

Function Shift Lab

Build new functions by changing inputs and outputs.

HIGH SCHOOL • MA.912.F.2.5

MA.912.F.2.5 "Given a table, equation or graph that represents a function, create a corresponding table, equation or graph of the transformed function defined by adding a real number to the x- or y-values or multiplying the x- or y-values by a real..."

NAME _____

DATE _____

TRANSFORM THE COORDINATES

Adding b to every y -value gives $y = f(x) + b$, and multiplying every y -value by k gives $y = kf(x)$. Adding h to every x -value gives $y = f(x - h)$, and multiplying every x -value by a gives $y = f(x/a)$. For x -value multiplication, $a \neq 0$ because sending every input to 0 generally does not produce a function.

WORKED EXAMPLE

$f(x) = 11x + 13$. Create $g(x)$ when every y -value is multiplied by 17.

1. $g(x) = 17f(x)$

2. $g(x) = 17(11x + 13)$

3. $g(x) = 187x + 221$

Answer: $g(x) = 187x + 221$

PRACTICE 6 problems

- 1** The table represents f . Add 6 to each y -value and create a table for g . x : -8 -2 0 3
 $f(x)$: 1 -5 4 9

ANSWER _____

- 2** $f(x) = 3x - 8$. Create $g(x)$ when 6 is added to every x -value.

ANSWER _____

- 3** The table represents f . Multiply every x -value by -2 and create a table for g . x : -9 -1 2 6
 $f(x)$: 3 8 -4 5

ANSWER _____

- 4** $h(x) = x^2 + 6$. Create $g(x)$ when every y -value is multiplied by -3.

ANSWER _____

- 5** $p(x) = -5x + 9$. Create $q(x)$ when 12 is added to every x -value.

ANSWER _____

- 6** The table represents r . Multiply every y -value by $1/2$ and create a table for s . x : -8 0 8
 $r(x)$: 10 -6 18

ANSWER _____

APPLY IT Show your work

1

A student runs a video channel. $f(x) = 6x + 10$ gives the dollars earned from x thousand views during a campaign. A sponsor adds \$15 to the earnings at every view level. Write an equation for $g(x)$, the new earnings function.

WORK SPACE

ANSWER _____

2

A school esports club is enlarging a floor plan. The table gives the x -coordinate and y -coordinate of each stage position. The club multiplies every x -coordinate by 3. Create the table for the new function g . x : -4 0 5 $f(x)$: 2 -3 7

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

$f(x) = 2x^2 - 5$. First multiply every x -value by -3. Then add 4 to every y -value. Write the equation of the final function $g(x)$.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	The table represents f . Add 6 to each y -value and create a table for g . x : -8 -2 0 3 $f(x)$: 1 -5 4 9	x: -8 -2 0 3 $g(x)$: 7 1 10 15
2	$f(x) = 3x - 8$. Create $g(x)$ when 6 is added to every x -value.	$g(x) = 3x - 26$
3	The table represents f . Multiply every x -value by -2 and create a table for g . x : -9 -1 2 6 $f(x)$: 3 8 -4 5	x: 18 2 -4 -12 $g(x)$: 3 8 -4 5
4	$h(x) = x^2 + 6$. Create $g(x)$ when every y -value is multiplied by -3.	$g(x) = -3x^2 - 18$
5	$p(x) = -5x + 9$. Create $q(x)$ when 12 is added to every x -value.	$q(x) = -5x + 69$
6	The table represents r . Multiply every y -value by $\frac{1}{2}$ and create a table for s . x : -8 0 8 $r(x)$: 10 -6 18	x: -8 0 8 $s(x)$: 5 -3 9

PART 2 • APPLY IT

- $g(x) = 6x + 25$** The sponsor changes each output, so add 15 to $f(x)$. $g(x) = f(x) + 15 = 6x + 25$.
- x : -12 0 15 $g(x)$: 2 -3 7** Multiply each input, or x -coordinate, by 3. Keep each corresponding y -value unchanged.

CHALLENGE

$$g(x) = 2x^2/9 - 1$$

Accept equivalent equation forms, such as $g(x) = 3(x - 6) - 8$ for problem 2. For tables, accept rows or ordered pairs in any order as long as each transformed input is matched with its original output.