

All of these skills are **essential** to be successful in Honors Geometry and Algebra 2. You must be able to show mastery of all of these concepts before enrolling in any Honors course or into Algebra 2.

- Each section corresponds to a problem from the Placement Test.
- The first 5 pages are a quick look at the skills and include video tutorials links. Watch the videos as necessary to understand each type of problem. Answers are included on p.4-5
- The last 16 pages provide more focused practice on each skill. Answers are included with each section. Once you've identified with sections are the hardest for you, spend the most time fine-tuning those skills.

### Section 1: Solving Multi-Step Linear Equations

1.  $-4x + 2(5x - 6) = -3x - 39$

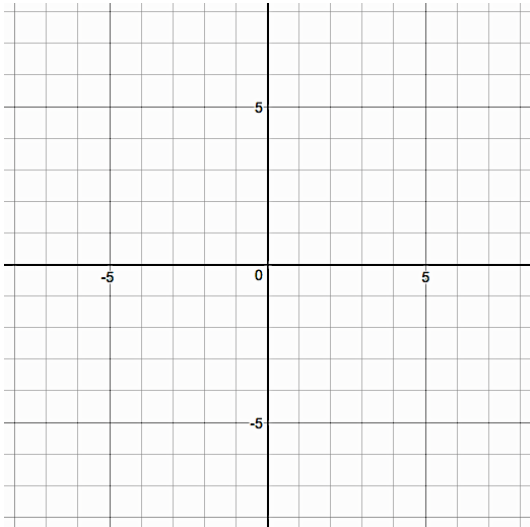
2.  $6(6x + 6) - 5 = 1 + 6x$

3.  $-16 + 5x = -7(-6 + 8x) + 3$

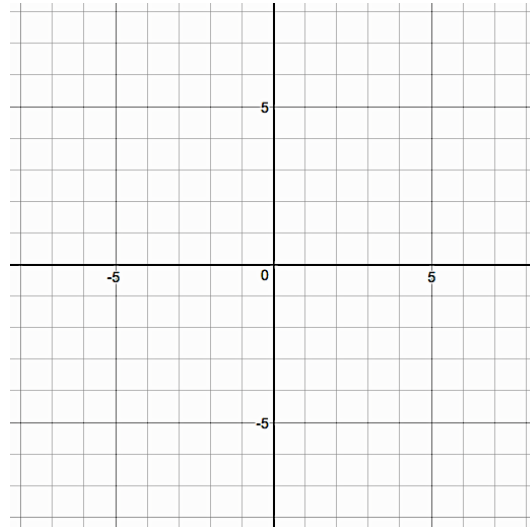
### Section 2: Graphing Linear Equations

Video Help: <https://www.youtube.com/watch?v=xyVJZKu7Euw>

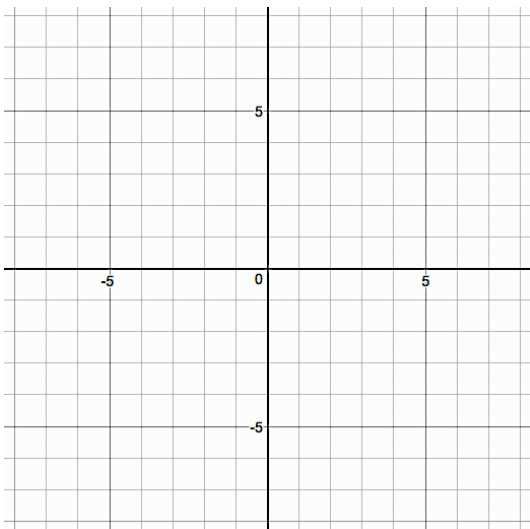
1.  $4x + y = 3$



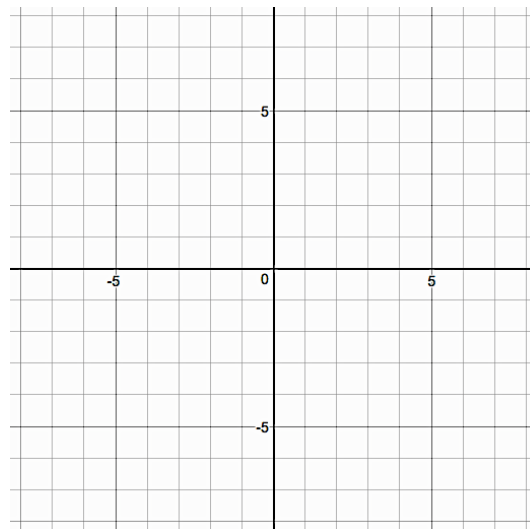
2.  $2y = -x + 6$



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



4.  $x = y + 4$



### Section 3: Writing the Equation of a Line Given 2 Points

Video Help:

<https://www.youtube.com/watch?v=LxtRnXIWzE>

<https://www.youtube.com/watch?v=4il4haYASys>

<https://www.youtube.com/watch?v=YJy2m30LqiY>

#1 – 4: Write the equation of the line that passes through the following points. Write your answer in slope-intercept form.

1.  $(-4, -2)$  and  $(-3, 5)$

2.  $(5, 3)$  and  $(4, 5)$

3.  $(-2, 2)$  and  $(-5, -4)$

4.  $(12, 5)$  and  $(-4, -7)$

### Section 4: Squaring a Binomial

Video Help:

<https://www.youtube.com/watch?v=02gIEfrnmK8>

1.  $(2x - 7)^2$

2.  $(5x + 3)^2$

3.  $(x - 8)^2$

4.  $(4x + 5)^2$

### Section 5: Systems of Linear Equations

Video Help:

<https://www.youtube.com/watch?v=K9IG-aCHCSE>

[https://www.youtube.com/watch?v=kf-o\\_CcTKH8](https://www.youtube.com/watch?v=kf-o_CcTKH8)

#1 – 4: Solve the system of equations (don't forget you need an answer for both x and y!)

1.  $6x - 12y = 24$   
 $-x - 6y = 4$

2.  $-8x - 10y = 24$   
 $6x + 5y = 2$

3.  $-7x + 2y = 18$   
 $6x + 6y = 0$

4.  $4x + 2y = 10$   
 $y = x - 13$

### Section 6: Exponent Rules

Video Help:

[https://www.youtube.com/watch?v=K\\_qNORcMIQY](https://www.youtube.com/watch?v=K_qNORcMIQY)

<https://www.youtube.com/watch?v=c4aiYf3fzVQ>

1.  $\frac{4m^4n^3p^3}{3m^2n^2p^4}$

2.  $\frac{2x^4y^3}{3x^2y^4z^4z^3}$

3.  $\frac{3x^4y^3}{15x^{-2}y^{11}}$

4.  $(3x^5)^2 \times 5x^7$

## Section 7: Solving Equations with Rational Coefficients

Video Help:

<https://www.youtube.com/watch?v=lfSBygktiQU>

1.  $\frac{2}{15}(5m + 35) - \frac{8}{3} = 4$

2.  $-\frac{1}{8}(5x - 8) - \frac{1}{4} = \frac{3}{2}$

3.  $3 = \frac{13}{2}x - \frac{5}{2}(x + 2)$

4.  $\frac{19}{20} = x - \frac{5}{4}$

## Section 8: Expressing Information in Function Notation

Video Help:

<https://www.youtube.com/watch?v=HERb3x0aw6c>

#1 – 4: Write a function to model each situation.

1. You have \$45 in your account and you plan to save an additional \$10 each month. What is your account balance after  $t$  months?
2. You have 100 homework problems to do. You time yourself & realize you can do 3 problems per minute. How many problems are left after  $m$  minutes?
3. There is a room full of cats coming in and going out at a pet shelter. Each cat has 4 legs. What is the number of legs in the room with  $x$  cats?
4. You're the CEO of a company and want to model your business's monthly expenses. You know you spend \$6500 each month for regular bills and an additional \$3500 each month for every employee you hire. What is your total monthly expense for  $h$  employees?

## Section 9: Factoring Quadratic Trinomials

Video Help:

<https://www.youtube.com/watch?v=z57PKs3Bm4U>

<https://www.youtube.com/watch?v=Tt-3Vdc-PM>

1.  $3x^2 - 2x - 5$

2.  $5x^2 + 19x + 12$

3.  $5x^2 - 18x + 9$

4.  $6x^2 + 5x - 6$

## Section 10: Solving a Quadratic Equation (that may or may not factor)

Video Help:

<https://www.youtube.com/watch?v=H5AM1bzqCQw>

1.  $3x^2 - x - 5 = 0$

2.  $5x^2 + 9x + 1 = 0$

3.  $2x^2 - 7x + 9 = 7$

4.  $2x^2 - x - 15 = 0$

**Answers:**

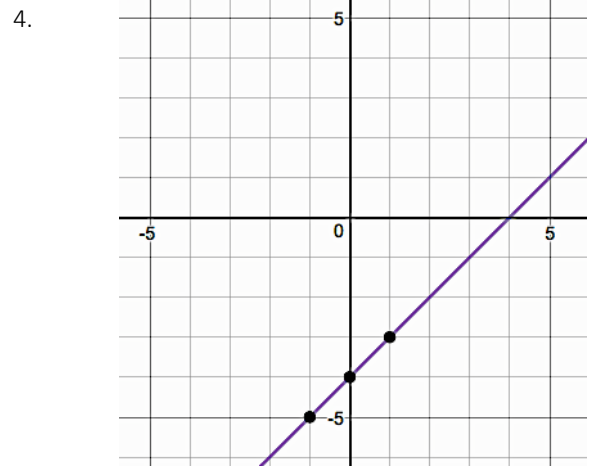
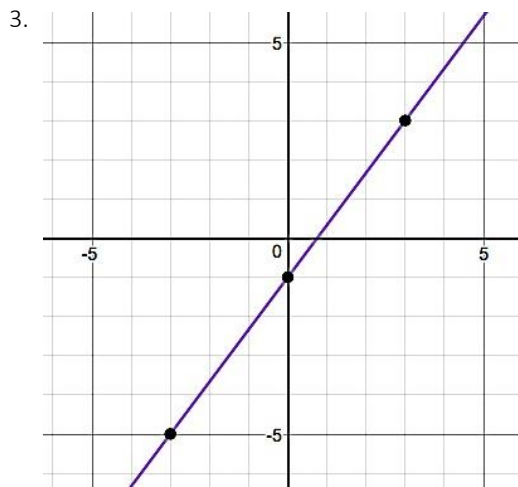
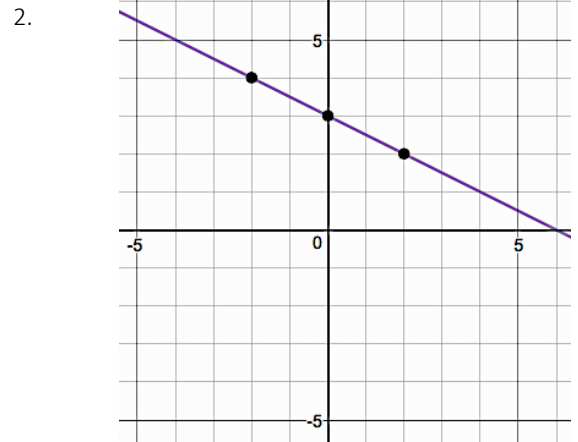
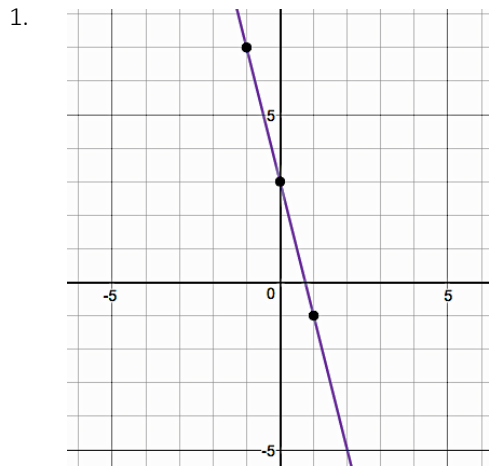
**Section 1:**

1.  $x = -3$

2.  $x = -1$

3.  $x = 1$

**Section 2:**



**Section 3:**

1.  $y = 7x + 26$

2.  $y = -2x + 13$

3.  $y = 2x + 6$

4.  $y = \frac{3}{4}x - 4$

**Section 4:**

1.  $4x^2 - 28x + 49$

2.  $25x^2 + 30x + 9$

3.  $x^2 - 16x + 64$

4.  $16x^2 + 40x + 25$

**Section 5:**

1.  $(2, -1)$

2.  $(7, -8)$

3.  $(-2, 2)$

4.  $(6, -7)$

**Section 6:**

1.  $\frac{4m^2n}{3p}$

2.  $\frac{2x^2}{3yz^7}$

3.  $\frac{x^6}{5y^8}$

4.  $45x^{17}$

**Section 7:**

1.  $m = 3$

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

3.  $x = 2$

4.  $x = \frac{11}{5}$

**Section 8:**

1.  $f(t) = 45 + 10t$

2.  $f(m) = 100 - 3m$

3.  $f(x) = 4x$

4.  $f(h) = 6500 + 3500h$

**Section 9:**

1.  $(3x - 5)(x + 1)$

2.  $(5x + 4)(x + 3)$

3.  $(5x - 3)(x - 3)$

4.  $(2x + 3)(3x - 2)$

**Section 10:**

1.  $x = \frac{1 \pm \sqrt{61}}{6}$

2.  $x = \frac{-9 \pm \sqrt{61}}{10}$

3.  $x = \frac{7 \pm \sqrt{33}}{4}$

4.  $x = 3, x = -\frac{5}{2}$

Name: \_\_\_\_\_

**Section 1 Practice: Solve the equations.**

1. $-4x + 3(2x - 5) = 31$	2. $8 - 3(x + 4) = 6 - (2x + 9)$
3. $-20 = -5x + 10x + 15$	4. $2(4x - 3) - 8 = 4 + 2x$
5. $-4x - 5(-x + 4) = -15$	6. $-x - 8 + 6x = -8 + 5x$
7. $12(x - 1) = 6x + 4 + 2x$	8. $5(x - 9) = 10(x - 5)$
9. $x = 3x - 4 + 5x + 4$	10. $-5(1 - 5x) + 5(-8x - 2) = -4x - 8x$

Answers:

1.  $x = 23$

2.  $x = -1$

3.  $x = -7$

4.  $x = 3$

5.  $x = 5$

6. Infinitely Many Solutions

7.  $x = 4$

8.  $x = 1$

9.  $x = 0$

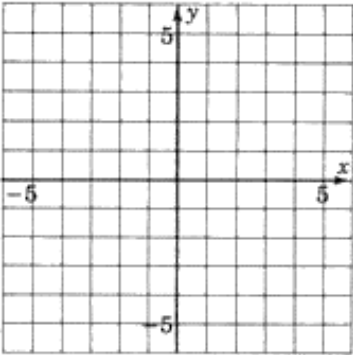
10.  $x = -5$

Name: \_\_\_\_\_

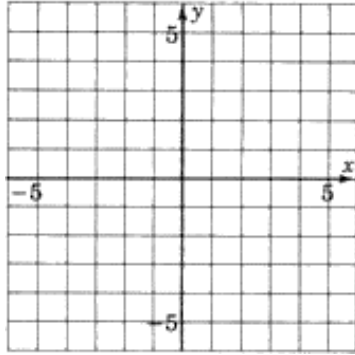
### Section 2 Practice

#1 - 9: Graph the following.

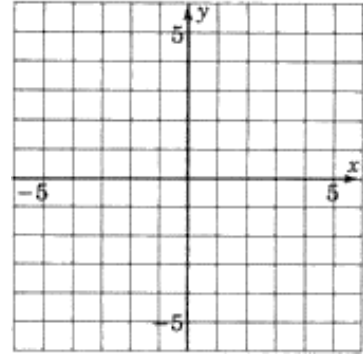
1.  $y = -\frac{1}{4}x + 1$



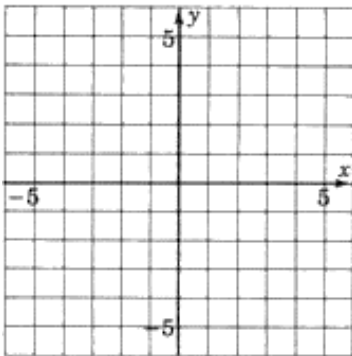
2.  $4x + y = 3$



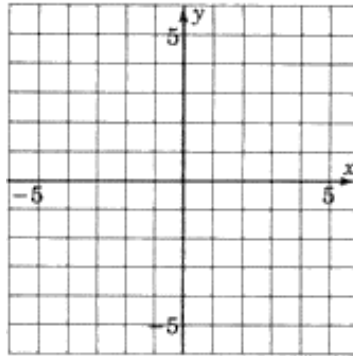
3.  $-2y = -3x + 8$



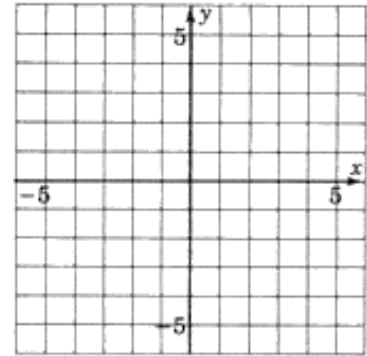
4.  $-\frac{1}{3}x = y$



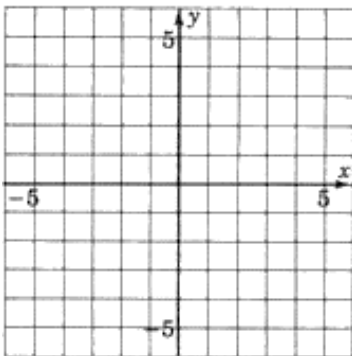
5.  $\frac{y}{4} = -x + 1$



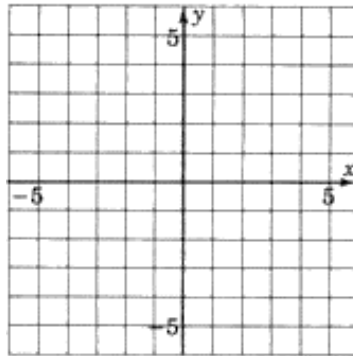
6.  $y = x$



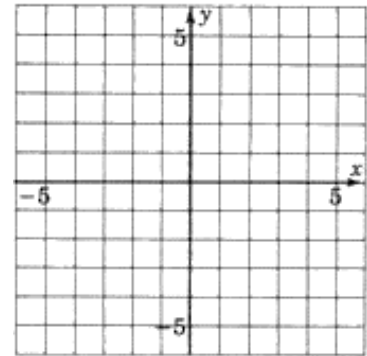
7.  $\frac{3}{4}x + y = -5$



\*8.  $y = 3$



\*9.  $x = -4$



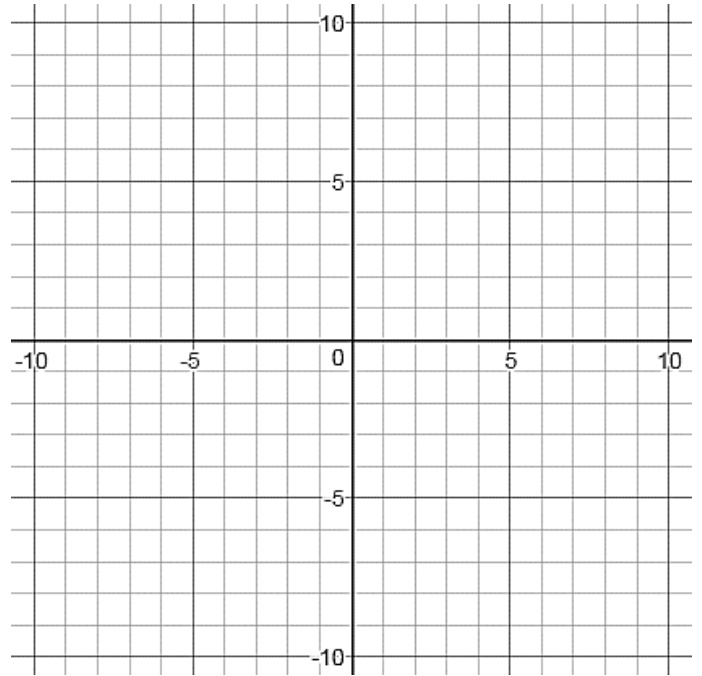
10. a) Find the x- and y-intercepts of the graph of the following :

$$\frac{4}{3}x - y = -8$$

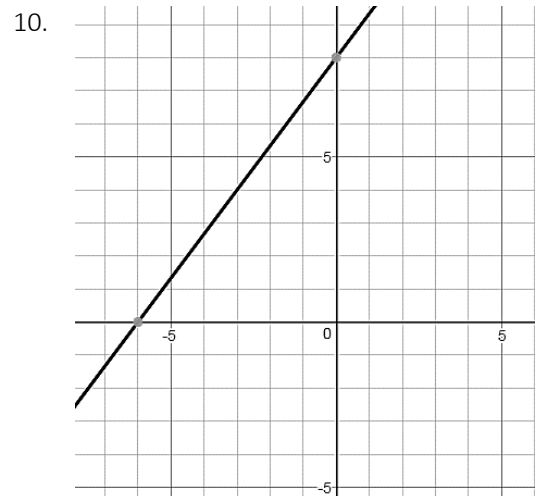
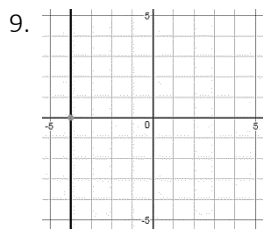
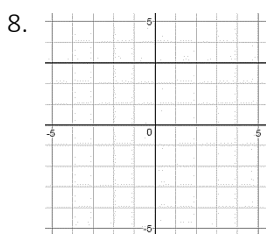
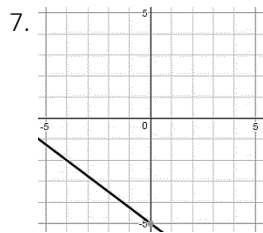
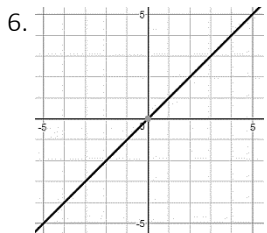
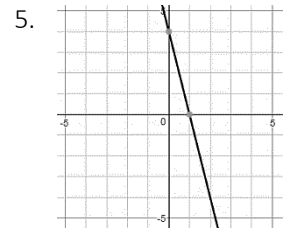
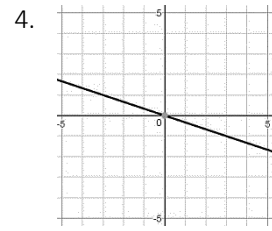
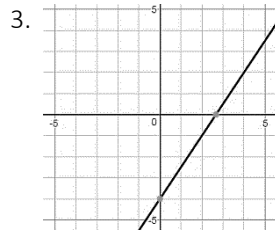
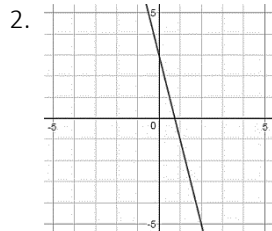
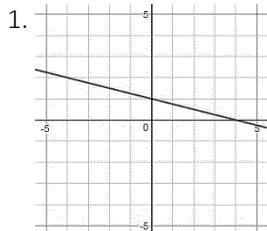
x-intercept: \_\_\_\_\_

y-intercept: \_\_\_\_\_

b) Now graph this line **using those intercepts**.



Answers:





Name: \_\_\_\_\_

### Section 3 Practice

Point-Slope Form: \_\_\_\_\_ Slope-Intercept Form: \_\_\_\_\_

Write the equation of the line passing through the following points. Your final answer should be in slope-intercept form.

1. Passes through the point  $(-1, 7)$  and  $m = -3$ .

2. Passes through the point  $(12, -1)$  and  $m = \frac{1}{4}$ .

Equation: \_\_\_\_\_

Equation: \_\_\_\_\_

3. Passes through the points  $(6, -4)$  and  $(-3, 5)$ .

4. Passes through the points  $(-2, 1)$  and  $(-10, 17)$ .

Equation: \_\_\_\_\_

Equation: \_\_\_\_\_

5. Passes through the points  $(8, 5)$  and  $(8, -2)$ .

6. Passes through the points  $(5, -1)$  and  $(3, 7)$ .

Equation: \_\_\_\_\_

Equation: \_\_\_\_\_

7. Passes through the points  $(-2, 2)$  and  $(-5, -4)$

8. Passes through the points  $(12, 5)$  and  $(-4, -7)$

Equation: \_\_\_\_\_

Equation: \_\_\_\_\_

Write the equation of the line given the following mixed-up ingredients. Your final answer should be in slope-intercept form.

9. Passes through the point  $(0, -3)$  and  $m = -\frac{3}{4}$ .

10. Passes through the point  $(5, 9)$  and is parallel to  $y = 3x - 2$ .

Equation: \_\_\_\_\_

Equation: \_\_\_\_\_

11. Write the equation of the line that has an x-intercept of 5 and a y-intercept of 7.

12. Passes through the point  $(6, 5)$  and is perpendicular to  $y = -2x - 18$ .

Equation: \_\_\_\_\_

Equation: \_\_\_\_\_

**Answers:**

1.  $y = -3x + 4$

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

3.  $y = -x + 2$

4.  $y = -2x - 3$

5.  $x = 8$

6.  $y = -4x + 19$

7.  $y = 2x + 6$

8.  $y = \frac{3}{4}x - 4$

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

10.  $y = 3x - 6$

11.  $y = -\frac{7}{5}x + 7$

12.  $y = \frac{1}{2}x + 2$

Name: \_\_\_\_\_

Section 4 Practice

Section 4: Squaring a Binomial

Squaring something means multiplying that thing by itself twice. You have to obey the rules of algebra.



$$(a + b)^2 \\ \neq \\ a^2 + b^2$$



$$(a + b)^2 =$$

Try these:

1.  $(2x - 7)^2$

2.  $(5x + 3)^2$

3.  $(x - 8)^2$

4.  $(4x + 5)^2$

4.  $16x^2 + 40x + 25$

3.  $x^2 - 16x + 64$

2.  $25x^2 + 30x + 9$

1.  $4x^2 - 28x + 49$

Section 4 Answers:

Name: \_\_\_\_\_

## Section 5 Practice

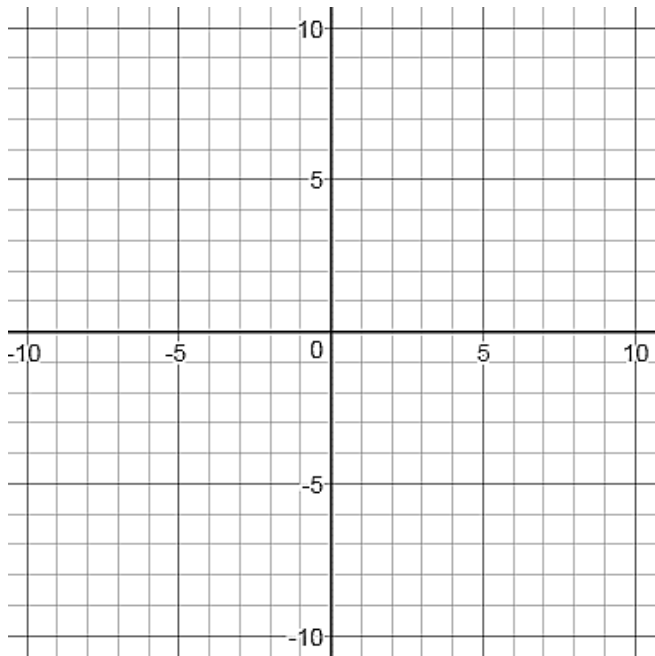
1. *Solve this same system of equations using 3 different methods:*

Solve by graphing:

$$y = 2x - 3$$

$$y = x - 1$$

Answer: \_\_\_\_\_



Now solve by substitution:

$$y = 2x - 3$$

$$y = x - 1$$

Answer: \_\_\_\_\_

Now solve by elimination!

$$y = 2x - 3$$

$$y = x - 1$$

Answer: \_\_\_\_\_

Now, solve these systems of linear equations using any method you wish.

2. 
$$\begin{aligned} 6x - 12y &= 24 \\ -x - 6y &= 4 \end{aligned}$$

3. 
$$\begin{aligned} -8x - 10y &= 24 \\ 6x + 5y &= 2 \end{aligned}$$

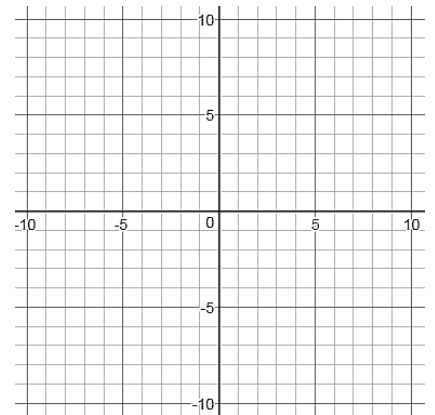
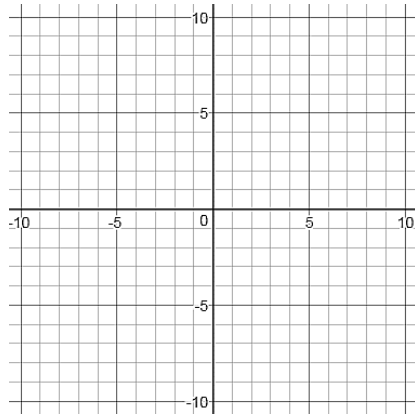
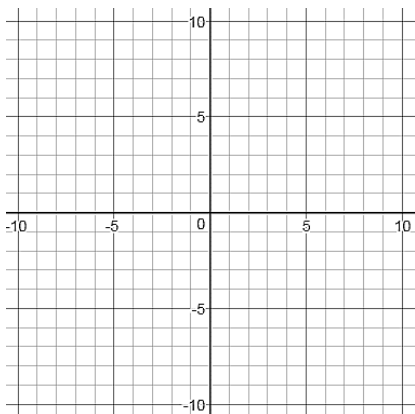
4.  $-7x + 2y = 18$   
 $6x + 6y = 0$

5.  $4x + 2y = 10$   
 $y = x - 13$

6.  $y = -2x + 1$   
 $y = -3x - 9$

7.  $y = 3x + 4$   
 $-12x + 4y = 16$

Scratch Graphs just in case you prefer graphing!



Answers:

1.  $(2, 1)$

2.  $(2, -1)$

3.  $(7, -8)$

4.  $(-2, 2)$

5.  $(6, -7)$

6.  $(-10, 21)$

7. Infinitely many solutions

Name: \_\_\_\_\_

## Section 6 Practice

### Important Exponent Rules

1.  $x^0 =$

2.  $(-x)^2 =$

3.  $-x^2 =$

4.  $x^a \cdot x^b =$

5.  $(x^a)^b =$

6.  $\frac{x^a}{x^b} =$

7.  $x^{-a} =$

8.  $\frac{1}{x^{-a}} =$

9.  $\frac{m}{x^{-a}} =$

10.  $\frac{m^{-b}}{x^{-a}} =$

1.  $3^2 \cdot 3^6$

2.  $\frac{4^6}{4^{14}}$

3.  $19^0$

4.  $y^2 \times y^5 \times y \times y^{-3}$

5.  $(2m^3)^3(-3m^7)(m)$

6.  $\left(\frac{12x^2}{3x^4}\right)$

7.  $(3m^5x^2)^4$

8.  $5x^{-3}$

9.  $5^{-3}x^{-3}$

10.  $(6x^7)^{-2}$

11.  $\left(\frac{16x^9y^4}{24x^3y^8}\right)^{-2}$

12.  $\frac{(6xy^7)^2}{x^9y^{-3}}$

13.  $2x \times 3x^0 y^3 \times 6xy^4$

14. 
$$\frac{(5x^2 z^6)^2 (-4x^2 z^6)}{x \times z^{28}}$$

THESE ARE THE MOST SIMILAR TO THE PROBLEMS ON THE READINESS TEST:

15. 
$$\frac{4m^4 n^3 p^3}{3m^2 n^2 p^4}$$

16. 
$$\frac{2x^4 y^3}{3x^2 y^4 z^4 z^3}$$

17. 
$$\frac{3x^4 y^3}{15x^{-2} y^{11}}$$

18.  $(3x^5)^2 \times 5x^7$

Answers:

1.  $3^8$

2.  $\frac{1}{4^8}$

3. 1

4.  $y^5$

5.  $-24m^{17}$

6.  $\frac{4}{x^2}$

7.  $81m^{20} x^8$

8.  $\frac{5}{x^3}$

9.  $\frac{1}{125x^3}$

10.  $\frac{1}{36x^{14}}$

11.  $\frac{9y^8}{4x^{12}}$

12.  $\frac{36y^{17}}{x^7}$

13.  $36x^2 y^7$

14.  $\frac{-100x^5}{z^{10}}$

15.  $\frac{4m^2 n}{3p}$

16.  $\frac{2x^2}{3yz^7}$

17.  $\frac{x^6}{5y^8}$

18.  $45x^{17}$

Name: \_\_\_\_\_

**Section 7 Practice:**

1. $\frac{2}{3}k + \frac{1}{4}k = -2$	2. $x + \frac{1}{3} = \frac{5}{6}$
3. $-\frac{1}{2} + x = -\frac{2}{5}$	4. $\frac{5}{6}x - \frac{2}{3}x = \frac{1}{3}$
5. $\frac{1}{2}(x - 5) = 6$	6. $\frac{2}{5}(5k + 35) - 8 = 12$
7. $\frac{2}{3}(x + 3) + \frac{1}{12} = 5$	8. $\frac{7}{6}(10 + 3x) = \frac{10}{3}$
9. $3 = \frac{13}{2}x - \frac{5}{2}(x + 2)$	10. $\frac{2x - 3}{7} - \frac{x}{2} = \frac{x + 3}{14}$

Answers: 1.  $k = -\frac{24}{11}$    2.  $x = \frac{1}{2}$    3.  $x = \frac{1}{10}$    4.  $x = 2$    5.  $x = 17$    6.  $k = 3$    7.  $x = \frac{35}{8}$   
8.  $x = -\frac{50}{21}$    9.  $x = 2$    10.  $x = -\frac{9}{4}$



### Section 8: Using function notation to model situations.

Function notation is an efficient way of:

1. Telling someone you are working with a FUNCTION and
2. Telling someone you need them to plug in a certain value.  
You just have to speak the language!

Example:

Original Equation	Now I want you to plug in 3 for x:	Same Equation written in FUNCTION NOTATION:	Now I want you to plug in 3 for x:
$y = 5x - 12$	$\begin{array}{c c} x & y \\ \hline & \end{array}$		

We can use function notation to model real situations. We often pick variables that make sense for what we're talking about.

**Example:**

I'm buying pizza for my friends who come to my party. For each friend that I invite I plan to have 3 slices of pizza.

- a) Here is a function that models this situation.

$$P(f) = 3f$$

Explain what the variables  $P$  and  $f$  stand for in the context of this problem.

- b) What does  $P(15)$  mean in the context of the problem?

- c) Calculate  $P(15)$  :

**PRACTICE:**

**Write a function to model each situation.**

1. You have \$45 in your account and you plan to save an additional \$10 each month. What is your account balance after  $t$  months?
2. You have 100 homework problems to do. You time yourself & realize you can do 3 problems per minute. How many problems are left after  $m$  minutes?
3. There is a room full of cats coming in and going out at a pet shelter. Each cat has 4 legs. What is the number of legs in the room with  $x$  cats?
4. You're the CEO of a company and want to model your business's monthly expenses. You know you spend \$6500 each month for regular bills and an additional \$3500 each month for every employee you hire. What is your total monthly expense for  $h$  employees?

1.  $f(t) = 45 + 10t$

2.  $f(m) = 100 - 3m$

3.  $f(x) = 4x$

4.  $f(h) = 6500 + 3500h$

Name: \_\_\_\_\_

**Section 9 Practice**

Distributing is the opposite of factoring, and vice versa.

$(3x - 1)(2x + 5)$  *Distributes* into \_\_\_\_\_

and

$6x^2 + 13x - 5$  *Factors* into \_\_\_\_\_

Factor the following trinomials. If a trinomial cannot be factored, write "PRIME"

1. $x^2 + 6x - 7$	2. $2x^2 + 11x + 5$
3. $x^2 - 21x - 100$	4. $6x^2 - 7x - 3$
5. $x^2 + 15x + 1$	6. $8x^2 + 18x - 5$
7. $24x^2 + 11x + 1$	8. $x^2 + x - 56$

9. $7x^2 - 9x + 2$	10. $x^2 - 13x + 36$
11. $6x^2 + 13x + 6$	12. $x^2 - 5x - 7$
13. $4x^2 - 5x - 6$	14. $9x^2 - 10x + 1$
15. $8x^2 + 14x + 3$	16. $x^2 + 2x - 24$
17. $7x^2 - 10x + 3$	18. $2x^2 - x - 21$
19. $x^2 + x - 72$	20. $3x^2 + 19x + 6$

Answers:

1.  $(x + 7)(x - 1)$     2.  $(2x + 1)(x + 5)$     3.  $(x - 25)(x + 4)$     4.  $(3x + 1)(2x - 3)$     5. Prime
6.  $(4x - 1)(2x + 5)$     7.  $(3x + 1)(8x + 1)$     8.  $(x - 7)(x + 8)$     9.  $(7x - 2)(x - 1)$     10.  $(x - 9)(x - 4)$
11.  $(3x + 2)(2x + 3)$     12. Prime    13.  $(4x + 3)(x - 2)$     14.  $(9x - 1)(x - 1)$     15.  $(4x + 1)(2x + 3)$
16.  $(x + 6)(x - 4)$     17.  $(7x - 3)(x - 1)$     18.  $(2x - 7)(x + 3)$     19.  $(x + 9)(x - 8)$     20.  $(3x + 1)(x + 6)$

Name: \_\_\_\_\_

### Section 10 Practice

If a quadratic equation is factorable, that is the best way to solve! Try these first.

1.  $x^2 - 5x + 4 = 0$

2.  $3x^2 + 6x = 0$

If a quadratic equation is NOT factorable, one option is the QUADRATIC FORMULA.

#### The Quadratic Formula

Used to Solve

$$ax^2 + bx + c = 0$$

Solve each of the following using the quadratic formula. Simplify as much as possible. If no solution is possible, state it.

3.  $x^2 - 3x - 1 = 0$

4.  $2x^2 + x - 7 = 0$

$$5. 2x^2 + 5x + 1 = 0$$

$$6. 5x^2 - 11x = -3$$

$$7. 5x^2 + 3 = 0$$

$$8. 3x^2 - x + 5 = 0$$

Answers:

$$1. \begin{array}{l} x = 1, \\ x = 4 \end{array}$$

$$2. \begin{array}{l} x = -2, \\ x = 0 \end{array}$$

$$3. x = \frac{3 \pm \sqrt{13}}{2}$$

$$4. x = \frac{-1 \pm \sqrt{57}}{4}$$

$$5. x = \frac{-5 \pm \sqrt{17}}{4}$$

$$6. x = \frac{11 \pm \sqrt{61}}{10}$$

7. No Real Solution

8. No Real Solution