# Unit 8H Function Operations Study Guide

Name: ______________________ Per: _____

| Assn | Learning Objective | A Day | B Day | Done |
|---|---|---|---|---|
| 8SG | Function Operations Study Guide | | | |
| 8.1 | Function Addition and Subtraction | Jan 3 | Jan 4 | |
| 8.2 | Lines Are a Changin’ | Jan 7 | Jan 8 | |
| 8.3 | Multiplying Binomials | Jan 9 | Jan 10 | |
| 8R | Function Operations Review | Jan 11 | Jan 14 | |
| | Unit 8 EMT | Jan 15 | Jan 16 | |

| Targets | Sample Question | Struggle | Help | OK | Yeah | Assn |
|---|---|---|---|---|---|---|
| Add and Subtract Functions | Given f(x) & g(x), find f(x) + g(x) OR $(f+g)(x)$ algebraically and graphically. Show the relation to a table. | | | | | 8.1, 8.2 |
| Multiply Expressions | Give $f(x) = 3x + 5$ and $g(x) = 5x + 5$. Find $f(x)g(x)$ | | | | | 8.2-R |
| Shifts (Vertical & Horizontal) | Given a linear equation, identify the vertical and horizontal shifts from the parent graph.. | | | | | 1.1, 8.1-R |
| Vertical Stretch | Given an equation, identify the vertical stretch | | | | | 8.1-R |

## Vocabulary

Parabola: ____________________________________________

Binomial ____________________________________________

Vertical Shift: ______________________ Horizontal Shift: ______________________

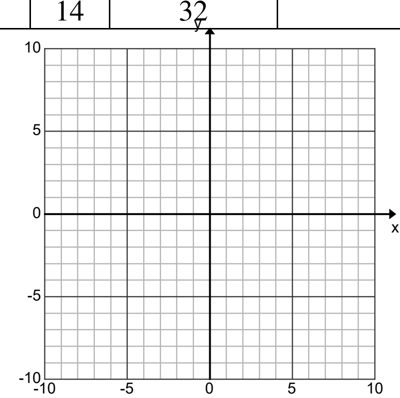
Vertical Stretch: ____________________________________________

## Adding/Subtracting Functions

| x | $f(x)$ | $g(x)$ | $f(x) + g(x)$ | $f(x) - g(x)$ |
|---|---|---|---|---|
| 1 | 6 | | 12 | 0 |
| 2 | 9 | 8 | | 1 |
| 3 | 12 | | 22 | 2 |
| 4 | | 12 | | 3 |
| 5 | | 14 | 32 | |

Lines have only one dimension. Adding or subtracting lines results in a new ___________. The input (x) gives an output $f(x)$. Adding the outputs would be the same as adding the two functions.

Add/Subtract functions in a table by performing the operation on the values. Complete the table to the right then use that table to fill in the table below.

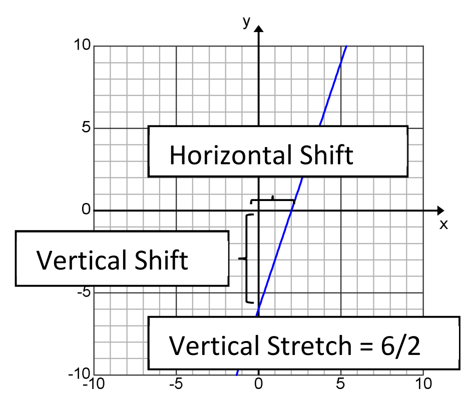


| | Slope | Y-int | Equation |
|---|---|---|---|
| $f(x)$ | | | |
| $g(x)$ | | | |
| $f(x) + g(x)$ | | | |
| $f(x) - g(x)$ | | | |

Graph and label the four equations from the table on the grid. Note that the function can be _____________ or subtracted on a graph by using the outputs.

## Transformations

The “parent graph of a linear equation is y = x. (In the parent equation, the slope is _____ and the y-intercept is __________.




To shift the parent equation vertically (up/down), add or ______________ a y-intercept. From the parent graph, write the equation for a line with a vertical shift of + 9. _________________.

The slope of a linear parent graph is 1/1. Altering the rate of change "stretches" or "smooshes" the rise compared to the run (1). Another name for slope is "vertical ______________" as the rise is "stretched" compared to the parent graph. (Non-linear graphs can also be "stretched".) In the equation for the graph above, y = 3x – 6, the vertical stretch is ____ or 3/1.

Applying a vertical shift to a parent graph will also shift it horizontally right or left depending on whether the slope is positive or ________________. On the graph above, the equation has a vertical shift of -6 and a slope of 3. The graph also "shifted" horizontally from the origin +2 units (to the right). You can expose the inverse of the horizontal shift in an equation by factoring out the slope. For y = 3x – 6, y = 3(x – ___).

## Multiplying Functions

Multiplying two one-dimensional figures (linear equations) results in a two dimensional figure (or second degr~~e~~e polynomial). (Remember, "When you multiply, you add dimensions."). The resultant graph is _____________ a **parabola**.

**Find the equation** for *f*(x): _______________ *g*(x): _________________

Vertical shift of *f*(x)? ______ Vertical stretch of *f*(x)? ________

Write the equation for *f*(x) that exposes the horizontal shift:_______________

Vertical shift of *g*(x)? ______ Vertical stretch of g(x)? ________

Write the equation for *g*(x) that exposes the horizontal shift:_______________

| x | *f*(x) | *g*(x) | *f*(x)*g*(x) |
|---|---|---|---|
| -5 | -9 | -1 | 9 |
| -4 | | 0 | 0 |
| -3 | -3 | | -3 |
| -2 | 0 | 2 | |
| -1 | | 3 | 9 |

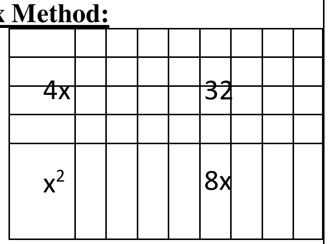
**Write the expression** for *f*(x)*g*(x) showing the factors to be multiplied. _(___________)(___________)

**Stack It Method:**

$$\begin{array}{r} x + 4 \\ \underline{x + 8} \\ 8x + 32 \\ \underline{x^2 + 4x \quad\ .} \\ x^2 + 12x + 32 \end{array}$$

FIND: (x + 4)(x – 2)

**Box Method:**




(x + 8)

FIND: (x + 2)(x + 2)

**Distribution Method:**

(x + 4)(x + 8) =

x(x + 8) + 4(x + 8) =

$x^2$ + 8x + 4x + 32

FIND: (x + 5)(x – 3)

**FOIL Method**

(First, Outside, Inside, Last)

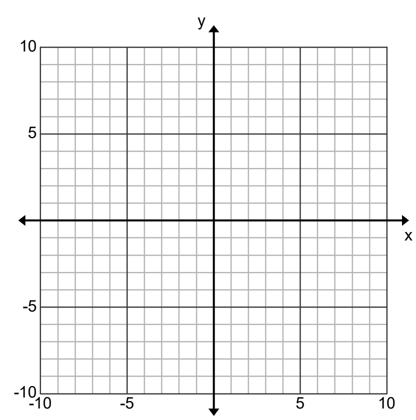
(x + 4)(x + 8)

FIND: (x + 3)(x – 4)

## Multiplying Linear Equations on a Graph.

As in adding linear equations by adding outputs on a graph, multiplying linear outputs reveals the parabolic outputs on the graph.

Given the two lines *g*(x) = 3x + 3 and *p*(x) = –2x + 4, complete the table. Graph the two lines. Multiply the individual linear outputs to find the **parabolic outputs**.




| x | *g*(x) | *p*(x) | g(x) *p*(x) |
|---|---|---|---|
| | 0 | | |
| | | 0 | |
| 0 | | | |
| | | | |

Note that the parabola has two x-intercepts: (      , 0) & (      , 0)

**Multiply the equations using any method above**. Check your table by multiplying the equations in your calculator: