

Sec 1H Opener for January 8, 2019

$$f(x) = 2x - 6 \quad g(x) = x + 4 \quad 1(x+4)$$

1. What is **VERTICAL SHIFT** for $g(x)$? 4

2. What is **VERTICAL STRETCH** for $f(x)$? +2

3. What is **HORIZONTAL SHIFT** for $f(x)$?

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

4. Write $f(x)g(x)$.

$$f(x)g(x) = (2x-6)(x+4)$$

5. What are the **x-intercepts** for $f(x)g(x)$?

$$(3, 0) \quad (-4, 0)$$

Bonus: What is the **y-intercept**? $(0, -24)$

8.2H Lines are a Changin'

Name _____ Questions???

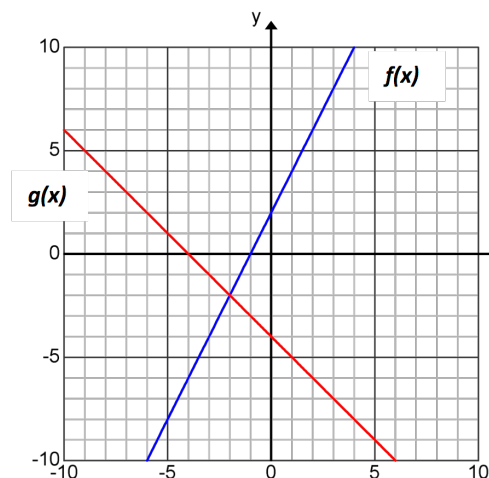
Per: _____

SHOW YOUR WORK. WORK IN PENCIL.

1. Use the **graph below** of the functions to answer the questions.

- Fill in the table from the graph below for $f(x)$ and $g(x)$
- Plot the points for $f(x) + g(x)$ in one color and $f(x)g(x)$ in a different color.
- What kind of graph is made by $f(x) + g(x)$? _____
- Write the equation for $f(x) + g(x)$? _____
- Where does $f(x) = g(x)$? _____
- Write the equation for $f(x)$: _____
- What is the y-intercept for $f(x)$: _____
- Where do you see this in your equation? _____
- Look at the graph, what's the x-int for $f(x)$: _____
- Change your equation to expose the x-int by factoring out the slope to look like: $y = m(x + \frac{b}{m})$. _____
- Write the equation for $g(x)$: _____
- What is the slope for $g(x)$: _____
- Where do you see this in your equation? _____
- What is the x-intercept for $g(x)$: _____
- Change your equation to show the x-intercept. _____
- What is $f(4) + g(4)$? _____
- What kind of graph is made by $f(x)g(x)$? _____
- What are your x-intercepts for $f(x)g(x)$ _____
- Write an equation in factored form for $f(x)g(x)$ based on "q" above. _____
- What is $g(-2)f(-2)$? _____

x	f(x)	g(x)	f(x) + g(x)	f(x)g(x)
-2				
-4				
2				
0				
-5				
4				



2. Given the equation $h(x) = 4x + 12$ ~~$4x + 12$~~ $-4x - 8$

- Fill in a table of values using the equation.
From the parent graph $f(x) = x$:
- What is the vertical stretch of $h(x)$? _____
- Where do you see the vertical stretch in the equation? _____
- What is the vertical shift of $h(x)$? _____
- Where do you see the vertical shift in the equation? _____
- Factor out the slope for $h(x)$. _____
- What is the horizontal shift of $h(x)$? _____
- Where do you see the horizontal shift in the equation? _____
- What change would happen if x became $(x + 3)$, or $h(x + 3)$? _____
- How would you make all the points on the line move down 8 units? _____
- Write the equation for your new line above: _____
- Show your equation that would show your new x-intercepts _____
- How would the vertical stretch change? _____

x	h(x)
-2	
-5	
0	
2	

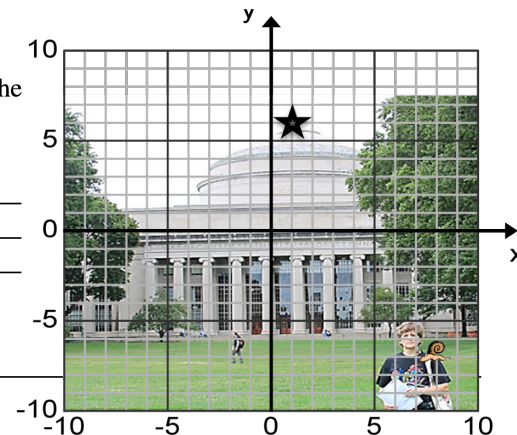
3. Compare the three equations $f(x) = 5x + 15$ and $d(x) = 3x + 6$ and $f(x) + d(x)$.
- How you would express $f(x) + d(x)$ as an equation? _____
 - Which of the three equations has the greatest vertical shift? _____
 - How do you know? _____
 - Factor the vertical stretch from all three equations: _____

 - Which equation has the greatest horizontal shift **left**? _____
 - How do you know? _____
 - Which equation has the greatest vertical stretch? _____
 - How do you know? _____

4. Given the equations $f(x) = 2x + 5$ and $d(x) = 3x + 2$, find:
- $f(x) + d(x) =$
 - $f(x) - d(x) =$
 - if $x = 1$, $f(x) + d(x) =$
 - If $x = 2$, $f(x) - d(x) =$
 - Write an equation (do not solve) for $f(x)d(x)$
 - If $x = -1$, $f(x) d(x) =$
 - Write an equation (do not solve) for $\frac{f(x)}{d(x)}$
 - If $x = 2$, $\frac{f(x)}{d(x)} =$

5. Given the equations $f(x) = x + 4$ and $d(x) = 2x + 5$, find:
- $f(x) + d(x)$
 - $f(x) - d(x)$
 - $f(1) + d(2)$
 - $f(-2) - d(3)$
 - Write an equation (do not solve) for $f(x)d(x)$
 - $f(4) \times d(2)$
 - Write an equation (do not solve) for $\frac{f(x)}{d(x)}$
 - $\frac{f(2)}{d(1)}$

6. Mrs. Burton took her pet snail to Boston to enroll her at MIT. While on the commons, Esmargo crept to the top of the dome in the quad at point (1, 6).
- Describe** the path Esmargo took if she crept along the slope triangle of the grid below. _____
 - Using math, what happened to the x value? _____
 - What happened to the y value? _____
 - Write this shorthand in a coordinate point: _____
 - What distance did Esmargo slither if she climbed up the hypotenuse of your slope triangle. _____
 - From the dome, Esmargo decided to rest under the little tree at (-5, -6). Describe her path (using the math notation as above). _____
 - How far did she slither from the top of the dome to under the tree? SYW. _____



8.2H Lines are a Changin'

Name _____ Per: _____

Key

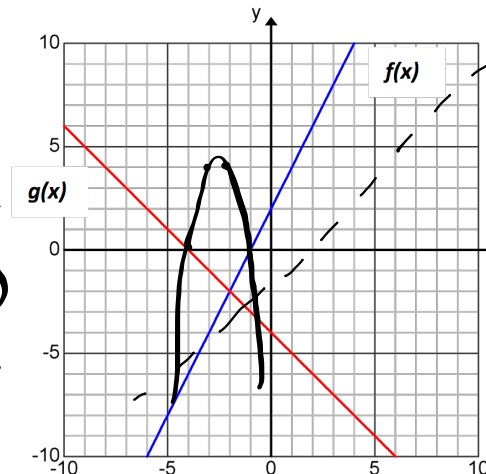
SHOW YOUR WORK. WORK IN PENCIL.

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1 Use the graph below of the functions to answer the questions.

- 4
2
18
- Fill in the table from the graph below for $f(x)$ and $g(x)$
 - Plot the points for $f(x) + g(x)$ in one color and $f(x)g(x)$ in a different color.
 - What kind of graph is made by $f(x) + g(x)$? linear
 - Write the equation for $f(x) + g(x)$? $x - 2$
 - Where does $f(x) = g(x)$? $(-2, -2)$
 - Write the equation for $f(x)$: $2x + 2$
 - What is the y-intercept for $f(x)$: $(0, 2)$
 - Where do you see this in your equation? constant
 - Look at the graph, what's the x-int for $f(x)$: $(-1, 0)$
 - Change your equation to expose the x-int by factoring out the slope to look like: $y = m(x + \frac{b}{m})$. $2(x+1)$
 - Write the equation for $g(x)$: $-x - 4$
 - What is the slope for $g(x)$: -1
 - Where do you see this in your equation? coefficient
 - What is the x-intercept for $g(x)$: $(-4, 0)$
 - Change your equation to show the x-intercept. $-1(x+4)$
 - What is $f(4) + g(4)$? 2
 - What kind of graph is made by $f(x)g(x)$? parabola
 - What are your x-intercepts for $f(x)g(x)$? $(-4, 0)$ $(-1, 0)$
 - Write an equation in factored form for $f(x)g(x)$ based on "q" above. $(2x+2)(-x-4)$
 - What is $g(-2)f(-2)$? 4

x	f(x)	g(x)	f(x) + g(x)	f(x)g(x)
-2	-2	-2	-4	4
-4	-6	0	-6	0
2	6	-6	0	-36
0	2	-4	-2	-8
-5	-8	1	-7	-8
4	10	-8	2	-80



2 Given the equation $h(x) = 4x + 12 - 4x - 8$

- 2
12
- Fill in a table of values using the equation.
From the parent graph $f(x) = x$:
 - What is the vertical stretch of $h(x)$? -4
 - Where do you see the vertical stretch in the equation? slope
 - What is the vertical shift of $h(x)$? -8
 - Where do you see the vertical shift in the equation? y-int, constant
 - Factor out the slope for $h(x)$. $-4(x+2)$
 - What is the horizontal shift of $h(x)$? -2
 - Where do you see the horizontal shift in the equation? add to x in factor form
 - What change would happen if x became $(x+3)$, or $h(x+3)$? shift left 3
 - How would you make all the points on the line move down 8 units? -8 from y-int
 - Write the equation for your new line above: $-4x - 16$
 - Show your equation that would show your new x-intercept: $-4(x+4)$
 - How would the vertical stretch change? it wouldn't

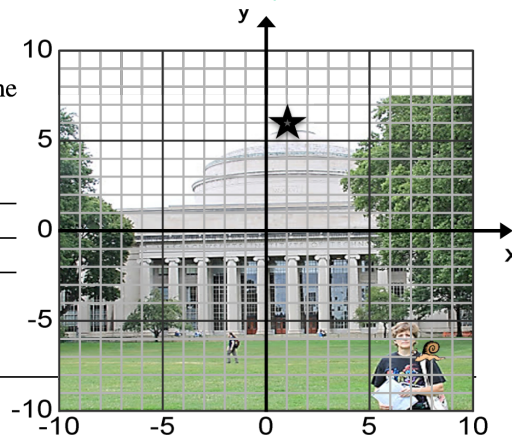
x	h(x)
-1	-4
0	-8
1	-12
2	-16
3	-20

3. Compare the three equations $f(x) = 5x + 15$ and $d(x) = 3x + 6$ and $f(x) + d(x)$.
- 10 a. How you would express $f(x) + d(x)$ as an equation? $8x + 21$
 b. Which of the three equations has the greatest vertical shift? $f(x)+d(x)$
 c. How do you know? largest y int
 d. Factor the vertical stretch from all three equations: $5(x+3)$ $3(x+2)$ $8(x+2\frac{1}{8})$
 e. Which equation has the greatest horizontal shift left? $f(x)$
 f. How do you know? smallest x-int
 g. Which equation has the greatest vertical stretch? $f(x)+d(x)$
 h. How do you know? largest slope

4. Given the equations $f(x) = 2x + 5$ and $d(x) = 3x + 2$, find:
- 8 a. $f(x) + d(x) =$ $5x + 7$ e. Write an equation (do not solve) for $f(x)d(x)$ $(2x+5)(3x+2)$ g. Write an equation (do not solve) for $\frac{f(x)}{d(x)}$ $\frac{2x+5}{3x+2}$
 b. $f(x) - d(x) =$ $-x + 3$ f. If $x = -1, f(x) d(x) =$ -3 h. If $x = 2, \frac{f(x)}{d(x)} =$ $\frac{9}{8}$
 c. if $x = 1, f(x) + d(x) =$ 12
 d. If $x = 2, f(x) - d(x) =$ 1

5. Given the equations $f(x) = x + 4$ and $d(x) = 2x + 5$, find:
- 8 a. $f(x) + d(x)$ $3x + 9$ d. $f(-2) - d(3)$ -9 g. Write an equation (do not solve) for $\frac{f(x)}{d(x)}$ $\frac{x+4}{2x+5}$
 b. $f(x) - d(x)$ $-x - 1$ e. Write an equation (do not solve) for $f(x)d(x)$ $(x+4)(2x+5)$ h. $\frac{f(2)}{d(1)}$ $\frac{6}{7}$
 c. $f(1) + d(2)$ 14 f. $f(4) \times d(2)$ 72

6. Mrs. Burton took her pet snail to Boston to enroll her at MIT. While on the commons, Esmargo crept to the top of the dome in the quad at point (1, 6).
- 7 a. Describe the path Esmargo took if she crept along the slope triangle of the grid below. left 7 up 13
 b. Using math, what happened to the x value? -7
 c. What happened to the y value? $+13$
 d. Write this shorthand in a coordinate point: $(-7, 13)$
 e. What distance did Esmargo slither if she climbed up the hypotenuse of your slope triangle. $\sqrt{218}$
 f. From the dome, Esmargo decided to rest under the little tree at $(-5, -6)$. Describe her path (using the math notation as above). $(-6, -12)$
 g. How far did she slither from the top of the dome to under the tree? SYW. $6\sqrt{5}$



Multiplying Polynomials

There are four methods we will show you.

- Stacking Method
- Box Method
- Distributive Method
- FOIL

STACKING METHOD

$$(3x + 7)(x - 5)$$

$$\begin{array}{r} 3x + 7 \\ \times \quad x - 5 \\ \hline -15x - 35 \\ 3x^2 + 7x \\ \hline 3x^2 - 8x - 35 \end{array}$$

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

$$6x^2 - 5x - 6$$

2. $(4s + 3)(s - 7)$

$$4s^2 - 25s - 21$$

BOX METHOD

$$(t+4)(t+2)$$

	$t+2$	
t	t^2	$2t$
$+4$	$4t$	8

$$t^2 + 6t + 8$$

1. $(a+9)(a+5)$

$$a^2 + 14a + 45$$

	$a+5$	
a	a^2	$5a$
$+9$	$9a$	45

2. $(r+1)(r+6)$

$$r^2 + 7r + 6$$

DISTRIBUTIVE METHOD

To distribute means to multiply every term in the parentheses. The same applies to binomials and polynomials.

$$6(x - 2) = 6 * x - 6 * 2 = 6x - 12$$

$$(x + 4)(x - 5)$$

$$x(x - 5) + 4(x - 5)$$
$$x^2 - 5x + 4x - 20$$

1. $(x + 9)(x + 5)$

$$x^2 - x - 20$$

$$x(x + 5) + 9(x + 5)$$

2. $(x - 1)(x - 4)$

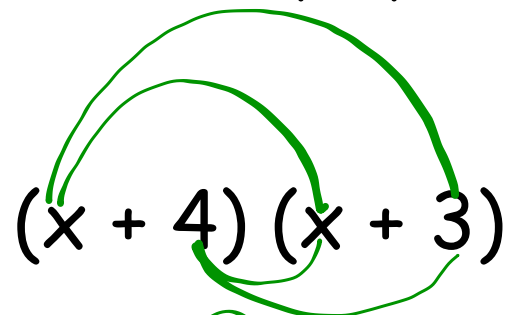
$$x^2 + 14x + 45$$

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

FOIL

First Outside Inside Last

This is just a specific application of binomials and the distributive property.

$$(x + 4)(x + 3)$$


$$x^2 + 3x + 4x + 12$$

$$x^2 + 7x + 12$$

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

2. $(2x - 1)(x - 4)$

Your Turn

Using the method of your choice, multiply the following:

1. $(3x + 2)(x + 5)$

2. $(x + 12)(x + 2)$

Bonus: $(2x^2 + 4x + 5)(3x^2 + x + 9)$ SHOW WORK!