ALBERT

Name _____ Date _____

Transformations of Functions Worksheet

Algebra 1 · Common Core HSF-BF.B.3

> 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. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

Practice

Builds the skill step by step.

1. How does the graph of f(x) + 3 compare with the graph of f(x)?

   A. It is shifted up 3.

   B. It is shifted down 3.

   C. It is shifted right 3.

   D. It is shifted left 3.

2. How does the graph of f(x − 2) compare with the graph of f(x)?

   A. It is shifted left 2.

   B. It is shifted down 2.

   C. It is shifted up 2.

   D. It is shifted right 2.

3. What is the vertex of $g(x) = x^2 + 5$?

4. What is the vertex of $g(x) = (x + 4)^2$?

5. How does the graph of $-f(x)$ compare with the graph of $f(x)$?

   A. It is shifted down 1.

   B. It is reflected across the y-axis.

   C. It is reflected across the x-axis.

   D. It is unchanged.

6. What is the vertex of $g(x) = |x| - 6$?

7. How does the graph of $2f(x)$ compare with the graph of $f(x)$?

   A. It is shifted right 2.

   B. It is stretched vertically by a factor of 2.

   C. It is shifted up 2.

   D. It is compressed vertically.

8. $f(x) = x^2$ and $g(x) = f(x - 3) + 1$. What is the vertex of g?

9. Which function is even?

   A. $f(x) = 2^x$

   B. $f(x) = x^3$

   C. $f(x) = x^2$

   D. $f(x) = x + 1$

10. $f(0) = 2$, and $g(x) = f(x) + k$ has $g(0) = 7$. What is k?

ALBERT

Name _____ Date _____

Transformations of Functions Worksheet

Algebra 1 · Common Core HSF-BF.B.3

On Level

Grade-level practice.

1. What is the vertex of $g(x) = (x - 5)^2 - 2$?

2. $f(x) = |x|$ and $g(x) = 3|x|$. What is $g(2)$?

3. $f(x) = x^2$ and $g(x) = f(2x)$. What is $g(3)$?

4. The graph of g is the graph of f shifted 4 units left, so $g(x) = f(x + k)$. What is k?

5. Which function is odd?

   A. $f(x) = |x|$

   B. $f(x) = x^3$

   C. $f(x) = x + 2$

   D. $f(x) = x^2$

6. Describe how the graph of $g(x) = -(x + 1)^2 + 3$ is related to the graph of $f(x) = x^2$.

7. $f(x) = 2^x$ and $g(x) = 2^x - 4$. g has a horizontal asymptote $y = c$. What is c?

8. The point (2, 5) is on the graph of f. $g(x) = f(x) - 3$. What is g(2)?

9. The point (2, 5) is on the graph of f. $g(x) = f(x - 1)$. The matching point on g is (a, 5). What is a?

10. Is $f(x) = x^2 + x$ even, odd or neither?

    A. neither

    B. even

    C. odd

    D. both

Transformations of Functions Worksheet

Algebra 1 · Common Core HSF-BF.B.3

Challenge

Multi-step and word problems that stretch it.

1. The point (4, 6) is on the graph of f. g(x) = 2f(x) + 1. The matching point on g is (4, b). What is b?

2. The point (3, 7) is on the graph of f. g(x) = f($\frac{1}{2}$x). The matching point on g is (a, 7). What is a?

3. g(x) = k · x^2 passes through (2, 12). What is k?

4. f(x) = √x starts at (0, 0). g(x) = √(x + 9). At what x-value does the graph of g start?

5. How does the graph of f(−x) compare with the graph of f(x)?

   A. It is reflected across the x-axis.

   B. It is shifted left 1.

   C. It is unchanged.

   D. It is reflected across the y-axis.

6. f is an odd function and f(3) = 5. What is f(−3)?

7. f is an even function and $f(-4) = 9$. What is $f(4)$?

8. Explain why $f(x) = x^3 - x$ is an odd function.

9. The vertex of f is (1, 4). $g(x) = f(x + 3) - 2$. What is the vertex of g?

10. $f(x) = x^2$ and $g(x) = -f(x) + k$. The maximum value of g is 10. What is k?