

2. −5 − 3

−5 + −3

−8

3. −8 − 2

−8 + −2

−10

4. −3 − 24

−3 + −24

−27

5. 10 − 17

10 + −17

−7

6. 13 − 9

13 + −9

4

7. −41 − 37

−41 + −37

−78

8. 62 − −29

62 + 29

91

9. −6 − −6

−6 + 6

0

Integers

Key

Multiplying & Dividing

RULE	EXAMPLES	
1. Multiply or divide. 2. The answer is positive if the signs are the same (both positive or both negative); negative if the signs are different (one positive and one negative).	$-5 \times -8 = 40$ $40 \div 4 = 10$	$16 \times -3 = -48$ $-20 \div 10 = -2$

Find each product or quotient.

1. -3×-8

24

2. -5×-5

25

3. -15×3

-45

4. 0×-121

0

5. $-35 \div -7$

5

6. $-65 \div 5$

-13

7. $240 \div -4$

-60

8. $36 \div 12$

3

9. $(-49 \div 7) \times 8$

-7x8

-56

Key

Integers

Problem Solving

RULE
4-Step Plan for Problem Solving 1. Explore. You need to read the problem and know what information you have and need and what is asked. 2. Plan. Develop a plan to solve the problem. Chose a strategy. Often it is helpful to make an estimate. 3. Solve. Carry out your plan 4. Examine. Be sure to label your answer appropriately. Check your answer by comparing to your estimate. If the answer does not make sense, make a new plan and try again. **NOTE:** Remember in most cases there is more than one way to solve the problem!

1. Rita opened a checking account with a balance of $150. She wrote 2 checks: $87 and $68. How much money remained in the account?

$87 + 68 = \$155$

$\$150 - \$155 = (-\$5)$

2. During a space shuttle launch, a maneuver is scheduled to begin at T minus 85 seconds (i.e. 85 seconds before liftoff). If the maneuver lasts 2 minutes, at what time will the maneuver be complete?

$-85 + 120 = (35 \text{ sec})$

3. The water level in a tank decreased 10 centimeters in 5 minutes. If the tank drains at a steady rate, what is the change in the water level each minute?

$-10 \div 5 = (-2 \text{ cm/min})$

Equations

Key

One-step Equations

RULE	EXAMPLE
1. Look at what has been done to the variable. 2. Undo it using the inverse operation on both sides of the equation. 3. Check your answer by replacing the variable with the solution.	X − 15 = 29 +15 +15 x = 44 ✓ 44 − 15 = 29

Solve.

1. d + 32 = 70
   −32 −32
   d = 38

2. 708 = c + 30
   −30 −30
   678 = c

3. x − 89 = 176
   +89 +89
   x = 265

4. x − 36 = 12
   +36 +36
   x = 48

5. 5x = 225
   $\frac{}{5}$ $\frac{225}{5}$
   x = 45

6. 12n = 96
   $\frac{}{12}$ $\frac{96}{12}$
   n = 8

7. n ÷72 = 360
   ×72 ×72
   n = 25,920

8. n ÷ 12 = 12
   ×12 ×12
   n = 144

Fractions: Solving Equations

Name Key

Solve and check each equation.

$$n - \frac{6}{8} = \frac{2}{3}$$

$$n - \frac{6}{8} + \frac{6}{8} = \frac{2}{3} + \frac{6}{8}$$

$$n = 1\frac{5}{12}$$

$$1\frac{5}{12} - \frac{6}{8} = \frac{2}{3}$$

$$\frac{17}{12} - \frac{6}{8} = \frac{2}{3}$$

$$\frac{34}{24} - \frac{18}{24} = \frac{16}{24} = \frac{2}{3}$$ ✔

1. Look at what has been done to the variable.
2. Undo it by using the inverse (opposite) operation on both sides of the equation.
3. Check your answer by plugging it back into the equation to see if it makes the equation true.

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1. $x - \frac{2}{3} = \frac{4}{9}$

$+\frac{2}{3} \quad +\frac{2}{3} = \frac{6}{9}$

$x = \frac{10}{9} = 1\frac{1}{9}$

2. $x + \frac{3}{4} = \frac{8}{9} \quad \frac{32}{36}$

$-3/4 \quad -3/4 \quad \frac{27}{36}$

$x = \frac{5}{36}$

3. $m - \frac{3}{10} = \frac{5}{8} \quad \frac{25}{40}$

$+3/10 \quad +3/10 \quad \frac{12}{40}$

$m = \frac{37}{40}$

4. $\frac{5}{4} \cdot \frac{4}{5}y = \frac{5}{1} \cdot \frac{5}{4}$

$y = \frac{25}{4} = 6\frac{1}{4}$

5. $\frac{1}{6} \cdot \frac{6}{1}x = \frac{4}{3} \cdot \frac{1}{6}$

$x = \frac{4}{18} = \frac{2}{9}$

6. $c + \frac{3}{4} = \frac{4}{5} \quad \frac{16}{20}$

$-3/4 \quad -3/4 \quad \frac{15}{20}$

$c = \frac{1}{20}$

7. $y - \frac{10}{30} = \frac{2}{5} \quad \frac{12}{30}$

$+\frac{10}{30} \quad +\frac{10}{30}$

$y = \frac{22}{30} = \frac{11}{15}$

8. $x + \frac{1}{2} = \frac{7}{10} \quad \frac{7}{10}$

$-1/2 \quad 1/2 \quad \frac{5}{10}$

$x = \frac{2}{10} = \frac{1}{5}$

9. $1\frac{2}{3}x = \frac{6}{5}$

$\frac{3}{5} \cdot \frac{5}{3}x = \frac{6}{5} \cdot \frac{3}{5}$

$x = \frac{18}{25}$

10. $1\frac{2}{9} = 18h$

$\frac{11}{9} \cdot \frac{1}{18} = h$

$\frac{11}{162} = h$

11. $\frac{x}{12} = 2\frac{3}{10}$

$x = \frac{23}{5\cancel{10}} \cdot \frac{\cancel{12}6}{1} = \frac{138}{5}$

$x = 27\frac{3}{5}$

12. $\frac{15}{35} \quad \frac{3}{7} = x + \frac{2}{5}$

$\frac{14}{35} - \frac{2}{5}$

$\frac{1}{35} = x$

13. $\frac{1}{5} + y = \frac{1}{4} \quad \frac{5}{20}$

$-1/5 \quad -1/5 \quad \frac{4}{20}$

$y = \frac{1}{20}$

14. $\frac{6}{5} \cdot \frac{5}{6}x = \frac{7}{2\cancel{12}} \cdot \frac{\cancel{6}}{5}^{1}$

$x = \frac{7}{10}$

15. $\frac{1}{6} \cdot \frac{6}{1}n = \frac{3}{5} \cdot \frac{1}{6}$

$n = \frac{3}{30} = \frac{1}{10}$