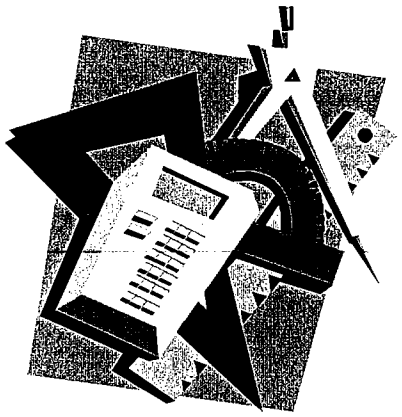
Key

Math 8



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).

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.

---

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Key

Equations

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.	$3x - 2 = 13$ $+2 \quad +2$ $\frac{3x}{3} = \frac{15}{3}$ $x = 5$ ✓ $3 \times 5 - 2$ $15 - 2 = 13$

Solve.

1. $6d - 3 = 32$

$+3 \quad +3$

$\frac{6d}{6} = \frac{35}{6}$

$d = 5\frac{5}{6}$

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

$-2 \quad -2$

$x \div 5 = 4$

$\cdot 5 \quad \cdot 5$

$x = 20$

3. $2y + 7 = 15$

$-7 \quad -7$

$\frac{2y}{2} = \frac{8}{2}$

$y = 4$

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

$+13 \quad +13$

$7 \cdot \frac{b}{7} = 36 \cdot 7$

$b = 252$

5. $-5y + 9 = 24$

$-9 \quad -9$

$\frac{-5y}{-5} = \frac{15}{-5}$

$y = -3$

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

$+3 \quad +3$

$8 \cdot \frac{f}{8} = -24 \cdot 8$

$f = -192$

Key

Equations

Equations with Variables on Both Sides

RULE	EXAMPLE
1. Eliminate the variable from one side of the equation using inverse operations. 2. Undo addition or subtraction. 3. Then, undo multiplication or division. 4. Check your answer by replacing the variable with the solution.	$8x - 3 = 6x + 1$ $-6x \quad -6x$ $2x - 3 = 1$ $+3 \quad +3$ $\frac{2x}{2} = \frac{4}{2}$ $x = 2$ ✓ $8 \times 2 - 3 = 6 \times 2 + 1$ $16 - 3 = 12 + 1$ $13 = 13$

Solve.

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

$-2k \quad -2k$

$1k + 10 = -21$

$-10 \quad -10$

$k = -31$

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

$-6x \quad -6x$

$-5x - 4 = -19$

$+4 \quad +4$

$\frac{-5x}{-5} = \frac{-15}{-5}$

$x = 3$

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

$-6p \quad -6p$

$18 - 2p = 11$

$-18 \quad -18$

$\frac{-2p}{-2} = \frac{-7}{-2}$

$p = 3.5$

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

$-14h \quad -14h$

$-3h - 14 = 7$

$+14 \quad +14$

$\frac{-3h}{-3} = \frac{21}{-3}$

$h = -7$

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

$-2p \quad -2p$

$-5p + 8 = -2$

$-8 \quad -8$

$\frac{-5p}{-5} = \frac{-10}{-5}$

$p = 2$

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

$-t \quad -t$

$-2t + 10 = 4$

$-10 \quad -10$

$\frac{-2t}{-2} = \frac{-6}{-2}$

$t = 3$

FINDING RULES FOR PATTERNS

Consider the following table of values:

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

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

$4x$	0	4	8	12	16	20	24
y	-2	2	6	10	14	18	22

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:

y-intercept

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?

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

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

2. Consider the following table of values:

yintercept

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?

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

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

3. What rule applies to the following data?

yintercept

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

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

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

4. Which rule applies to the following table?

yintercept

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

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

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

Key

THE PYTHAGOREAN THEOREM

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:

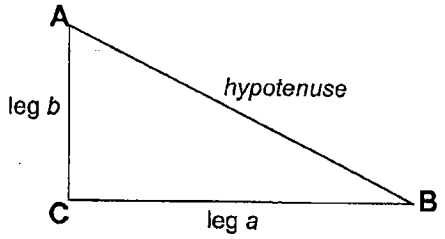
The Pythagorean Theorem

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.

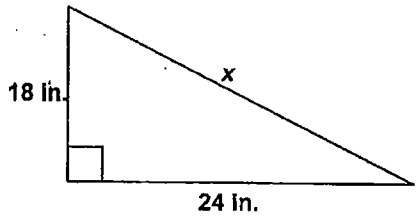
As a formula, the Pythagorean Theorem is:

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

You will often use this formula to solve problems.



1. What is x?



$18^2 + 24^2 = x^2$

$324 + 576 = x^2$

$900 = x^2$

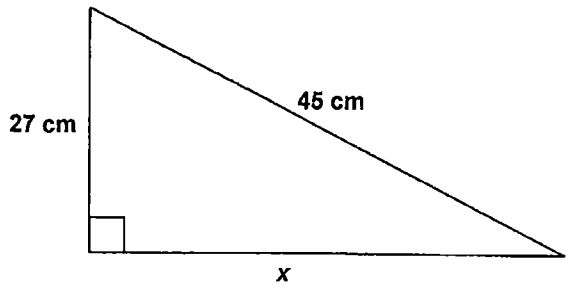
$\sqrt{900} = x$

$30 = x$

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

Key

2. What is x?



a. 20 cm
b. 25 cm
c. 28 cm
(d.) 36 cm

$27^2 + x^2 = 45^2$

$729 + x^2 = 2025$

$-729 \quad -729$

$x^2 = 1296$

$x = \sqrt{1296}$

$x = 36$

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

$12^2 + 5^2 = x^2$

$144 + 25 = x^2$

$169 = x^2$

$\sqrt{169} = x$

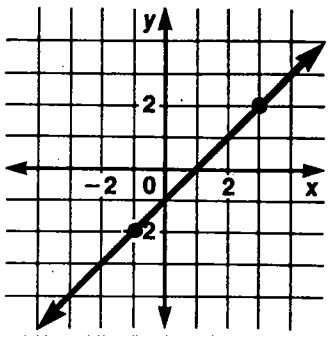
$13\ m = x$

Name Key Date

Reteaching Worksheet 8-6

Graphing Equations

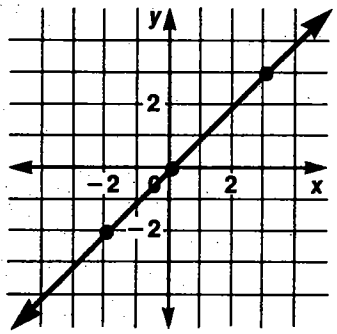
An equation has many ordered pairs of values that are solutions. For example, four ordered pairs for the equation $y = x - 1$ are (3, 2), (0, −1), (2, 1), and (−1, −2). There are too many to name so a picture is drawn of them. This picture is called a graph of the equation. The graph of $y = x - 1$ is the line drawn on the coordinate system at the right.



Find three ordered pairs that satisfy each equation. Graph each ordered pair. Draw a line through the points.

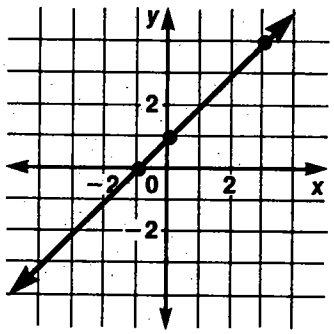
1. $y = x$

x	y
−2	−2
0	**0**
3	**3**



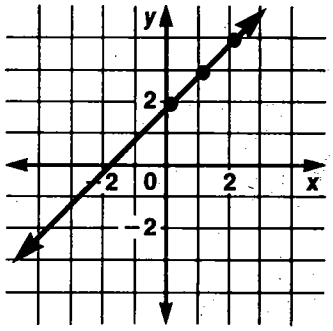
2. $y = x + 1$

x	y
−1	**0**
0	**1**
3	**4**



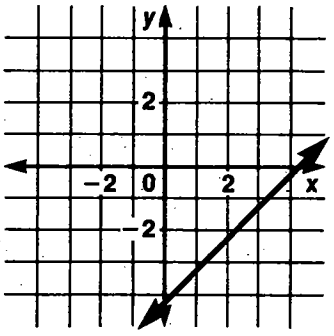
3. $y = x + 2$

x	y
0	**2**
1	**3**
2	**4**

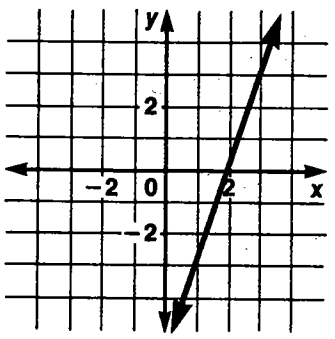


Graph each equation.

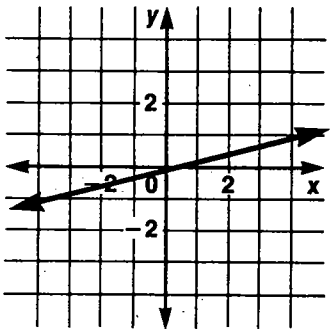
4. $y = x - 4$



5. $y = 3x + (-5)$



6. $y = \frac{1}{4}x$



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 $(0,5)$.

$y = mx + b$ The slope-intercept equation.

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

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

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

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. (1,5) and (4,2) $y = -1x + 6$

$m = \frac{5-2}{1-4} = \frac{3}{-3} = -1$

$5 = -1(1) + b$
$5 = -1 + b$
$6 = b$

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) $y = \frac{1}{3}x - 1\frac{2}{3}$

$m = \frac{-3-(-1)}{-5-1} = \frac{-2}{-6} = \frac{1}{3}$

$-3 = \frac{1}{3}(-5) + b$
$-3 = -\frac{5}{3} + b$
$-1\frac{2}{3} = b$

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

$m = \frac{3-6}{0-(-2)} = \frac{-3}{2}$

$3 = -\frac{3}{2}(0) + b$
$3 = b$

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) $y = -6x + 49$

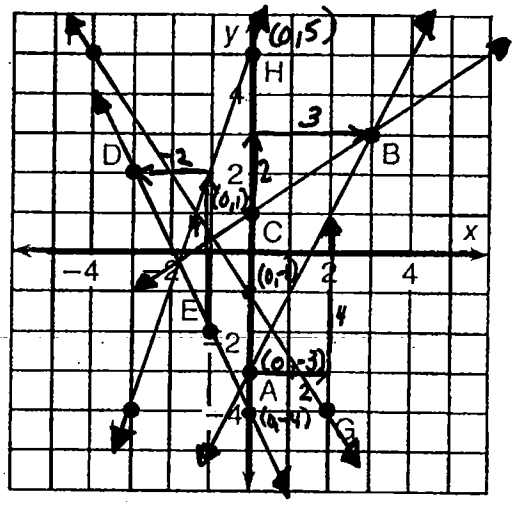
$m = \frac{-5-7}{9-7} = \frac{-12}{2} = -6$

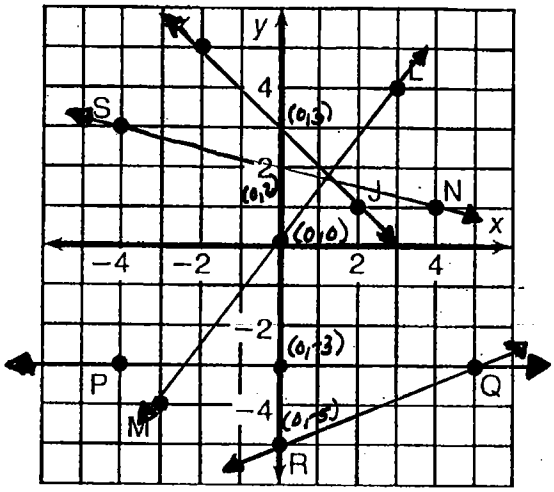
$-5 = -6(9) + b$
$-5 = -54 + b$
$49 = b$

Key

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

OBJECTIVE 5–i: To find an equation of a line given two points on the line (using the graph).