Rising Honors Geometry Summer Packet 2026

This packet provides practice on prerequisite skills needed for the Honors Geometry course.

Part 1: Simplifying Expressions and Combining Like Terms

Problem Set 1

Evaluate each expression.

1. $1 + 4 \bullet 6 - 3$ 2. $2 + (10 - 1) \div 3$ 3. $\frac{15+3}{9} \bullet - 5 - (-2)$ 4. $\frac{(-8+3)\bullet 2-(-2)}{-4}$

5. $(10 - 7)^2 - \frac{-18}{-3}$ 6. $\frac{-27-8}{5(10-9)}$ 7. $-9 \bullet 5 - [10 - (-7)]^2$ 8. $-4\left(5 \bullet - \frac{30}{6} + 9\right)$

Evaluate each expression using the values given.

1. $z + y^2 - \frac{x}{3}$, *if* $x = -9$, $y = -3$, *and* $z = -4$

2. $y - x + \frac{x^2}{4}$, *if* $x = 2$ *and* $y = -9$

Problem Set 2

Simplify each of the following expressions.

1. $7m + 1 + 7m + 4$ 2. $10 - 7p + p - 5$ 3. $6(5x + 7) - 7$

4. $-6(-8 + 9) + 4a$ 5. $-2(-1 + 6m) + 8m$ 6. $-3k - 3(5k + 7)$

7. $-7k(1 - 8k) + 5k(-3 - 2k)$ 8. $7a(1 + 8a) - 8a(a + 9)$ 9. $(6 + 5n) + (4n - 8)$

10. $(5x - 3x^2) - (7x + 8x^2)$ 11. $(k + 5k^2) + (k + 4 - 7k^2)$ 12. $(5v^2 + 7v^3) - (6v^3 - 2v^2 - 8)$

13. $(3n - 2 - 8n^2) + (7 - 8n - 7n^2)$ 14. $-5(2u - h)$ 15. $(1 - 4a - 5a^3) - (6 + a^3 + 4a)$

Problem Set 3

Simplify each of the following expressions using the FOIL method.

Remember:

When multiplying two polynomials, you must distribute every term in the first expression to every term in the second expression. For binomials, it is helpful to remember the FOIL method, which reminds you to multiply the first terms together first, then the outer terms, then the inner terms, then the last terms. Finally, simplify by putting like terms together. When multiplying larger polynomials, you can follow the same pattern.

1. $(2x - 7)(x + 6)$
2. $(2x - 6)(8x - 1)$
3. $(x + 6)(8x - 3)$

7. $(5p + 6)((3p^2 + p + 6)$
8. $(7x + 5)(4x^2 + 8x + 5)$
9. $(3c - 5)(2c^2 - c + 8)$

Remember:

Rules for exponents

Product Rule ~ $a^x + a^y = a^{x+y}$

When terms with the same base are multiplied, you add the exponents.

Quotient Rule ~ $\frac{a^x}{a^y} = a^{x-y}$

When terms with the same base are divided, you subtract the exponents.

Power Rule ~ $\left(a^x\right)^y = a^{x \cdot y}$

When a term is raised to another exponent, you multiply the exponents.

Zero Exponent ~ $a^0 = 1$

Anything raised to the zero power is equal to one.

Negative exponents ~ $\left(\frac{a}{b}\right)^{-x} = \left(\frac{b}{a}\right)^x$

A negative exponent is equivalent to taking the reciprocal of the base number, and applying the absolute value to the exponent

Problem Set 4

Simplify each of the following expressions. Your answer should include only positive exponents.

1. $(4xy)^2$
2. $\frac{y^3}{4x^2y^{-1}}$
3. $4u^{-2}v^0 2u^{-2}$
4. $\left(y^4\right)^{-1}$

5. $\left(x^3\right) \cdot \left(2x^{-1}\right)^0$
6. $\left(\frac{2x^3}{2x^{-4}y^{-4}}\right)^2$
7. $\frac{\left(b^2\right)^3}{a^0 \cdot 2a^{-3}b^2}$
8. $\frac{(2ab)^3}{2a^2b^4 \cdot a^3b^3}$

9. $a^{-2}b^3 \cdot (2b)^4$
10. $\frac{4x^4}{3x^4y^{-3}}$
11. $\frac{\left(a^4b^{-3}\right)^0}{2ba^{-2}}$
12. $x^{-2}y^2 \cdot \left(x^0y^0\right)^{-3}$

Part 2: Solving Equations and Systems of Linear Equations & Inequalities

Solve each equation:

1. $5^{2x-1} = 5^{7x-8}$

36. $9^{2x+1} = 27^{x-1}$

4. $-2(8m - 3) = 86$

5. $x + 16 = -8(5x - 2)$

6. $-9 + 4m = 3(m - 5)$

7. $2x + 6x = -10$

8. $\frac{2}{5} = -p + \frac{7}{5}p$

9. $-\frac{7}{2}n - 2n = -\frac{99}{4}$

Problem Set 6

Solve each of the following proportions.

1. $\frac{2}{6} = \frac{m}{4}$

2. $\frac{4}{5} = \frac{b}{4}$

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

4. $\frac{6}{5} = \frac{10}{k-1}$

5. $\frac{17d}{25} = \frac{51}{125}$

6. $\frac{x-4}{x} = \frac{7}{9}$

7. $\frac{3w}{10w+2} = \frac{2}{7}$

8. $\frac{8a-5}{5a-4} = \frac{13}{8}$

Use substitution to solve each system of equations.

7. $\begin{cases} y = 4x \\ 3x - y = 1 \end{cases}$

8. $\begin{cases} x = 2y - 3 \\ x = 2y + 4 \end{cases}$

Use elimination to solve each system of equations.

13. $\begin{cases} 2x + 3y = 6 \\ x + 2y = 5 \end{cases}$

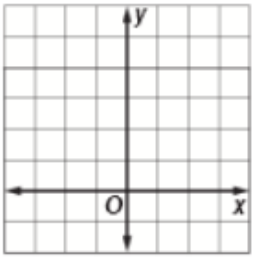
14. $\begin{cases} 3a - b = 2 \\ a + 2b = 3 \end{cases}$

Solve each inequality and graph the solution on a number line.

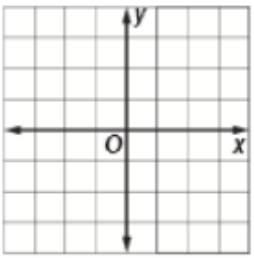
1. $2(t+3) \geq 16$
2. $3x + 10 > 8 - (x + 14)$
3. $2(y-2) > -4 + 2y$
4. $m + 17 \leq -(3m - 13)$
5. $k - 6 \leq -(10 + k)$
6. $n - 4 \leq -3(2 + n)$
7. $3 < 3w$ *or* $3w \geq 9$
8. $2y + 2 < 12$ *or* $y - 3 \geq 2y$
9. $\frac{1}{2}n > -2$ *or* $2n - 2 < 6 + n$
10. $3a + 2 \geq 5$ *or* $7 + 3a < 2a + 6$

Graph each inequality.

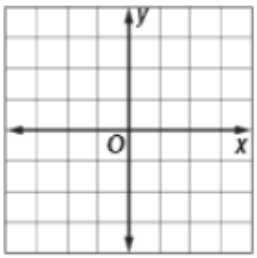
11. $y < 4$



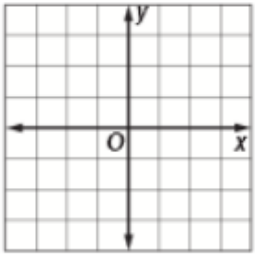
12. $x \geq 1$



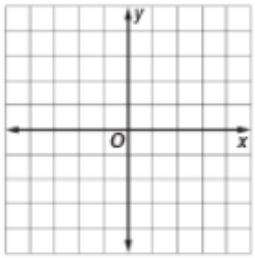
13. $3x \leq y$



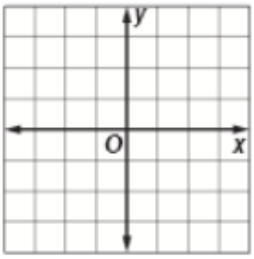
14. $-x > y$



15. $x - y \geq 1$



16. $2x - 3y \leq 6$

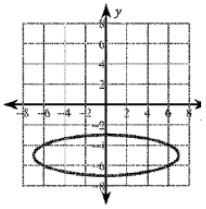


Part 3: Functions

51. Identify the domain and range of the following. Is the relation a function?

a. {(-1,3),(5,3),(2,6),(8,1)}

b. {(0,3),(4,1),(-2,4).(4,5),(-10,2)}

c. 

52. Characteristics of Graphs: For each function below: sketch the graph, state x and y intercepts, and state domain and range

a) $2y - x + 5 = 0$ b) $7x = 15$

c) $y = 3^x + 5$ d) $y = 2(x-4)^2 + 3$

53. For the function: $y = -3(x+5)^2 - 4$

a.) State the y-intercept

b) What transformations take place from the parent graph of $y = x^2$

c) State the end-behavior of the graph of this function

$f(x) = \frac{1}{2}x^2 + 4x + 6$ is in _____ form.

Domain- Interval: _____ Set: _____

Range: Interval: _____ Set: _____

Vertex: _____ Max or Min (circle one)

Axis of symmetry: _____

Number of real solutions (circle one): 0 1 2

Which are _____ and _____ **(write n/a if there are 0)**

y-intercept: _____

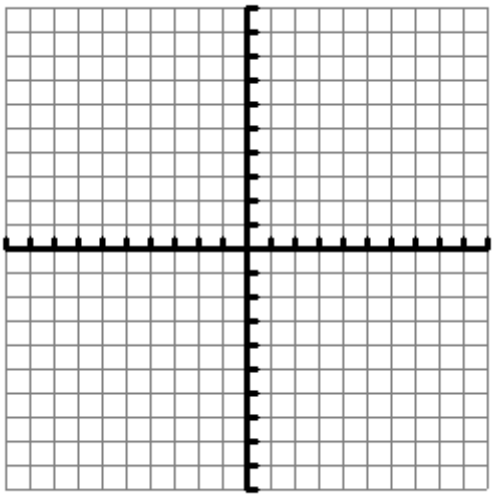
Interval of Increase: _____

Interval of Decrease: _____

As $x \to \infty$, $y \to$ _____

As $x \to -\infty$, $y \to$ _____

x					
y					



Part 4: Linear Functions

Remember:

Slope-Intercept Form is $y = mx + b$, where m is the slope, and b is the y-interecept.

Slope can also be understood as $\frac{rise}{run}$.

The slope can be found from 2 points using the formula $\frac{y_2 - y_1}{x_2 - x_1}$.

Problem Set 8

Write an equation in slope-intercept form that satisfies each of the following requirements.

1. Slope = -2, y-intercept=1

2. slope=$\frac{2}{3}$, passes through the point $(-3, 2)$

Write the following equations in slope-intercept form.

3. $5x + y = 30$

4. $x - y = 7$

5. $-4x + 3y = 12$

Remember:

Lines are parallel if the slopes are the same.

Lines are perpendicular if the slopes are the negative inverse of each other, such as $\frac{2}{3}$ and $-\frac{3}{2}$

Problem Set 9

State whether each pair of lines is parallel, perpendicular, or neither.

1. $y = 6x - 4$
   $y = 6x - 3$

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

3. $2x - 3y = -6$
   $2x - y = 2$

IX: Writing Equations of lines using <u>POINT SLOPE FORM</u> $y - y_1 = m(x - x_1)$:

54. Write the equation of a line passing through (6,5) with slope 1/2.

55. Write the equation of a line passing through (-1,3) and (7,2).

56. Write the equation of the line that is perpendicular to the graph of $2x - 3y = -3$, and passes through $(-3, 0)$.

Part 5: Quadratics: Factoring & Solving

Factoring Guide

Type of Factoring	When to Use It	Method	Example
1. Greatest Common Factor	Anytime, ALL THE TIME, if Possible. You should always look for the GCF before you do any other type of factoring.	Find the greatest common multiple of each term and factor it out.	$14x^2 + 21x$ Factored: $7x(2x + 3)$
2. Difference of Two Squares	Two Terms. A perfect square minus another perfect square.	$a^2 - b^2$ Factored: $(a + b)(a - b)$	$x^2 - 4$ Factored: $(x + 2)(x - 2)$
3. Standard Form when $a = 1$	Three Terms. Trinomial in the form $x^2 + bx + c$	Look for factors of c that add up to b.	$x^2 - 7x + 12$ Factored: $(x - 3)(x - 4)$
4. Grouping	Four Terms. This is the only type of factoring you can try when there are 4 terms.	Group the first two and the second two terms. Find GCF of each group.	$3x^2 - 4x - 6x + 8$ Factored: $(3x^2 - 4x)(-6x + 8)$ $x(3x - 4) - 2(3x - 4)$ $(3x - 4)(x - 2)$
5. Perfect Square Trinomial	Three Terms. Trinomial in the form $a^2 + 2ab + b^2$ or $a^2 - 2ab + b^2$	$a^2 + 2ab + b^2$ Factored: $(a + b)^2$ $a^2 - 2ab + b^2$ Factored: $(a - b)^2$	$4x^2 - 12x + 9$ Factored: $(2x - 3)^2$
6. Standard Form when $a \neq 1$	Three Terms. Trinomial in the form $ax^2 + bx + c$	1. Multiply $a \cdot c$ 2. Look for factors of $a \cdot c$ that add up to b. 3. Separate b term into those 2 factors. 4. Grouping	$2x^2 - 5x - 3$ Factored: $(2x^2 - 6x) + (x - 3)$ $2x(x - 3) + 1(x - 3)$ $(2x + 1)(x - 3)$

Factor Completely.

1. $x^2 + 3x$
2. $x^2 - 4x + 3$
3. $x^2 - 6x + 9$
4. $x^2 - 9$
5. $4x^2 + 12x$
6. $x^2 - 3x + 2$
7. $x^2 + 10x + 9$
8. $-4x^2 + 19x - 21$
9. $5x^2 - 25x$
10. $6x^2y + 4xy^2$
11. $y^2 - 8y + 15$
12. $x^2 - y^2$
13. $-81 + a^4$
14. $25x^2 - 20x + 4$
15. $x^3 + 7x^2 + x$
16. $8y^2 - 200$
17. $3x^2 + 2x - 8$
18. $2x^2 - 4x + 2$
19. $2x^2 - 3x - 2$
20. $a^2 - 18a + 72$

Solve the quadratic equation by factoring.

37. $x^2 + 2x - 24 = 0$
38. $9x^2 - 25 = 0$

Solve the quadratic equation by using square roots.

39. $2x^2 - 1 = 13$
40. $(x - 3)^2 - 5 = 19$

Solve the quadratic equation by completing the square.

41. $x^2 - 6x + 4 = 0$
42. $2x^2 = 8x + 16$

Solve the quadratic equation by using the quadratic formula.

43. $x^2 + 6x + 2 = 0$
44. $3x^2 - 5x + 12 = 0$

Part 6: Radical Expressions

Simplify

25. $\sqrt{147}$

26. $2\sqrt{14} \cdot \sqrt{21}$

27. $\frac{\sqrt{60}}{\sqrt{3}}$

28. $\sqrt{\frac{11}{32}}$

29. $\frac{1}{6+\sqrt{3}}$

30. $2\sqrt{50} - 3\sqrt{32}$

31. $b\sqrt{40b^2} + 3\sqrt{90b^4}$

32. $\sqrt{a^5b^3cd^8}$

Part 1: Simplifying Expressions and Combining Like Terms

Problem Set 1

Evaluate each expression.

1. $1 + 4 \cdot 6 - 3$
   $1 + 24 - 3$
   22

2. $2 + (10 - 1) + 3$
   5

3. $\frac{15+3}{9} \cdot - 5 - (- 2)$
   -8

4. $\frac{(-8+3)\cdot 2-(-2)}{-4}$
   2

5. $(10 - 7)^2 - \frac{-18}{-3}$
   3

6. $\frac{-27-8}{5(10-9)}$
   -7

7. $- 9 \cdot 5 - [10 - (- 7)]^2$
   -334

8. $- 4\left(5 \cdot - \frac{30}{6} + 9\right)$
   64

Evaluate each expression using the values given.

1. $z + y^2 - \frac{x}{3}$, *if* $x = -9$, $y = -3$, *and* $z = -4$
   8

2. $y - x + \frac{x^2}{4}$, *if* $x = 2$ *and* $y = -9$
   -10

Problem Set 2

Simplify each of the following expressions.

1. $7m + 1 + 7m + 4$
   $14m + 5$

2. $10 - 7p + p - 5$
   $-6p + 5$

3. $6(5x + 7) - 7$
   $30x + 42 - 7$
   $30x + 35$

4. $- 6(- 8 + 9) + 4a$
   $-6 + 4a$

5. $- 2(- 1 + 6m) + 8m$
   $2 - 4m$

6. $- 3k - 3(5k + 7)$
   $-18k - 21$

7. $- 7k(1 - 8k) + 5k(- 3 - 2k)$
   $-22k + 46k^2$

8. $7a(1 + 8a) - 8a(a + 9)$
   $-65a + 48a^2$

9. $(6 + 5n) + (4n - 8)$
   $-2 + 9n$

10. $\left(5x - 3x^2\right) - \left(7x + 8x^2\right)$
    $-2x - 11x^2$

11. $\left(k + 5k^2\right) + \left(k + 4 - 7k^2\right)$
    $-2k^2 + 2k + 4$

12. $\left(5v^2 + 7v^3\right) - \left(6v^3 - 2v^2 - 8\right)$
    $-6v^3 + 14v^2 + 8$

13. $(3n - 2 - 8n^2) + (7 - 8n - 7n^2)$
    $-15n^2 - 5n + 5$

14. $- 5(2u - h)$
    $-10u + 5h$

15. $(1 - 4a - 5a^3) - (6 + a^3 + 4a)$
    $-6a^3 - 8a - 5$

Part 2: Solving Equations and Systems of Linear Equations & Inequalities

Solve each equation:

1. $5^{2x-1} = 5^{7x-8}$

$2x-1 = 7x-8$

$-5x = -7$

$x = \frac{7}{5}$

36. $9^{2x+1} = 27^{x-1}$

$(3^2)^{2x+1} = (3^3)^{x-1}$

$4x+2 = 3x-3$

$x = -5$

4. $-2(8m - 3) = 86$

$m = -5$

5. $x + 16 = -8(5x - 2)$

$x = 0$

6. $-9 + 4m = 3(m - 5)$

$m = -6$

7. $2x + 6x = -10$

$x = -\frac{5}{4}$

8. $\frac{2}{5} = -p + \frac{7}{5}p$

$p = 1$

9. $-\frac{7}{2}n - 2n = -\frac{99}{4}$

$n = \frac{9}{2}$

Problem Set 6

Solve each of the following proportions.

1. $\frac{2}{6} = \frac{m}{4}$

$m = \frac{4}{3}$

2. $\frac{4}{5} = \frac{b}{4}$

$b = \frac{16}{5}$

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

$x = \frac{11}{3}$

4. $\frac{6}{5} = \frac{10}{k-1}$

$k = \frac{28}{3}$

5. $\frac{17d}{25} = \frac{51}{125}$

$d = \frac{3}{5}$

6. $\frac{x-4}{x} = \frac{7}{9}$

$x = 18$

7. $\frac{3w}{10w+2} = \frac{2}{7}$

$w = 4$

8. $\frac{8a-5}{5a-4} = \frac{13}{8}$

$a = 12$

Use substitution to solve each system of equations.

7. $\begin{cases} y = 4x \\ 3x - y = 1 \end{cases}$

$(-1, -4)$

8. $\begin{cases} x = 2y - 3 \\ x = 2y + 4 \end{cases}$

No Solution

Use elimination to solve each system of equations.

13. $\begin{cases} 2x + 3y = 6 \\ x + 2y = 5 \end{cases}$

$(-3, 4)$

14. $\begin{cases} 3a - b = 2 \\ a + 2b = 3 \end{cases}$

$(1, 1)$

3

e each inequality and graph the solution on a number line.

1. $2(t+3) \geq 16$

$t \geq 5$

2. $3x + 10 > 8 - (x + 14)$

$x > -4$

3. $2(y-2) > -4 + 2y$

No Solution

4. $m + 17 \leq -(3m - 13)$

$m \leq -1$

5. $k - 6 \leq -(10 + k)$

$k \leq -2$

6. $n - 4 \leq -3(2 + n)$

$n \leq -\frac{1}{2}$

7. $3 < 3w$ *or* $3w \geq 9$

$w > 1$ or $w \geq 3$

8. $2y + 2 < 12$ *or* $y - 3 \geq 2y$

$y < 5$ or $y \leq -3$

9. $\frac{1}{2}n > -2$ *or* $2n - 2 < 6 + n$

$n > -4$ or $n < 8$

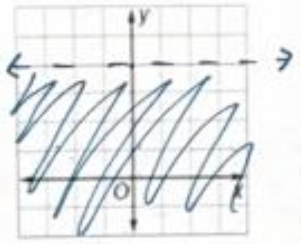
All real numbers

10. $3a + 2 \geq 5$ *or* $7 + 3a < 2a + 6$

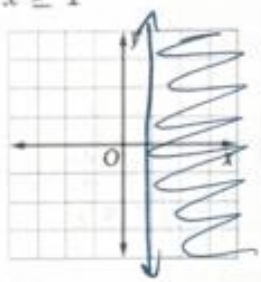
$a \geq 1$ or $a < -1$

Graph each inequality.

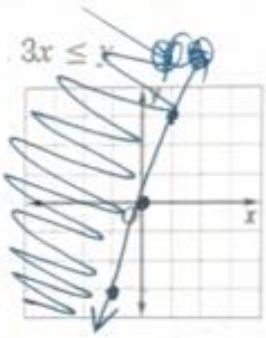
11. $y < 4$



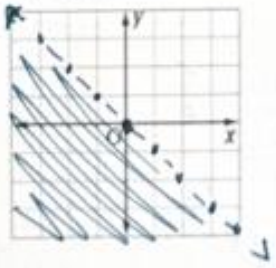
12. $x \geq 1$



13. $3x \leq y$

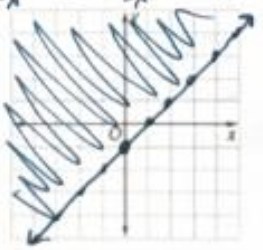


14. $-x > y$



15. $x - y \geq 1$

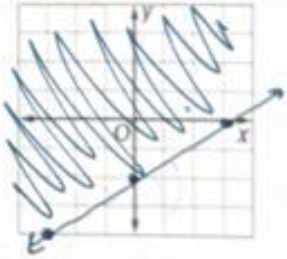
$-x \quad -x \quad -x+1$



$\frac{-y}{-1} \leq \frac{-x+1}{-1}$

$y \leq x - 1$

16. $2x - 3y \leq 6$



$\frac{-3y}{-3} \leq \frac{-2x+6}{-3}$

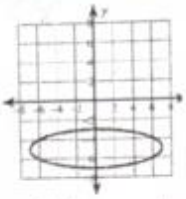
$y \geq \frac{2}{3}x - 2$

Part 3: Functions

51. Identify the domain and range of the following. Is the relation a function?

a. {(-1,3),(5,3),(2,6),(8,1)} D{-1, 2, 5, 8} R{1, 3, 6} YES

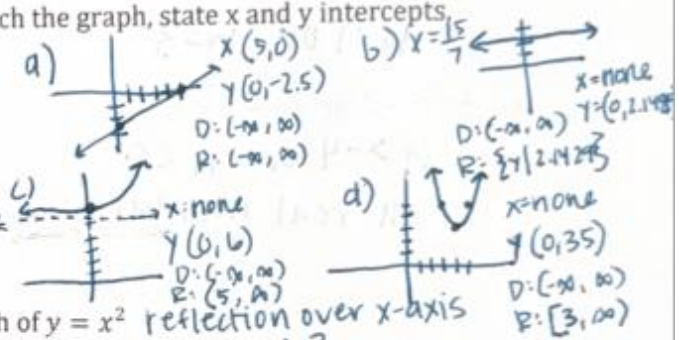
b. {(0,3),(4,1),(-2,4),(4,5),(-10,2)} D: {-10, -2, 0, 4} NO R: {1, 2, 3, 4, 5}

c. 

D: {x | -7 ≤ x ≤ 7} or [-7, 7]
R: {y | -7 ≤ y ≤ -3} or [-7, -3]
NO

52. Characteristics of Graphs: For each function below: sketch the graph, state x and y intercepts, and state domain and range

a) $2y - x + 5 = 0$ b) $7x = 15$
c) $y = 3^x + 5$ d) $y = 2(x-4)^2 + 3$



53. For the function: $y = -3(x+5)^2 - 4$

a.) State the y-intercept (0, -79)

b) What transformations take place from the parent graph of $y = x^2$ reflection over x-axis
stretch of 3
shift left 5
shift down 4

c) State the end-behavior of the graph of this function

$f(x) = \frac{1}{2}x^2 + 4x + 6$ is in Standard form.

Domain- Interval: (-∞, ∞) Set: {x | -∞ < x < ∞}

Range: Interval: [-2, ∞) Set: {y | -2 ≤ y < ∞}

Vertex: (-4, -2) Max or (Min) (circle one)

Axis of symmetry: x = -4

Number of real solutions (circle one): 0 1 (2)

Which are (-6, 0) and (-2, 0) **(write n/a if there are 0)**

y-intercept: (0, 6)

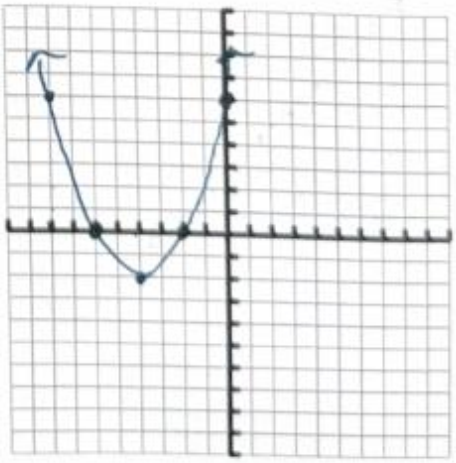
Interval of Increase: (-4, ∞)

Interval of Decrease: (-∞, -4)

As $x \to \infty$, $y \to$ ∞

As $x \to -\infty$, $y \to$ ∞

x	-8	-6	-4	-2	0
y	6	0	-2	0	6



Slope-Intercept Form is $y = mx + b$, where m is the slope, and b is the y-interecept.

Slope can also be understood as $\frac{rise}{run}$.

The slope can be found from 2 points using the formula $\frac{y_2 - y_1}{x_2 - x_1}$.

Problem Set 8

Write an equation in slope-intercept form that satisfies each of the following requirements.

1. Slope = -2, y-intercept=1

$y = -2x + 1$

2. slope=$\frac{2}{3}$, passes through the point $(-3, 2)$

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

Write the following equations in slope-intercept form.

3. $5x + y = 30$

$y = -5x + 30$

4. $x - y = 7$

$y = x - 7$

5. $-4x + 3y = 12$

$y = \frac{4}{3}x + 4$

Remember:

Lines are parallel if the slopes are the same.

Lines are perpendicular if the slopes are the negative inverse of each other, such as $\frac{2}{3}$ and $-\frac{3}{2}$

Problem Set 9

State whether each pair of lines is parallel, perpendicular, or neither.

1. $y = 6x - 4$
   $y = 6x - 3$

parallel

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

perpendicular

3. $2x - 3y = -6$
   $2x - y = 2$

neither

IX: Writing Equations of lines using <u>POINT SLOPE FORM</u> $y - y_1 = m(x - x_1)$:

54. Write the equation of a line passing through (6,5) with slope 1/2. $y - 5 = \frac{1}{2}(x - 6)$

55. Write the equation of a line passing through (-1,3) and (7,2).

$y - 3 = -\frac{1}{8}(x + 1)$ or $y - 2 = -\frac{1}{8}(x - 7)$

56. Write the equation of the line that is perpendicular to the graph of $2x - 3y = -3$, and passes through (-3, 0).

$y = \frac{3}{2}(x + 3)$

6

Problem Set 3

Simplify each of the following expressions using the FOIL method.

Remember:

When multiplying two polynomials, you must distribute every term in the first expression to every term in the second expression. For binomials, it is helpful to remember the FOIL method, which reminds you to multiply the first terms together first, then the outer terms, then the inner terms, then the last terms. Finally, simplify by putting like terms together. When multiplying larger polynomials, you can follow the same pattern.

1. $(2x - 7)(x + 6)$

$2x^2+12x-7x-42$

$2x^2+5x-42$

2. $(2x - 6)(8x - 1)$

$16x^2-2x-48x+6$

$16x^2-50x+6$

3. $(x + 6)(8x - 3)$

$8x^2-3x+48x-18$

$8x^2+45x-18$

7. $(5p + 6)((3p^2 + p + 6)$

$15p^3+23p^2+36p+36$

8. $(7x + 5)(4x^2 + 8x + 5)$

$28x^3+76x^2+75x+25$

9. $(3c - 5)(2c^2 - c + 8)$

$6c^3-13c^2+29c-40$

Remember:

Rules for exponents

Product Rule - $a^x + a^y = a^{x+y}$

When terms with the same base are multiplied, you add the exponents.

Quotient Rule - $\frac{a^x}{a^y} = a^{x-y}$

When terms with the same base are divided, you subtract the exponents.

Power Rule - $(a^n)^y = a^{xy}$

When a term is raised to another exponent, you multiply the exponents.

Zero Exponent - $a^0 = 1$

Anything raised to the zero power is equal to one.

Negative exponents - $\left(\frac{a}{b}\right)^{-x} = \left(\frac{b}{a}\right)^x$

A negative exponent is equivalent to taking the reciprocal of the base number, and applying the absolute value to the exponent.

Problem Set 4

Simplify each of the following expressions. Your answer should include only positive exponents.

1. $(4xy)^2$

$16x^2y^2$

2. $\frac{y^3}{4x^2y^{-1}}$

$\frac{y^4}{4x^2}$

3. $4u^{-2} / 2u^{-2}$

$\frac{8}{u^4}$

4. $(y^4)^{-1}$

$\frac{1}{y^4}$

5. $(x^3) \cdot (2x^{-1})^0$

x^3

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

$x^{14}y^8$

7. $\frac{(b^2)^3}{a^3 \cdot 2a^{-1}b^3}$

$\frac{b^4}{2a^5}$

8. $\frac{(2ab)^3}{2a^2b^5 \cdot a^{-1}b^3}$

$\frac{4}{ab^4}$

9. $a^{-2}b^2 \cdot (2b)^4$

$\frac{16b^7}{a^2}$

10. $\frac{4x^5}{3x^{-1}y^{-1}}$

$\frac{4y^3}{3}$

11. $\frac{(a^3b^{-1})^4}{2ba^{-2}}$

$\frac{a^2}{2b}$

12. $x^{-2}y^2 \cdot (x^0y^0)^{-3}$

$\frac{y^2}{x^2}$

2

...or Completely.

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

2. $x^2 - 4x + 3$
$(x-3)(x-1)$

3. $x^2 - 6x + 9$
$(x-3)^2$

4. $x^2 - 9$
$(x-3)(x+3)$

5. $4x^2 + 12x$
$4x(x+3)$

6. $x^2 - 3x + 2$
$(x-2)(x-1)$

7. $x^2 + 10x + 9$
$(x+9)(x+1)$

8. $-4x^2 + 19x - 21$
$-(2x-7)(2x-3)$

9. $5x^2 - 25x$
$5x(x-5)$

10. $6x^2y + 4xy^2$
$2xy(3x+2y)$

11. $y^2 - 8y + 15$
$(y-3)(y-5)$

12. $x^2 - y^2$
$(x+y)(x-y)$

13. $-81 + a^4$
$(a^2+9)(a+3)(a-3)$

14. $25x^2 - 20x + 4$
$(5x-2)^2$

15. $x^3 + 7x^2 + x$
$x(x^2+7x+1)$

16. $8y^2 - 200$
$8(y+5)(y-5)$

17. $3x^2 + 2x - 8$
$(3x-4)(x+2)$

18. $2x^2 - 4x + 2$
$2(x-1)^2$

19. $2x^2 - 3x - 2$
$(2x+1)(x-2)$

20. $a^2 - 18a + 72$
$(a-12)(a-6)$

Solve the quadratic equation by factoring.

37. $x^2 + 2x - 24 = 0$ $(-6,0)$ $(4,0)$

38. $9x^2 - 25 = 0$ $(-\frac{5}{3},0)$ $(\frac{5}{3},0)$

Solve the quadratic equation by using square roots.

39. $2x^2 - 1 = 13$ $(-\sqrt{7},0)$ $(\sqrt{7},0)$

40. $(x-3)^2 - 5 = 19$ $(3-2\sqrt{6},0)$ $(3+2\sqrt{6},0)$

Solve the quadratic equation by completing the square.

41. $x^2 - 6x + 4 = 0$ $(3-\sqrt{5},0)$ $(3+\sqrt{5},0)$

42. $2x^2 = 8x + 16$ $(2-2\sqrt{3},0)$ $(2+2\sqrt{3},0)$

Solve the quadratic equation by using the quadratic formula.

43. $x^2 + 6x + 2 = 0$
$(-\frac{\sqrt{3}}{3} - 1, 0)$ $(\frac{\sqrt{3}}{3} - 1, 0)$

44. $3x^2 - 5x + 12 = 0$
$\frac{5 \pm \sqrt{-119}}{6}$ ∴ no real roots
or
2 imaginary roots
$x \notin \mathbb{R}$
or
2 complex roots

8

Part 6: Radical Expressions

Simplify

25. $\sqrt{147}$ $7\sqrt{3}$

26. $2\sqrt{14} \cdot \sqrt{21}$ $14\sqrt{6}$

27. $\frac{\sqrt{60}}{\sqrt{3}}$ $2\sqrt{5}$

28. $\sqrt{\frac{11}{32}}$ $\frac{\sqrt{22}}{8}$

29. $\frac{1}{6+\sqrt{3}}$ $\frac{6-\sqrt{3}}{33}$

30. $2\sqrt{50} - 3\sqrt{32}$ $-2\sqrt{2}$

31. $b\sqrt{40b^2} + 3\sqrt{90b^4}$ $11\sqrt{10}\,b^2$

32. $\sqrt{a^5b^3cd^8}$ $a^2bd^4\sqrt{abc}$

Additional Math Resources

The following is a list of websites to visit for additional help or practice material:

- Khan Academy
  - Take control of your learning by working on the skills you choose at your own pace. ... Math, science, computer programming, history, art, economics, and more.
- Algebasics
  - has video tutorials explaining the basics of algebra, equations, ratio and proportion, absolute value, polynomials, factoring, linear equations, radicals, applications, and much more.
- Algebra-Class
  - o ers help with solving equations, graphing equations, writing equations, inequalities, functions, exponents and monomials, polynomials, and the quadratic equation. It also has a list of resources.
- Algebra Help
  - contains lessons on topics that include equations, simplifying, factoring, distribution, and trinomials, as well as equation calculators and worksheets. This site also has an extensive list of math resources and study tips. .
- Help Algebra
  - covers topics such as fractions, percents, decimals, algebraic expressions, addition, multiplication, and word problems. Each section includes explanations and examples.
- College Cram
  - allows students to choose the algebra subject they are struggling with from a drop down menu, select the appropriate chapter, and pick your resources. The oages will feature formula solvers, bottomless worksheets, ashcards, quizzes, interactive overviews, and brief lessons and study sheets.
- Interactive Mathematics
  - has a large section on algebra, including information on factoring and fractions, the quadratic equation, exponents and radicals, systems of equations, matrices and determinants, and inequalities.
- Math Expression
  - has videos, worksheets, and lessons to help you develop your algebra skills. Math topics include algebra, exponents, symmetry, fractions, measurements, angles, and more. The site also includes a list of useful resources.
- Purple Math
  - contains lessons with explanations on everything from absolute value and negative numbers to intercepts, variables, and factoring. In addition, this site includes a forum that allows students to ask questions and receive answers, as well as a list of homework tips and guidelines.