Honors Geometry Summer Assignment
2024-2025 Academic Year

Name:

Assignment Due: Tuesday, August 27, 2024
Assignment Quiz: Friday, August 30, 2024

The beginning of the school year represents an opportunity to build a strong academic foundation. The object of the summer assignment is to help students achieve their maximum potential in the upcoming year. By eliminating the need to review at the beginning of the school year, classes may begin with the prescribed curriculum. Thank you for your cooperation.

The following packet contains topics from previous math courses that you should have mastered. Reviewing these topics over the summer is designed to improve YOUR success next school year. You are advised to know each concept, as new math skills in the coming school year will build on this previous knowledge.

- All problems are expected to be completed without a calculator.
- Show all work. No work will receive no credit. Use additional paper if needed.
- Additional copies may be obtained on the Summer Assignments Link on www.wayne-local.com.
- This packet will be worth 50 points in your first quarter grade.
- Spend a little bit of time each week working on this packet.
- Some websites to visit for help:

www.khanacademy.com
www.purplemath.com
www.aaamath.com
http://mathforum.org/
http://www.math.com/
http://www.sparknotes.com/math/
http://regentsprep.org/
http://teachertube.com/
http://youtube.com/

YOU MUST SHOW YOUR THINKING TO RECEIVE FULL CREDIT! (Show your work!!)

Section I. Linear Equations

Example:
$$4x - 2(1 - x) = -38$$
$$4x - 2 + 2x = -38$$
$$6x - 2 = -38$$
$$6x = -36$$
$$x = -6$$

Solve each equation.

1) $2p + 5 = 13$	2) $12 + 2b = 2 + 5b$	3) $4x + 5 + 5x + 40 = 180$
4) $2 (4x + 4) = x + 1$	5) $2 (x + 5) = 3 (x - 2)$	6) $180 - x = 3 (90 - x)$

7) $3 (180 - y) = 2 (90 - y)$	8) $6x - 3 (6 - 5x) + 3x = 10 - 4 (2 - x)$
9) $\frac{1}{2} (6 + 4x) - \frac{1}{4} (8x - 12) = \frac{1}{2} (2x - 4)$	10) $5x - [7 - (2x - 1)] = 3 (x - 5) + 4 (x + 3)$

Section II. Systems of Equations

Substitution Method

Example: $y = 5 - 2x$

$5x - 6y = 21$

$5x - 6(5 - 2x) = 21$

$5x - 30 + 12x = 21$

$17x - 30 = 21$

$17x = 51$

$x = 3$

Solution: Substitute $5 - 2x$ for y in equation 2.

So $y = 5 - 2x$

$y = 5 - 2(3)$

$y = 5 - 6$

$y = -1$

Solution is (3, -1)

Solve each system of equations by the substitution method.

1) $y = 2x + 5$ $3x - y = 4$	2) $x = 8 + 3y$ $2x - 5y = 8$
3) $3x + 2y = 71$ $y = 4 + 2x$	4) $8x + 3y = 26$ $2x = y - 4$
5) $x - 7y = 13$ $3x - 5y = 23$	6) $3x + y = 19$ $2x - 5y = -10$

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Elimination Method

Example 1: $3x + 4y = -10$ $3x + 4y = -10$

                 $5x - 2y = 18$ $\underline{10x - 4y = 36}$

                                     $13x = 26$

                                          $x = 2$

Now substitute 2 for x and solve for y.

     $3(2) + 4y = -10$

     $4y = -16$

     $y = -4$ *Solution is (2, -4)*

Example 2: $5x - 2y = -19$ $15x - 6y = -57$

                $2x + 3y = 0$ $\underline{4x + 6y = 0}$

                                 $19x = -57$

                                   $x = -3$

Now substitute -3 for x and solve for y.

     $2(-3) + 3y = 0$

     $3y = 6$

     $y = 2$ *Solution is (-3, 2)*

Solve each system of equations by the elimination method. Use the format shown in the examples.

1) $3x + 4y = 9$

    $-3x - 2y = -3$

2) $5x + 3y = 30$

    $3x + 3y = 18$

3) $3x + y = -3$

    $x + 4y = 10$
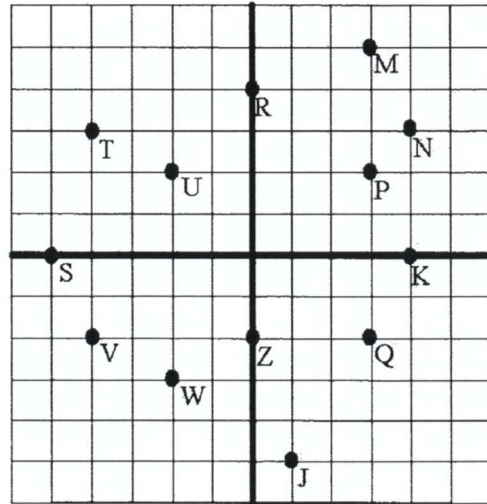
4) $4x - 6y = -26$

    $-2x + 3y = 13$

5) $2x - 8y = 24$

    $3x + 5y = 2$

7) $5x - 9y = 47$

    $6x + 2y = 18$

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Name the coordinates of each point

1) M   6) T

2) N   7) U

3) K   8) V

4) R   9) W

5) S   10) Q

11) Name all of the points show on the y-axis.

12) What is the x-coordinate of every point that lies on a vertical line through P?

13) Which of the following points lie on a horizontal line through W? Circle all that apply.

     (-2, 1)   (2,3)   (1,-3)   (-2,0)   (0,-3)   (2,0)

Name all the points shown that lie in the quadrant indicated. (A point on an axis is not in any quadrant).

   14) Quadrant I   15) Quadrant II

   16) Quadrant III   17) Quadrant IV

   Plot each point on the a coordinate place.

   18) A (2,1)   22) E (-2,-1)

   19) B (5,0)   23) F (1,-2)

   20) C (0,3)   24) G (4,-2)

   21) D (-3.1)   25) H (-4,-3)
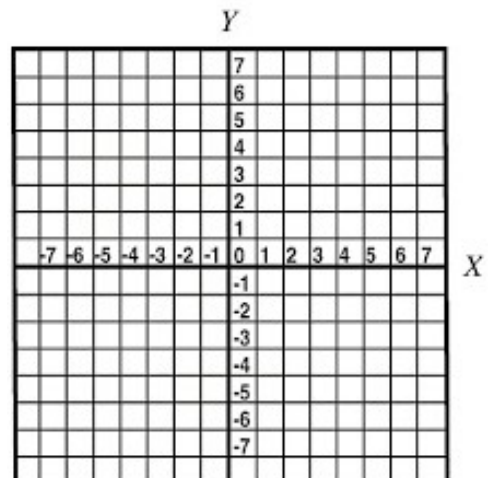
Slope Intercept Form

An equation is in **slope-intercept form** if it is written as:

$$y = mx + b.$$

m is the slope.
b is the y-intercept.

A line has a slope of –4 and a y-intercept of 3. Write the equation in slope-intercept form.

$y = mx + b$ *Substitute the given values for m and b.*

$y = -4x + 3$

A line has a slope of 2. The ordered pair (3, 1) is on the line. Write the equation in slope-intercept form.

Step 1: Find the y-intercept.

$y = mx + b$

$y = 2x + b$ *Substitute the given value for m.*

$1 = 2(3) + b$ *Substitute the given values for x and y.*

$1 = 6 + b$ *Solve for b.*

$\underline{-6 \quad -6}$

$-5 = b$

Step 2: Write the equation.

$y = mx + b$

$y = 2x - 5$ *Substitute the given value for m and the value you found for b.*

Write the equation that describes each line in slope-intercept form.

1. slope $= \dfrac{1}{4}$, y-intercept $= 3$ _____

2. slope $= -5$, y-intercept $= 0$ _____

3. slope $= 7$, y-intercept $= -2$ _____

4. slope is 3, (4, 6) is on the line.   _____

5. slope is $\dfrac{1}{2}$, (–2, 8) is on the line.   _____

6. slope is –1, (5, –2) is on the line.   _____

Slope Intercept Form (Continue)

You can use the slope and y-intercept to graph a line.

Write $2x + 6y = 12$ in slope-intercept form. Then graph the line.

Step 1: Solve for y.

$2x + 6y = 12$ *Subtract 2x from both sides.*

$$\frac{-2x \qquad\qquad -2x}{6y = -2x + 12}$$

$$\frac{6y}{6} = \frac{-2x + 12}{6}$$ *Divide both sides by 6.*

$$y = -\frac{1}{3}x + 2$$ *Simplify.*

Step 2: Find the slope and y-intercept.

slope: $m = -\frac{1}{3} = \frac{-1}{3}$

y-intercept: $b = 2$

Step 3: Graph the line.

- Plot (0, 2).
- Then count 1 **down** (because the rise is **negative**) and 3 **right** (because the run is **positive**) and plot another point.
- Draw a line connecting the points.

Plot (0, 2).

Count 1 down.

Count 3 right.
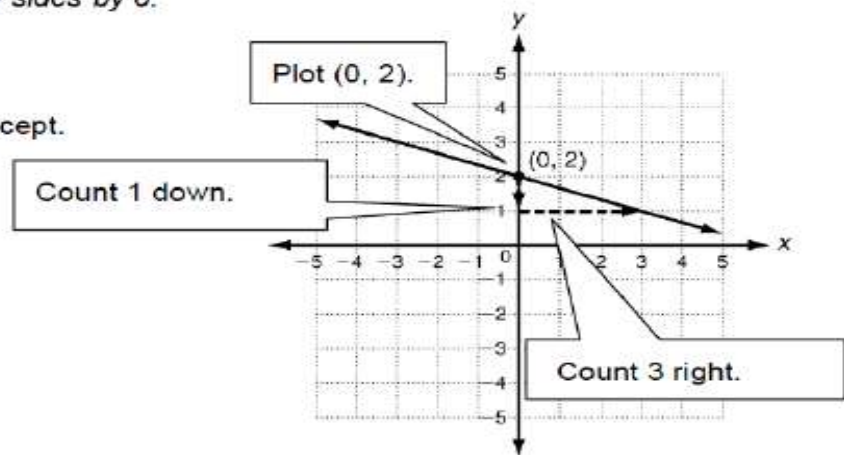
Write the following equations in slope-intercept form.

7) $5x + y = 30$	8) $x - y = 7$	9) $-4x + 3y = 12$

10) Write $2x - y = 3$ in slope-intercept form. Then graph the line.
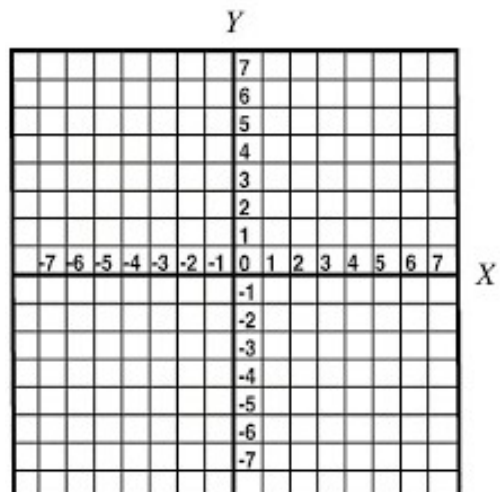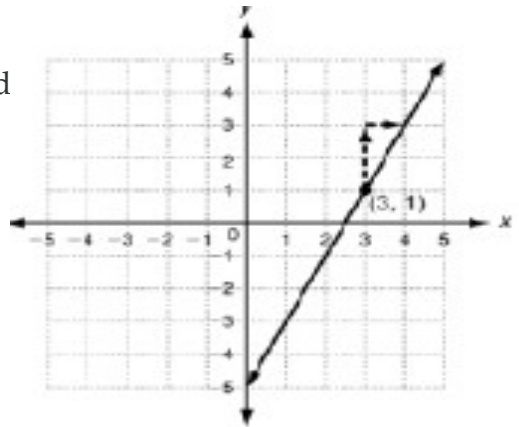
Point-Slope Form

You can graph a line if you know the slope and any point on the line.

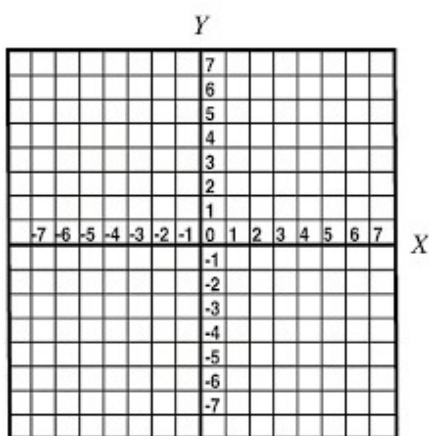**Graph the line with slope 2 that contains the point (3, 1)**

Step 1: Plot (3,1)

Step 2: The slope is 2 or $\frac{2}{1}$. Count **2 up** and **1 right** and plot another point.
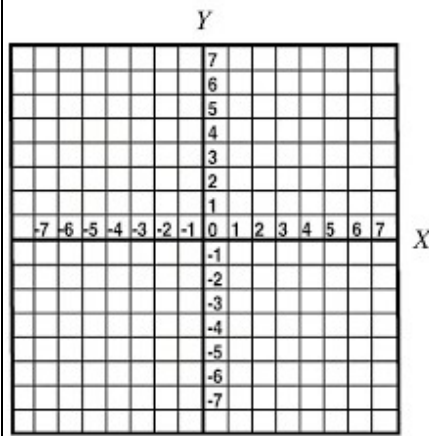
Step 3: Draw a line connecting the points.

Graph the line with the given slope that contains the given point. Then write the equation of the line in slope intercept form.
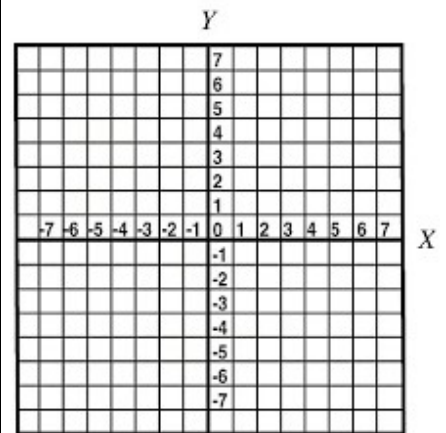
1) slope = $\frac{2}{3}$; (-3, -3)

Equation: _____

2) slope = $\frac{-1}{2}$; (-2, 4)

Equation: _____

3) slope = 3; (-2, -2)

Equation: _____

Slopes of Parallel and Perpendicular Lines

Parallel Lines

Two lines are **parallel** if they lie in the same plane and have no points in common. The lines will never intersect.

Identify which lines are parallel.
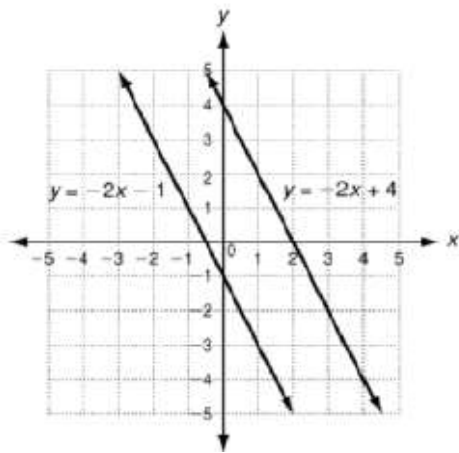
$y = -2x + 4;$ $y = 3x + 4;$ $y = -2x - 1$

If lines have the same slope, but different y-intercepts, they are parallel lines.

$y = -2x + 4;$ $y = 3x + 4;$ $y = -2x - 1$

$m = -2,$ $m = 3$ $m = -2$

$b = 4$ $b = 4$ $b = -1$

$y = -2x + 4$ and $y = -2x - 1$ are parallel.

Perpendicular Lines

Two lines are **perpendicular** if they intersect to form right angles.

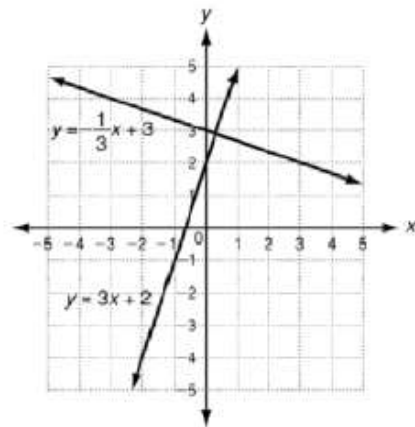**Identify which lines are perpendicular.**

If the product of the slopes of two lines is -1, the two lines are perpendicular.

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

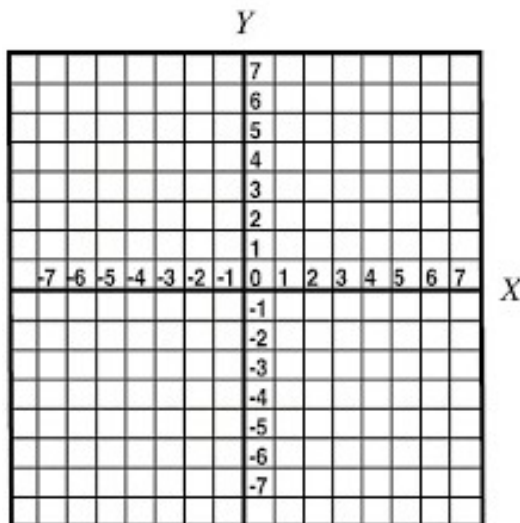$m = -3$ $m = 3$ $m = -\frac{1}{3}$

Because $3\left(-\frac{1}{3}\right) = -1$, $y = 3x + 2$ and
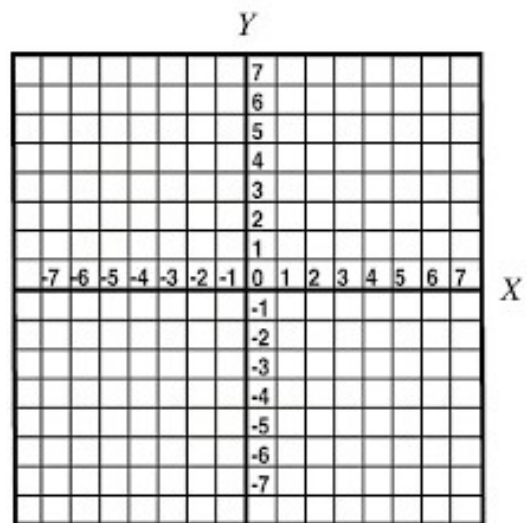
$y = -\frac{1}{3}x + 3$ are perpendicular.

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1) Identify which two lines are parallel. Then graph the parallel lines.

   $y = 4x + 2;$ $y = 2x + 1;$ $y = 2x - 3$

2) Identify which two lines are perpendicular. Then graph the parallel lines.

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

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Section IV. Fractions

Examples: a) $\dfrac{8w}{2} = 4w$

b) $\dfrac{5x-10}{15} = \dfrac{5(x-2)}{15} = \dfrac{x-2}{3}$

c) $\dfrac{x+6}{36-x^2} = \dfrac{x+6}{(x-6)(x+6)} = \dfrac{1}{6-x}$

Simplify the following fractions

1) $\dfrac{14}{70}$	2) $\dfrac{75}{15}$	3) $\dfrac{18a}{36}$	4) $\dfrac{3x}{x}$
5) $\dfrac{x}{3x}$	6) $\dfrac{5bc}{10b^2}$	7) $\dfrac{-8y^3}{2y}$	8) $\dfrac{-18r^3t}{12rt}$
9) $\dfrac{3ab^2}{6bc}$	10) $\dfrac{6a+12}{6}$	11) $\dfrac{9x-6y}{3}$	12) $\dfrac{33ab-22b}{11b}$
13) $\dfrac{x+2}{3x+6}$	14) $\dfrac{2c-2d}{2c+2d}$	15) $\dfrac{t^2-1}{t-1}$	16) $\dfrac{5a+5b}{a^2-b^2}$
17) $\dfrac{b^2-25}{b^2-12b+35}$	18) $\dfrac{a^2+8a+16}{a^2-16}$	19) $\dfrac{3x^2-6x-24}{3x^2+2x-8}$	

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Section V. Quadratic Equations

Example: $3x^2 + 14x + 8 = 0$

$(3x + 2)(x + 4) = 0$

$3x + 2 = 0$ or $x + 4 = 0$

$x = -\dfrac{2}{3}$; $x = -4$

Solve each equation by factoring.

1) $x^2 + 5x - 6 = 0$	2) $x^2 - 7x - 18 = 0$	3) $x^2 = 20x - 36$
4) $x^2 + 8x = 20$	5) $4x^2 + 15 = 17x$	6) $3x^2 - 13x - 10 = 0$
7) $6x^2 + 11x - 10 = 0$	8) $8x^2 + 10x - 25 = 0$	

Section VI. Radical Expressions

Examples: a) $\sqrt{56} = \sqrt{4 \cdot 14} = 2\sqrt{14}$

b) $\sqrt{\dfrac{7}{3}} = \dfrac{\sqrt{7}}{\sqrt{3}} \cdot \dfrac{\sqrt{3}}{\sqrt{3}} = \dfrac{\sqrt{21}}{\sqrt{9}} = \dfrac{\sqrt{21}}{3}$

c) $\left(3\sqrt{7}\right)^2 = (3\sqrt{7})(3\sqrt{7}) = 3 \cdot 3 \cdot \sqrt{7} \cdot \sqrt{7} = 9 \cdot \sqrt{49} = 9 \cdot 7 = 63$

Simplify the following.

1) $\sqrt{36}$	*2)* $\sqrt{81}$	*3)* $\sqrt{24}$	*4)* $\sqrt{98}$	*5)* $\sqrt{300}$
6) $\sqrt{\dfrac{1}{4}}$	*7)* $\dfrac{\sqrt{5}}{\sqrt{3}}$	*8)* $\sqrt{\dfrac{80}{25}}$	*9)* $\dfrac{2\sqrt{3}}{\sqrt{12}}$	*10)* $\sqrt{\dfrac{250}{48}}$
11) $\sqrt{13^2}$	*12)* $\left(\sqrt{13^2}\right)^2$	*13)* $\left(2\sqrt{3}\right)^2$	*14)* $\left(3\sqrt{8}\right)^2$	*15)* $\left(9\sqrt{2}\right)^2$
16) $5\sqrt{18}$	*17)* $4\sqrt{27}$	*18)* $6\sqrt{24}$	*19)* $5\sqrt{8}$	*20)* $9\sqrt{40}$

Examples: a) $2^2 + x^2 = 4^2$

$$4 + x^2 = 16$$

$$x^2 = 12$$

$$x = \sqrt{12}$$

$$x = 2\sqrt{3}$$

b) $x^2 + \left(3\sqrt{2}\right)^2 = 9^2$

$$x^2 + 18 = 81$$

$$x^2 = 63$$

$$x = \sqrt{63}$$

$$x = 3\sqrt{7}$$

Solve for x. Assume x represents a positive number.

21) $3^2 + 4^2 = x^2$	22) $x^2 + 4^2 = 5^2$	23) $5^2 + x^2 = 13^2$
24) $x^2 + 3^2 = 4^2$	25) $4^2 + 7^2 = x^2$	26) $x^2 + 5^2 = 10^2$
27) $1^2 + x^2 = 3^2$	28) $x^2 + 5^2 = (5\sqrt{2})^2$	29) $x^2 + (5\sqrt{2})^2 = (2x)^2$

Section VII. Proportions

Definition: $\frac{a}{b} = \frac{c}{d}$ *if and only if* $ad = bc$

Examples: a) $\dfrac{3}{2} = \dfrac{y}{22}$

$3(22) = 2y$

$66 = 2y$

$33 = y$

b) $\dfrac{x + 4}{5} = \dfrac{x - 2}{3}$

$3(x + 4) = 5(x - 2)$

$3x + 12 = 5x - 10$

$22 = 2x$

$11 = x$

Solve the following proportions using the format used in the examples.

1) $\dfrac{7}{2} = \dfrac{y}{3}$	2) $\dfrac{7}{2} = \dfrac{21}{x}$	3) $\dfrac{25}{15} = \dfrac{10}{x}$
4) $\dfrac{10}{6x+7} = \dfrac{6}{2x+9}$	5) $\dfrac{4}{x-3} = \dfrac{6}{x+3}$	6) $\dfrac{3x-5}{2} = \dfrac{x-15}{4}$
7) $\dfrac{2-4x}{-6} = \dfrac{6x-8}{10}$	8) $\dfrac{x+2}{5} = \dfrac{4}{x+1}$	9) $\dfrac{2}{x-3} = \dfrac{x-2}{6}$

Answers

Section I: Linear Equations

1) 4   2) $\frac{10}{3}$ or $3\frac{1}{3}$ 3) 15   4) -1   5) 16   6) 45   7) 360   8) 1   9) 8   10) No Solution

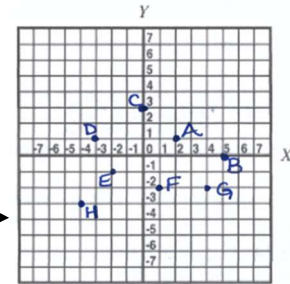## Section II: Systems of Equations

1) (9, 23)   2) (-16, -8)   3) (9, 22)   4) (1, 6)   5) (6, -1)   6) (5, 4)

Elimination Method

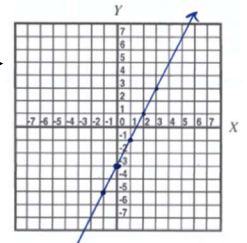1) (-1, 3)   2) (6, 0)   3) (-2, 3)   4) All real numbers   5) (4, -2)   6) (4, -3)

Section III: Coordinate Plane

1) (3, 5)   2) (4, 3)   3) (4, 0)   4) (0, 4)
5) (-5, 0)   6) (-4, 3)   7) (-2, 2)   8) (-4, -2)
9) (-2, -3)   10) (3, -2)   11) R(0, 4); Z(0, -2)   12) x = 3
13) (1, 3); (0, -3)   14) M, N, P   15) T, U   16) V, W
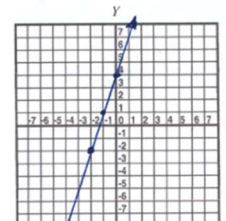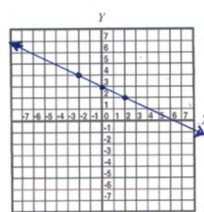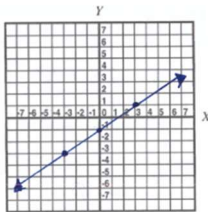17) J, Q   18-25) See Graph to the right.

Slope Intercept Form

1) $y = \frac{1}{4}x + 3$ 2) $y = -5x$ 3) $y = 7x - 2$

4) $y = 3x - 6$ 5) $y = \frac{1}{2}x + 9$ 6) $y = -x + 3$

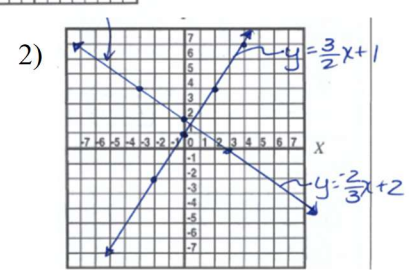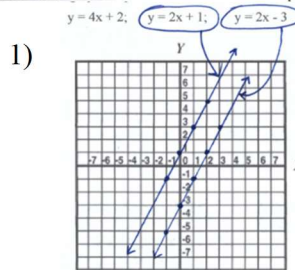7) $y = -5x + 30$ 8) $y = x - 7$ 9) $y = \frac{4}{3}x + 4$ 10) $y = 2x - 3$

Point-Slope Form

1) $y = \frac{2}{3}x - 1$ 2) $y = -\frac{1}{2}x + 3$ 3) $y = 3x + 4$

Slopes of Parallel and Perpendicular Lines

1)

2)

Section IV: Fractions

1) $\frac{1}{5}$ 2) 5   3) $\frac{a}{2}$ 4) 3   5) $\frac{1}{3}$ 6) $\frac{c}{2b}$ 7) $-4y^2$

8) $-\frac{3r^2}{2}$ 9) $\frac{ab}{2c}$ 10) $a + 2$ 11) $3x - 2y$ 12) $3a - 2$ 13) $\frac{1}{3}$ 14) $\frac{c-d}{c+d}$

15) $t + 1$ 16) $\frac{5}{a-b}$ 17) $\frac{b+5}{b-7}$ 18) $\frac{x+4}{x-4}$ 19) $\frac{3(x-4)}{3x-4}$ or $\frac{3x-12}{3x-4}$

Section V: Quadratic Equations

1) -6, 1   2) 9, -2   3) 18, 2   4) -10, 2   5) $\frac{5}{4}$, 3   6) $-\frac{2}{3}$, 5   7) $\frac{2}{3}$, $-\frac{5}{2}$ 8) $\frac{5}{4}$, $-\frac{5}{2}$

Section VI: Radical Expressions

1) 6   2) 9   3) $2\sqrt{6}$ 4) $7\sqrt{2}$ 5) $10\sqrt{3}$ 6) $\frac{1}{2}$ 7) $\frac{\sqrt{15}}{3}$ 8) $\frac{4\sqrt{5}}{5}$ 9) 1

10) $\frac{5\sqrt{30}}{12}$ 11) 13   12) 169   13) 12   14) 72   15) 162   16) $15\sqrt{2}$ 17) $12\sqrt{3}$ 18) $12\sqrt{6}$

19) $10\sqrt{2}$ 20) $18\sqrt{10}$ 21) ± 5 22) ± 3 23) ± 12 24) $\pm \sqrt{7}$ 25) $\pm \sqrt{65}$ 26) $\pm 5\sqrt{3}$

27) $\pm 2\sqrt{2}$ 28) ± 5 29) $\pm \frac{5\sqrt{6}}{3}$

Section VII: Proportions

1) $\frac{21}{2}$ 2) 6   3) 6   4) 3   5) 15   6) -1   7) -7   8) -6, 3   9) 6, -1