LESSON MAKER PRO

Function Shift Lab

Track how each change moves a function.

HIGH SCHOOL · MA.912.F.2.1

MA.912.F.2.1 "Identify the effect on the graph or table of a given function after replacing f(x) by f(x)+k,kf(x), f(kx) and f(x+k) for specific values of k."

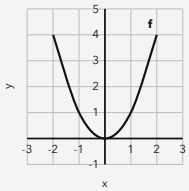
NAME _____ DATE _____

TRANSFORMATION RULES

For k > 0, f(x)+k moves a graph up k, kf(x) multiplies every y-value by k, f(kx) divides every x-value by k, and f(x+k) moves a graph left k. A negative multiplier reflects the graph across the x-axis as it multiplies the y-values.

WORKED EXAMPLE

The grid shows f. Let g(x)=f(x)+3. Find the vertex of g.



1. The vertex of f is (0,0).
2. Add 3 to the y-coordinate.
3. The new vertex is (0,3).

Answer: (0,3)

PRACTICE 4 problems

1 Let g(x)=f(x)+5. Describe the change from f to g.

ANSWER _____

2 Point (3,-1) is on f. If g(x)=4f(x), what point is on g?

ANSWER _____

3 Point (10,6) is on f. If g(x)=f(5x), what point is on g?

ANSWER _____

4 Point (7,9) is on f. If g(x)=f(x-6), what point is on g?

ANSWER _____

APPLY IT Show your work

1 The table gives f(d), the downloads a student band's song gets on day d. Let g(d)=f(d)+7. Write the three g(d) values in order.

SONG DOWNLOADS

d	f(d)
1	14
3	19
5	16

ANSWER _____

2 A gaming club's score-difference graph has x-intercept A. The number line shows its x-coordinate. If h(x)=f(9x), give the x-intercept of h.



ANSWER _____

CHALLENGE One step up

Point (12,-3) is on f. For g(x)=-10f(x+11), find the corresponding point on g. Explain the horizontal and vertical changes.

WORK SPACE AND ANSWER

ANSWER KEY # Function Shift Lab

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Let g(x)=f(x)+5. Describe the change from f to g.	**Shift up 5 units.**
2	Point (3,-1) is on f. If g(x)=4f(x), what point is on g?	**(3,-4)**
3	Point (10,6) is on f. If g(x)=f(5x), what point is on g?	**(2,6)**
4	Point (7,9) is on f. If g(x)=f(x-6), what point is on g?	**(13,9)**

PART 2 · APPLY IT

1. **21, 26, 23** Add 7 to each output: 14+7=21, 19+7=26, and 16+7=23.
2. **(8/9,0)** For f(9x), divide each x-coordinate by 9. The intercept moves from x=8 to x=8/9.

CHALLENGE

(1,30). The x-coordinate moves left 11, and the y-coordinate is multiplied by -10.

Accept coordinate pairs with equivalent fraction forms. For transformation descriptions, accept equivalent direction language such as “5 units upward” or “right 6 units.”