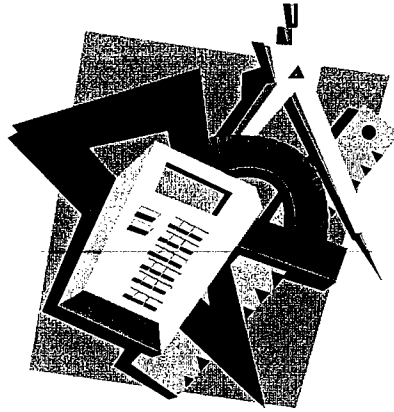


# Math 7H

*Key*



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](http://www.colonialsd.org)).

# 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.	$X - 15 = 29$ $\begin{array}{r} +15 \\ +15 \\ \hline x = 44 \end{array}$ $\checkmark 44 - 15 = 29$

Solve.

$$\begin{array}{r} 1. \ d + 32 = 70 \\ \quad -32 \quad -32 \\ \hline d = 38 \end{array}$$

$$\begin{array}{r} 2. \ 708 = c + 30 \\ \quad -30 \quad -30 \\ \hline 678 = c \end{array}$$

$$\begin{array}{r} 3. \ x - 89 = 176 \\ \quad +89 \quad +89 \\ \hline x = 265 \end{array}$$

$$\begin{array}{r} 4. \ x - 36 = 12 \\ \quad +36 \quad +36 \\ \hline x = 48 \end{array}$$

$$\begin{array}{r} 5. \ 5x = 225 \\ \quad \overline{5} \quad \overline{5} \\ \hline x = 45 \end{array}$$

$$\begin{array}{r} 6. \ 12n = 96 \\ \quad \overline{12} \quad \overline{12} \\ \hline n = 8 \end{array}$$

$$\begin{array}{r} 7. \ n \div 72 = 360 \\ \quad \times 72 \quad \times 72 \\ \hline n = 25,920 \end{array}$$

$$\begin{array}{r} 8. \ n \div 12 = 12 \\ \quad \times 12 \quad \times 12 \\ \hline n = 144 \end{array}$$

# Fractions: Solving Equations

Name Key

Solve and check each equation.

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

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

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

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

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

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

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.

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

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

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

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

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

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

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

$$+ \frac{3}{10} \quad + \frac{3}{10} = \frac{25}{40} + \frac{12}{40}$$

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

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

$$y = \frac{25}{16} = 1\frac{9}{16}$$

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

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

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

$$- \frac{3}{4} \quad - \frac{3}{4} = \frac{16}{20} - \frac{15}{20}$$

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

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

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

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

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

$$- \frac{1}{2} \quad - \frac{1}{2} = \frac{7}{10} - \frac{5}{10}$$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$14. \quad \frac{6}{5} \cdot \frac{5}{6}x = \frac{7}{12}$$

$$x = \frac{7}{12} \cdot \frac{1}{5}$$

$$x = \frac{7}{60}$$

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

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

# Equations

Key

## Two-step Equations

RULE	EXAMPLE
1. First, undo addition or subtraction. 2. Then, undo multiplication or division. 3. Check your answer by replacing the variable with the solution.	$3x - 2 = 13$ $\begin{array}{r} +2 \quad +2 \\ \hline 3x \quad = \quad 15 \\ 3 \qquad \quad 3 \\ \hline x = 5 \end{array}$ $\checkmark 3 \times 5 - 2$ $15 - 2 = 13$

Solve.

1.  $6d - 3 = 32$

$$\begin{array}{r} +3 \quad +3 \\ \hline 6d \quad = \quad 35 \\ 6 \qquad \quad 6 \\ \hline d = 5\frac{5}{6} \end{array}$$

2.  $\frac{x}{5} + 2 = 6$

$$\begin{array}{r} -2 \quad -2 \\ \hline x \div 5 = 4 \\ \cdot 5 \quad \cdot 5 \\ \hline x = 20 \end{array}$$

3.  $2y + 7 = 15$

$$\begin{array}{r} -7 \quad -7 \\ \hline 2y \quad = \quad 8 \\ 2 \qquad \quad 2 \\ \hline y = 4 \end{array}$$

4.  $\frac{b}{7} - 13 = 23$

$$\begin{array}{r} +13 \quad +13 \\ \hline 7 \cdot \frac{b}{7} = 36 \cdot 7 \\ \hline b = 252 \end{array}$$

5.  $-5y + 9 = 24$

$$\begin{array}{r} -9 \quad -9 \\ \hline -5y \quad = \quad 15 \\ -5 \qquad \quad -5 \\ \hline y = -3 \end{array}$$

6.  $\frac{f}{8} - 3 = -27$

$$\begin{array}{r} +3 \quad +3 \\ \hline 8 \cdot \frac{f}{8} = -24 \cdot 8 \\ \hline f = -192 \end{array}$$

Key

# Equations

## Equations with Variables on Both Sides

RULE	EXAMPLE
<ol style="list-style-type: none"><li>1. Eliminate the variable from one side of the equation using inverse operations.</li><li>2. Undo addition or subtraction.</li><li>3. Then, undo multiplication or division.</li><li>4. Check your answer by replacing the variable with the solution.</li></ol>	$\begin{array}{r} 8x - 3 = 6x + 1 \\ -6x \quad -6x \\ \hline 2x - 3 = 1 \\ + 3 \quad + 3 \\ \hline \frac{2x}{2} = \frac{4}{2} \\ x = 2 \end{array}$ <p>✓ <math>8 \times 2 - 3 = 6 \times 2 + 1</math> <math>16 - 3 = 12 + 1</math> <math>13 = 13</math></p>

Solve.

1.  $3k + 10 = 2k - 21$

$$\begin{array}{r} -2k \quad -2k \\ \hline 1k + 10 = -21 \\ -10 \quad -10 \\ \hline k = -31 \end{array}$$

2.  $1x - 4 = 6x - 19$

$$\begin{array}{r} -6x \quad \downarrow -6x \\ \hline -5x - 4 = -19 \\ \downarrow +4 \quad \downarrow +4 \\ \hline \frac{-5x}{-5} = \frac{-15}{-5} \\ x = 3 \end{array}$$

3.  $18 + 4p = 6p + 11$

$$\begin{array}{r} -6p \quad -6p \\ \hline 18 - 2p = 11 \\ -18 \quad -18 \\ \hline -2p = -7 \\ \frac{-2p}{-2} = \frac{-7}{-2} \\ p = 3.5 \end{array}$$

4.  $11h - 14 = 7 + 14h$

$$\begin{array}{r} -14h \quad -14h \\ \hline -3h - 14 = 7 \\ +14 \quad \downarrow +14 \\ \hline \frac{-3h}{-3} = \frac{21}{-3} \\ h = -7 \end{array}$$

5.  $-3p + 8 = 2p - 2$

$$\begin{array}{r} -2p \quad -2p \\ \hline -5p + 8 = -2 \\ -8 \quad -8 \\ \hline \frac{-5p}{-5} = \frac{-10}{-5} \\ p = 2 \end{array}$$

6.  $-t + 10 = t + 4$

$$\begin{array}{r} -t \quad \downarrow -t \\ \hline -2t + 10 = 4 \\ -10 \quad -10 \\ \hline \frac{-2t}{-2} = \frac{-6}{-2} \\ t = 3 \end{array}$$

## FINDING RULES FOR PATTERNS

Consider the following table of values:

<b>x</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>y</b>	<b>-2</b>	<b>2</b>	<b>6</b>	<b>10</b>	<b>14</b>	<b>18</b>	<b>22</b>

Represent the relationship of  $x$  to  $y$  by an equation.

**STRATEGY:** To figure out the rule, first study the  $y$ -values.

**STEP 1:** Find a pattern for the  $y$ -values:

-2, 2, 6, 10, 14, 18, 22...

You can see that these numbers increase by 4 from one number to the next.

So the pattern involves multiples of 4. The equation will have  $4x$  as part of it.

**STEP 2:** Find each value for  $4x$ . Multiply each  $x$ -number by 4.

Substitute these "4 $x$ -numbers" for the  $x$ -numbers of Step 2 and the corresponding  $y$ -numbers.

<b>4x</b>	<b>0</b>	<b>4</b>	<b>8</b>	<b>12</b>	<b>16</b>	<b>20</b>	<b>24</b>
<b>y</b>	<b>-2</b>	<b>2</b>	<b>6</b>	<b>10</b>	<b>14</b>	<b>18</b>	<b>22</b>

Notice that each  $y$ -value is 2 less than the corresponding  $4x$ -number.

Translated into an equation this statement becomes:

**SOLUTION:**  $y = 4x - 2$

Key

1. Consider the following table of values:

x	0	1	2	3	4	5	6	+1
y	1	6	11	16	21	26	31	+5

Which equation represents the relationship of x to y?

$$\text{slope} = \frac{\Delta y}{\Delta x} = \frac{5}{1}$$

- a.  $y = 6x + 1$
- b.  $y = 5x + 1$
- c.  $y = 5x - 1$
- d.  $y = x + 5$

2. Consider the following table of values:

x	0	1	2	3	4	5	6	1
y	2	6	10	14	18	22	26	4

Which equation represents the relationship of x to y?

$$\text{slope} = \frac{\Delta y}{\Delta x} = \frac{4}{1} = 4$$

- a.  $y = 4x + 2$
- b.  $y = 4x - 2$
- c.  $y = 3x + 4$
- d.  $y = 2x + 6$

3. What rule applies to the following data?

x	0	1	2	3	4	1
y	-3	-2	-1	0	1	1

- a.  $y = x - 3$
- b.  $y = x + 3$
- c.  $y = 2x - 5$
- d.  $y = x^2 - 3$

$$\text{slope} = \frac{\Delta y}{\Delta x} = \frac{1}{1} = 1$$

4. Which rule applies to the following table?

x	5	4	3	2	1	0	-1	-2	-3	-1
y	13	10	7	4	1	-2	-5	-8	-11	-3

- a.  $y = 6x - 1$
- b.  $y = 6x + 1$
- c.  $y = 3x - 2$
- d.  $y = 2x + 3$

$$\text{slope} = \frac{\Delta y}{\Delta x} = \frac{-6}{-2} = \frac{-3}{-1} = 3$$

## THE PYTHAGOREAN THEOREM

Key

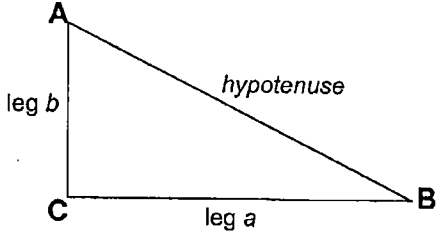
One of the most famous theorems in the history of mathematics is the Pythagorean Theorem. It has to do with the sides of right triangles:

**The Pythagorean Theorem**  
*In any right triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the legs.*

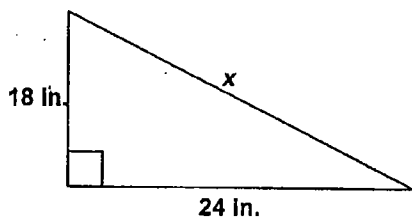
As a formula, the Pythagorean Theorem is:

$$a^2 + b^2 = c^2$$

You will often use this formula to solve problems.



1. What is  $x$ ?

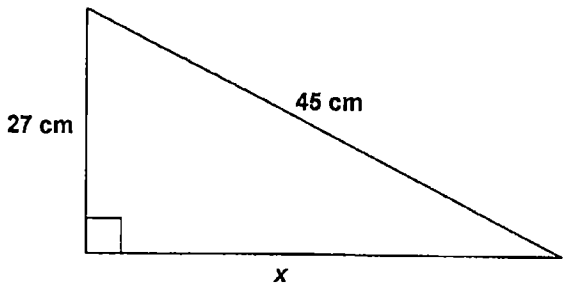


- a. 12 in.
- b. 30 in.
- c. 36 in.
- d. 40 in.

$$\begin{aligned} 18^2 + 24^2 &= x^2 \\ 324 + 576 &= x^2 \\ 900 &= x^2 \\ \sqrt{900} &= x \\ 30 &= x \end{aligned}$$

Key

2. What is  $x$ ?



- a. 20 cm
- b. 25 cm
- c. 28 cm
- d. 36 cm

$$\begin{aligned} 27^2 + x^2 &= 45^2 \\ 729 + x^2 &= 2025 \\ \underline{-729} \quad \underline{-729} & \\ x^2 &= 1296 \\ x &= \sqrt{1296} \\ x &= 36 \end{aligned}$$

3. The length and width of a rectangle are 12 m and 5 m. What is the length of the diagonal? Show your work.

$$\begin{aligned} 12^2 + 5^2 &= x^2 \\ 144 + 25 &= x^2 \\ 169 &= x^2 \\ \sqrt{169} &= x \\ 13 \text{ m} &= x \end{aligned}$$

**EXTRA PRACTICE 29**  
**Slope and Equations of Lines**  
 Use after Section 7.2

Name Key

Examples:

- a) Find a slope-intercept equation for the line with slope 2 that contains (0,5).

$$y = mx + b$$

$$y = 2x + 5$$

The slope-intercept equation.  
 Substitute 2 for  $m$  and 5 for  $b$ .

- b) Find an equation of a line that contains the points (5,-2) and (-2,1).

$$m = \frac{1 - (-2)}{-2 - 5} = \frac{3}{-7} = -\frac{3}{7}$$

First find the slope.

$$y = -\frac{3}{7}x + b$$

Using the slope-intercept form  $y = mx + b$  and substituting for  $m$ .

$$1 = -\frac{3}{7}(-2) + b$$

Using the point (-2,1) and substituting  $x = -2$  and  $y = 1$ .

(We could have just as easily used the point (5,-2)).

$$1 = \frac{6}{7} + b$$

$$\frac{1}{7} = b$$

$$y = -\frac{3}{7}x + \frac{1}{7}$$

Substitute  $b$  into  $y = mx + b$ .

Find an equation of the line containing the given point and having the given slope.

1. (4,-3),  $m = -1$   $y = -1x + 1$

2. (-5,-6),  $m = 2$   $y = 2x + 4$

3. (-7,2),  $m = 3$   $y = 3x + 23$

4. (3,5),  $m = -2$   $y = -2x + 11$

5. (6,-2),  $m = -3$   $y = -3x + 16$

6. (5,-2),  $m = 2$   $y = 2x - 12$

7. (7,0),  $m = 4$   $y = 4x - 28$

8. (0,9),  $m = -2$   $y = -2x + 9$

9. (5,-1),  $m = \frac{1}{5}$   $y = \frac{1}{5}x - 2$

10. (-3,-2),  $m = \frac{1}{4}$   $y = \frac{1}{4}x - 1\frac{1}{4}$

2.  $-6 = 2(-5) + b$   
 $-6 = -10 + b$   
 $4 = b$

4.  $5 = -2(3) + b$   
 $5 = -6 + b$   
 $11 = b$

6.  $-2 = 2(5) + b$   
 $-2 = 10 + b$   
 $-12 = b$

8.  $9 = -2(0) + b$   
 $9 = 0 + b$   
 $9 = b$

10.  $-2 = \frac{1}{4}(-3) + b$   
 $-2 = -\frac{3}{4} + b$   
 $-1\frac{1}{4} = b$

1.  $-3 = -1(4) + b$   
 $-3 = -4 + b$   
 $1 = b$

3.  $2 = 3(-7) + b$   
 $2 = -21 + b$   
 $23 = b$

5.  $-2 = -3(6) + b$   
 $-2 = -18 + b$   
 $16 = b$

7.  $0 = 4(7) + b$   
 $0 = 28 + b$   
 $-28 = b$

9.  $-1 = \frac{1}{5}(5) + b$   
 $-1 = 1 + b$   
 $-2 = b$

Key

EXTRA PRACTICE 29 (continued)  
Slope and Equations of Lines  
Use after Section 7.2

Find an equation of the line that contains the given pair of points

11. (15, 2) and (4, 2)  $y = -1x + 6$   
 $m = \frac{2-2}{1-4} = \frac{0}{-3} = 0$   
 $2 = -1(15) + b$   
 $2 = -15 + b$   
 $17 = b$

12. (-4, 2) and (1, -3)  $y = -1x - 2$   
 $m = \frac{2-(-3)}{-4-1} = \frac{5}{-5} = -1$   
 $2 = -1(-4) + b$   
 $2 = 4 + b$   
 $-2 = b$

13. (-5, -3) and (1, -1)  $y = \frac{1}{3}x - \frac{1}{3}$   
 $m = \frac{-3-(-1)}{-5-1} = \frac{-2}{-6} = \frac{1}{3}$   
 $-3 = \frac{1}{3}(-5) + b$   
 $-3 = -\frac{5}{3} + b$   
 $-\frac{4}{3} = b$

14. (0, 3) and (-2, 6)  $y = -\frac{1}{2}x + 3$   
 $m = \frac{3-6}{0-(-2)} = \frac{-3}{2}$   
 $3 = -\frac{1}{2}(0) + b$   
 $3 = b$

15. (-8, 3) and (-4, 1)  $y = -\frac{1}{2}x - 1$   
 $m = \frac{3-1}{-8-(-4)} = \frac{2}{-4} = -\frac{1}{2}$   
 $3 = -\frac{1}{2}(-8) + b$   
 $3 = 4 + b$   
 $-1 = b$

16. (6, 2) and (-3, 0)  $y = \frac{2}{9}x + \frac{2}{3}$   
 $m = \frac{2-0}{6-(-3)} = \frac{2}{9}$   
 $2 = \frac{2}{9}(6) + b$   
 $2 = \frac{4}{3} + b$   
 $\frac{2}{3} = b$

17. (1, 3) and (4, 6)  $y = 1x + 2$   
 $m = \frac{3-6}{1-4} = \frac{-3}{-3} = 1$   
 $3 = 1(1) + b$   
 $3 = 1 + b$   
 $2 = b$

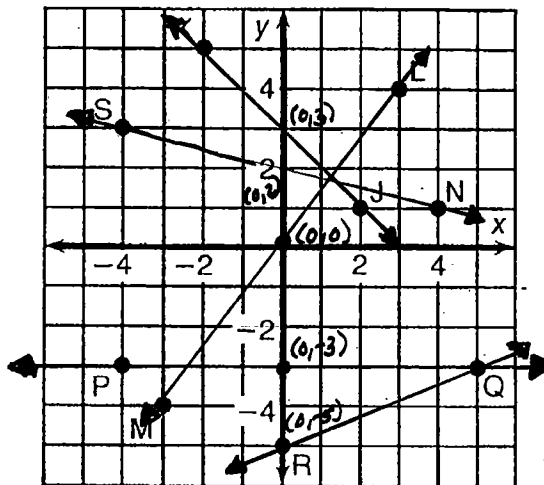
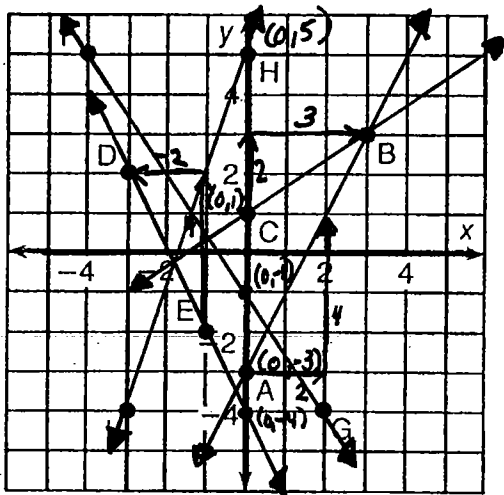
18. (3, -4) and (-3, 4)  $y = -\frac{4}{3}x$   
 $m = \frac{-4-4}{3-(-3)} = \frac{-8}{6} = -\frac{4}{3}$   
 $-4 = -\frac{4}{3}(3) + b$   
 $-4 = -4 + b$   
 $0 = b$

19. (-7, 4) and (-4, 7)  $y = 1x + 11$   
 $m = \frac{4-7}{-7-(-4)} = \frac{-3}{-3} = 1$   
 $4 = 1(-7) + b$   
 $4 = -7 + b$   
 $11 = b$

20. (9, -5) and (7, 7)  $y = -6x + 49$   
 $m = \frac{-5-7}{9-7} = \frac{-12}{2} = -6$   
 $-5 = -6(9) + b$   
 $-5 = -54 + b$   
 $49 = b$

# What Did the Ape Think of the Grape's House?

For each exercise, draw the line indicated and write its equation. Find your answer in the answer section and notice the two letters next to it. Print these letters in the two boxes at the bottom of the page that contain the number of that exercise.



$m = \frac{\text{rise}}{\text{run}}$

- $m = \frac{6}{3}$  ① Equation of  $\overleftrightarrow{AB}$   $y = 2x - 3$
- $m = \frac{2}{3}$  ② Equation of  $\overleftrightarrow{CB}$   $y = \frac{2}{3}x + 1$
- $m = \frac{4}{-2}$  ③ Equation of  $\overleftrightarrow{DE}$   $y = -2x - 4$
- $m = \frac{9}{-6}$  ④ Equation of  $\overleftrightarrow{FG}$   $y = -\frac{3}{2}x - 1$
- $m = \frac{9}{3}$  ⑤ Equation of  $\overleftrightarrow{HI}$   $y = 3x + 5$

- ⑥ Equation of  $\overleftrightarrow{JK}$   $y = -1x + 3$   $m = \frac{4}{-4}$
- ⑦ Equation of  $\overleftrightarrow{LM}$   $y = \frac{4}{3}x + 0$   $m = \frac{8}{6}$
- ⑧ Equation of  $\overleftrightarrow{NS}$   $y = -\frac{1}{4}x + 2$   $m = \frac{2}{-8}$
- ⑨ Equation of  $\overleftrightarrow{PQ}$   $y = -3$   $m = 0$
- ⑩ Equation of  $\overleftrightarrow{RQ}$   $y = \frac{2}{5}x - 5$   $m = \frac{2}{5}$

Answers:

- ~~DE~~  $y = -\frac{1}{4}x + 2$
- ~~TT~~  $y = \frac{2}{5}x$
- ~~EA~~  $y = -2x + 3$
- ~~SA~~  $y = \frac{4}{3}x - 1$
- ~~NE~~  $y = \frac{2}{3}x + 1$
- ~~VI~~  $y = \frac{2}{5}x - 5$
- ~~TH~~  $y = -\frac{3}{2}x + 2$
- ~~OU~~  $y = -x + 3$
- ~~TH~~  $y = -2x - 4$
- ~~AS~~  $y = 2x - 3$
- ~~GH~~  $y = -\frac{3}{2}x - 1$
- ~~TI~~  $y = \frac{4}{3}x$
- ~~HE~~  $y = 3x + 5$
- ~~TW~~  $y = -3$
- ~~SH~~  $y = \frac{2}{3}x + 5$

5	5	3	3	6	6	4	4	7	7	9	9	1	1	8	8	10	10	2	2
H	E	T	H	O	U	G	H	T	I	T	W	A	S	D	E	V	I	N	E