

## Mathematics Department Summer Assignment

Course: Algebra 2 and Honors Algebra 2/Trigonometry Grade: 9 and 11

The following practice will help you review topics from previous mathematics courses that are important for your success in Honors Algebra 2.

There will be an assessment on these skills within the first five days of school. Use your notes from your previous mathematics courses to assist you.

Highlight any questions you may have as you will have an opportunity to discuss them during our first days of school. A helpful website with video tutorials is [www.khanacademy.org](http://www.khanacademy.org). I will be reaching out to you throughout the summer!

**TOPIC:** Simplify and evaluate expressions using order of operations

**REVIEW:**

<b>Order of Operations</b>	<b>Step 1</b> Evaluate expressions inside grouping symbols. <b>Step 2</b> Evaluate all powers. <b>Step 3</b> Multiply and/or divide from left to right. <b>Step 4</b> Add and/or subtract from left to right.
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<b>Example:</b> Evaluate $[18 - (6 + 4)] \div 2$ . $[18 - (6 + 4)] \div 2 = [18 - 10] \div 2$ $= 8 \div 2$ $= 4$	<b>Example:</b> Evaluate $3x^2 + x(y - 5)$ if $x = 3$ and $y = 0.5$ . Replace each variable with the given value. $3x^2 + x(y - 5) = 3 \cdot (3)^2 + 3(0.5 - 5)$ $= 3 \cdot (9) + 3(-4.5)$ $= 27 - 13.5$ $= 13.5$
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**PRACTICE:**

1. Find the value of  $6 + 8^2 + 4 - 2$ .
2. Evaluate  $\frac{3a^2 + 2b}{c^2}$  if  $a = 1$ ,  $b = 2$ ,  $c = 3$ .
3. Evaluate  $-|b - 2a|$  if  $a = 2.5$  and  $b = -8$ .
4. Use  $I = prt$ , the formula for simple interest over  $t$  years, to find  $I$  when  $p = \$2500$ ,  $r = 8.5\%$ , and  $t = 30$  months.
5. Simplify  $\frac{1}{4}(12v - 8) + 2(6v + 1)$ .
6.  $(4c^2 - 12c + 7) - (c^2 + 2c - 5)$

**TOPIC:** Simplify each expression using laws of exponents. There should be no negative exponents in your final answer.

**REVIEW:**

$$a^0 = 1 \quad (a^m)^n = a^{mn} \quad a^{-n} = \frac{1}{a^n} \quad a^m \cdot a^n = a^{m+n} \quad \frac{a^m}{a^n} = a^{m-n}$$

**PRACTICE:**

7.  $(5r^2t)^2(3r^0t^{-4})$

8.  $\frac{2a^4bc^3}{18a^2b^7c^{-1}}$

9.  $\frac{18a^{18}b^4}{24a^{24}b^4}$

**TOPIC:** Linear Equations and Inequalities

**REVIEW:**

<p style="text-align: center;"><b>Solving Linear Equations</b></p> <p>1. Distribute if there are parentheses. 2. Combine like terms. 3. Isolate the variables. 4. Solve for the variable indicated.</p>	<p><b>Example</b> Solve for <math>v</math>.</p> $-8v - 7 + 5v = 29$ <p style="text-align: right;">Original equation</p> $-3v - 7 = 29$ <p style="text-align: right;">Combine like terms</p> $-3v = 36$ <p style="text-align: right;">Add 7 to both sides</p> $v = -12$ <p style="text-align: right;">Divide both sides by -3</p> <p>Check the solution by plugging it into the original equation.</p> $-8v - 7 + 5v = 29$ <p style="text-align: right;">Original equation</p> $-8(-12) - 7 + 5(-12) = ? 29$ <p style="text-align: right;">Replace variable with -12</p> $96 - 7 - 60 = ? 29$ $29 = 29$ <p style="text-align: right;"><math>v = -12</math> makes the equation true; so it is a solution.</p>
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**PRACTICE:**

10. Solve  $5x + 2 = 3x + 24$ .

11. Solve  $c + 3 - 2c - (1 - 3c) = 2$

12. Solve  $4(a + 2) = 14 - 2(3 - 2a)$

**TOPIC: Domain and Range of functions**

**REVIEW:**

**Example** State the domain and the range of the relation.

$\{(4, -2), (-7, 6), (2, -3), (5, 7)\}$

The domain is the set of  $x$ -coordinates.

$$D = \{4, -7, 2, 5\}$$

The range is the set of  $y$ -coordinates.

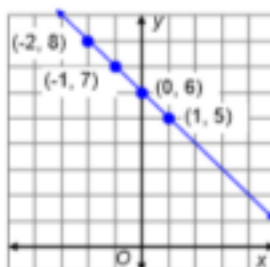
$$R = \{-2, 6, -3, 7\}$$

**Example** Graph a Relation

Graph the relation represented by  $y = -x + 6$  and determine the domain and range. Determine whether the equation is a *function*.

Make a table of values that satisfy the equation. Then graph the equation.

$x$	$y$
-2	8
-1	7
0	6
1	5



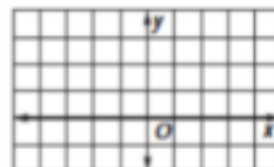
Every real number is the  $x$ -coordinate of some point on the line, and every real number is the  $y$ -coordinate of some point on the line. So the domain and range are both all real numbers.

The graph passes the vertical line test, so the equation is a function.

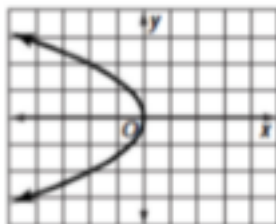
**PRACTICE:**

18. Graph the relation  $\{(-3, 3), (-3, 2), (-3, 1), (-3, 0)\}$  and find the domain and range.

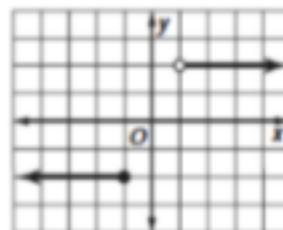
Then determine whether the relation is a function.



19. Determine whether this is a function. Explain why or why not.



20. Determine whether this is a function. Explain why or why not.



**TOPIC: Evaluate functions**

**REVIEW:**

**EXAMPLE:** Given  $f(x) = x^3 - 5$ , find each value when  $x = -2$  and when  $x = 2a$ .

$f(x) = x^3 - 5$	Original function	$f(x) = x^3 - 5$	Original function
$f(-2) = (-2)^3 - 5$	Substitute.	$f(2a) = (2a)^3 - 5$	Substitute.
$= -8 - 5$ or $-13$	Simplify.	$= 8a^3 - 5$	$(ab)^3 = a^3b^3$

**PRACTICE:**

21. Find  $f(-3)$  if  $f(x) = 10x + 3x^2$ .

22. Find  $g(a)$  if  $g(x) = 5x^2 - 8x$ .

**TOPIC: Identify Linear Functions**

**REVIEW:**

**EXAMPLE:** State whether each function is a linear function. Explain.

a.  $g(x) = \frac{4}{3x}$  This is not a linear function because  $x$  is in the denominator.

b.  $f(x) = \sqrt{2x-3}$  This is not a linear function because  $x$  is under a radical sign.

c.  $h(x) = \frac{2}{3}x + 5$  This is a linear function because it is in the form  $f(x) = mx + b$ .

$$m = \frac{2}{3}, b = 5$$

**PRACTICE:**

23. Is  $f(x) = \frac{1}{x+3}$  a linear function? Explain why or why not.

24. Is  $y - 3x = 10$  a linear function? Explain why or why not.

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**TOPIC: SLOPE AND WRITING EQUATIONS OF LINES**

**REVIEW:**

<b>Slope <math>m</math> of a Line</b>	For points $(x_1, y_1)$ and $(x_2, y_2)$ , where $x_1 \neq x_2$ , $m = \frac{\text{change in } y = y_2 - y_1}{\text{change in } x = x_2 - x_1}$
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**Example 1: Find the slope of the line that passes through  $(2, -1)$  and  $(-4, 5)$ .**

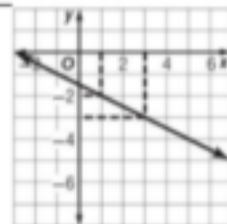
$$\begin{aligned} m &= \frac{y_2 - y_1}{x_2 - x_1} && \text{Slope formula} \\ &= \frac{5 - (-1)}{-4 - 2} && (x_1, y_1) = (2, -1), \\ & && (x_2, y_2) = (-4, 5) \\ &= \frac{6}{-6} = -1 && \text{Simplify.} \end{aligned}$$

The slope of the line is  $-1$ .

**Example 2: Find the slope of the line.**

Find two points on the line with integer coordinates, such as  $(1, -2)$  and  $(3, -3)$ . Divide the difference in the  $y$ -coordinates by the difference in the  $x$ -coordinates:  
$$\frac{-3 - (-2)}{3 - 1} = -\frac{1}{2}$$

The slope of the line is  $-\frac{1}{2}$ .



**Forms of Equations**

**Slope-Intercept Form of a Linear Equation**

$y = mx + b$ , where  $m$  is the slope and  $b$  is the  $y$ -intercept

**Point-Slope Form of a Linear Equation**

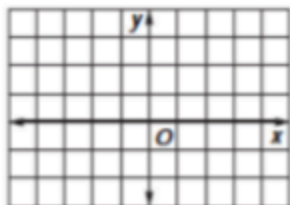
$y - y_1 = m(x - x_1)$ , where  $(x_1, y_1)$  are the coordinates of a point on the line and  $m$  is the slope of the line

**Parallel and Perpendicular Lines:** Remember that parallel lines have equal slope. The slopes of two perpendicular lines are negative reciprocals, that is, their product is  $-1$ .

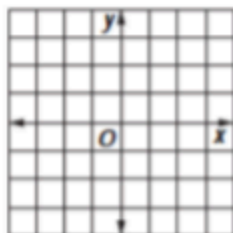
**PRACTICE:**

25. Find the  $x$ -intercept and the  $y$ -intercept of the graph of  $3y = 2x - 6$ .

26. Graph  $y = 3x + 2$

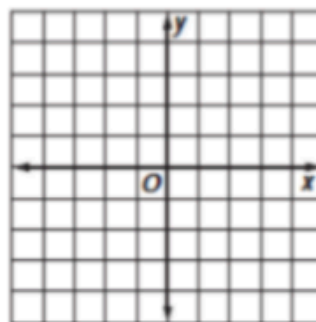


27. Graph  $y \geq -\frac{1}{2}x + 2$



28. Find the slope of the line that passes through  $(-7, 9)$  and  $(-6, -5)$ .

29. Graph the line passing through  $(2, 4)$  that is perpendicular to the graph of  $y = -3$ .



30. Write an equation in slope-intercept form for the line that has a slope of 2 and passes through  $(1, -5)$ .

31. Write an equation for the line that passes through  $(-2, 3)$  and is parallel to the line whose equation is  $3x + 2y = 6$ .