LESSON MAKER PRO

Graph Shift Lab

Find what changed and by how much.

GRADE 8 · 8A.AF.I.25

8A.AF.I.25 "Identify the effect on the graph of replacing f (x) by f (x) + k, k·f (x), f (kx), and f (x + k) for specific values of k (both positive and negative); find the value of k given the graphs..."

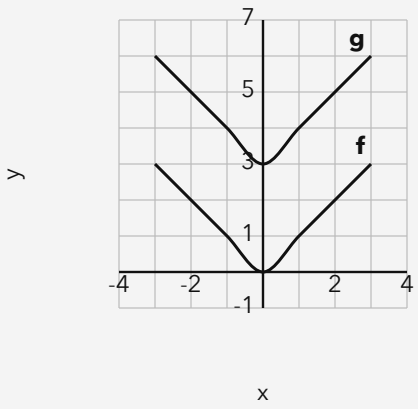
NAME _____ DATE _____

THE BIG IDEA

In f(x)+k, positive k shifts the graph up and negative k shifts it down. In f(x+k), positive k shifts left and negative k shifts right. In k·f(x), heights multiply by k; in f(kx), horizontal distances divide by |k|. A negative multiplier also reflects the graph.

WORKED EXAMPLE

The graph shows f(x)=|x| and g(x). Find k if g(x)=f(x)+k.



1. At x=0, f(0)=0 and g(0)=3.
2. Subtract: k=g(0)-f(0)=3-0.

Answer: k=3

PRACTICE 4 problems

1 If $g(x)=x^2-4$, how does its graph compare with $f(x)=x^2$?

ANSWER _____

2 If f(x)=|x| and g(x)=-2f(x), name both changes to the graph.

ANSWER _____

3 If $f(x)=2^x$ and g(x)=f(-x), how does the graph change?

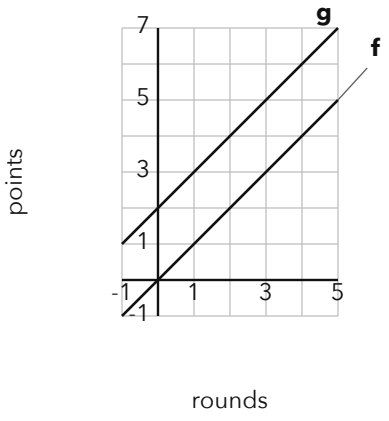
ANSWER _____

4 If g(x)=f(2x), what happens to each point's horizontal distance from the y-axis?

ANSWER _____

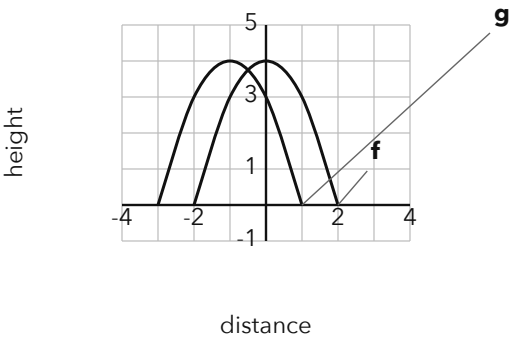
APPLY IT Show your work

1 In a game, f(x) is your points after x rounds. A bonus gives the score g(x)=f(x)+k. Use the graph to find k.



ANSWER _____

2 The curves show a skater's height during two jumps. Horizontal distance x is measured from a marker. If g(x)=f(x+k), find k and name the shift.



ANSWER _____

CHALLENGE One step up

Let f(x)=x when x<0 and f(x)=2x when x≥0. If g(x)=f(-2x), find g(-1) and g(1). Explain how the graph changes.

WORK SPACE AND ANSWER

ANSWER KEY

Graph Shift Lab

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PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	If $g(x)=x^2-4$, how does its graph compare with $f(x)=x^2$?	**It shifts down 4 units.**
2	If $f(x)=\|x\|$ and $g(x)=-2f(x)$, name both changes to the graph.	**Reflect across the x-axis and stretch vertically by a factor of 2.**
3	If $f(x)=2^x$ and $g(x)=f(-x)$, how does the graph change?	**It reflects across the y-axis.**
4	If $g(x)=f(2x)$, what happens to each point's horizontal distance from the y-axis?	**It is divided by 2.**

PART 2 · APPLY IT

1. **k=2 points** At x=0, the graph shows f(0)=0 and g(0)=2, so k=2.
2. **k=1; g is f shifted left 1 unit.** The highest point moves from x=0 on f to x=-1 on g. A shift left by 1 means k=1.

CHALLENGE

g(-1)=4 and g(1)=-2. Reflect f across the y-axis, then compress it horizontally by a factor of 1/2.

For the challenge, accept the reflection and horizontal compression in either order. Accept equivalent descriptions of a horizontal distance divided by 2.