

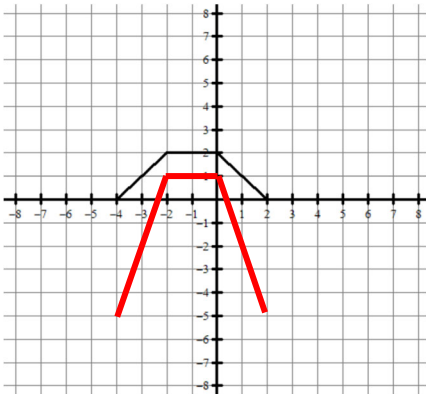
1.12B Dilations of Functions

AP Precalculus

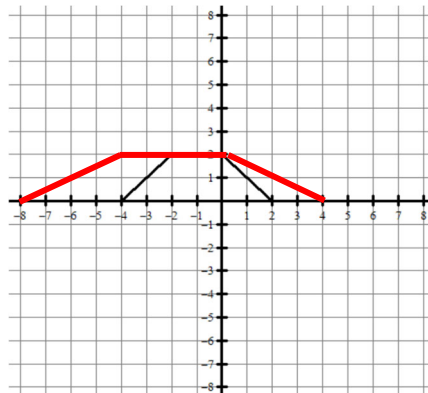
1.12B Practice

GRAPHICAL TRANSFORMATION. Use the graph of f to graph $g(x)$.

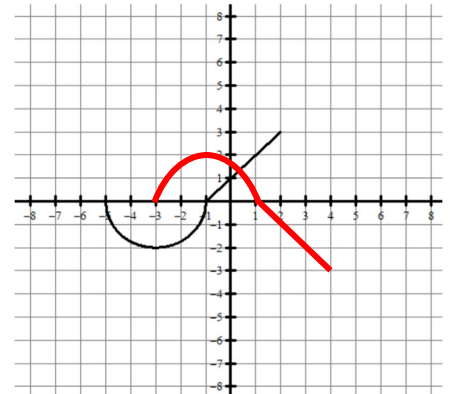
1. $g(x) = 3f(x) - 5$



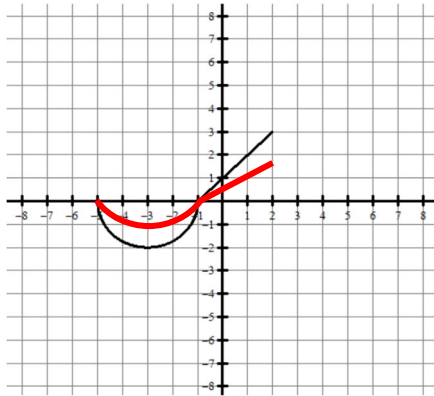
2. $g(x) = f\left(\frac{1}{2}x\right)$



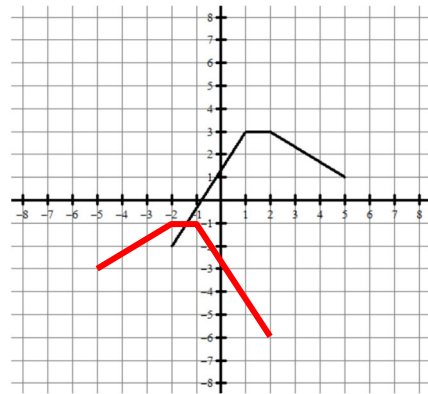
3. $g(x) = -f(x - 2)$



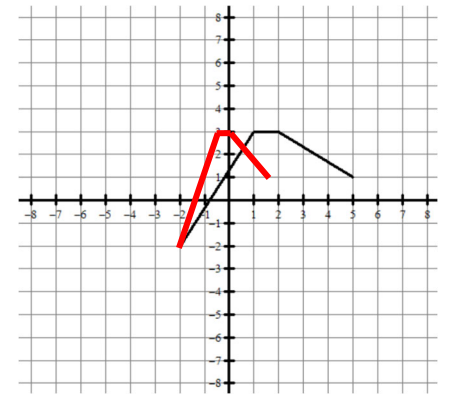
4. $g(x) = \frac{1}{2}f(x)$



5. $g(x) = f(-x) - 4$



6. $g(x) = f(2(x + 1))$



ALGEBRAIC TRANSFORMATION. Express the $g(x)$ in terms of x .

7. $f(x) = 4x + 3$

$g(x) = 3f(x) + 5$, find $g(x)$.

$$g(x) = 3[4x + 3] + 5$$

$$g(x) = 12x + 9 + 5$$

$$g(x) = 12x + 14$$

8. $f(x) = 2x + 6$

$g(x) = f\left(\frac{1}{2}(x + 2)\right) - 1$, find $g(x)$.

$$g(x) = 2\left[\frac{1}{2}(x + 2)\right] + 6 - 1$$

$$g(x) = 2\left[\frac{1}{2}x + 1\right] + 6 - 1$$

$$g(x) = x + 2 + 6 - 1$$

$$g(x) = x + 7$$

9. $f(x) = 4x - 5$

$g(x) = -2f(x + 1) + 5$, find $g(x)$.

$$g(x) = -2[4(x + 1) - 5] + 5$$

$$g(x) = -2[4x + 4 - 5] + 5$$

$$g(x) = -2[4x - 1] + 5$$

$$g(x) = -8x + 2 + 5$$

$$g(x) = -8x + 7$$

10. $f(x) = 2x^2 - 3x + 1$

$g(x) = f(2x) + 3$, find $g(x)$.

$$g(x) = [2(2x)^2 - 3(2x) + 1] + 3$$

$$g(x) = [2(4x^2) - 6x + 1] + 3$$

$$g(x) = 8x^2 - 6x + 1 + 3$$

$$g(x) = 8x^2 - 6x + 4$$

NUMERIC TRANSFORMATION. Use the table of values to answer the following.

11. Given the table of values for f .

x	$f(x)$
-9	2
-3	8
2	15
6	-2
8	-13

Let $g(x) = f(3x) + 1$, find $g(2)$.

$$\begin{aligned} g(2) &= f(3 \cdot 2) + 1 \\ &= f(6) + 1 \\ &= -2 + 1 \\ g(2) &= -1 \end{aligned}$$

12. Given the table of values for f .

x	$f(x)$
0	0
1	2
2	4
3	8
4	16

Let $g(x) = 2f(x+2) - 3$, find $g(1)$.

$$\begin{aligned} g(1) &= 2f(1+2) - 3 \\ &= 2f(3) - 3 \\ &= 2 \cdot 8 - 3 \\ g(1) &= 13 \end{aligned}$$

13. Given the table of values for f .

x	$f(x)$
-8	-32
-2	6
0	-8
2	21
8	14

Let $g(x) = 4f(-x)$, find $g(2)$.

$$\begin{aligned} g(2) &= 4 \cdot f(-2) \\ &= 4 \cdot 6 \\ g(2) &= 24 \end{aligned}$$

DOMAIN AND RANGE TRANSFORMATION. Find the domain and range of the transformed function.

14. Given the graph for f has a domain of $(-6, 8]$ and range of $[-4, 8]$.

$$\text{Let } g(x) = -3f(2x).$$

Find the domain and range of $g(x)$.

Domain compresses by $1/2$

$$(-3, 4]$$

Range vertical reflection and stretches by 3

$$[-24, 12]$$

15. Given the graph for f has a domain of $(0, 5)$ and range of $[-10, 4]$.

$$\text{Let } g(x) = 2f(x-3) + 4.$$

Find the domain and range of $g(x)$.

Domain shifts right 3

$$(3, 8)$$

Range stretches by 2 and shifts up 4

$$[-16, 12]$$

16. Given the graph for f has a domain of $[-2, 4]$ and range of $(-6, 8)$.

$$\text{Let } g(x) = f\left(\frac{1}{2}x\right) + 5.$$

Find the domain and range of $g(x)$.

Domain stretches by 2

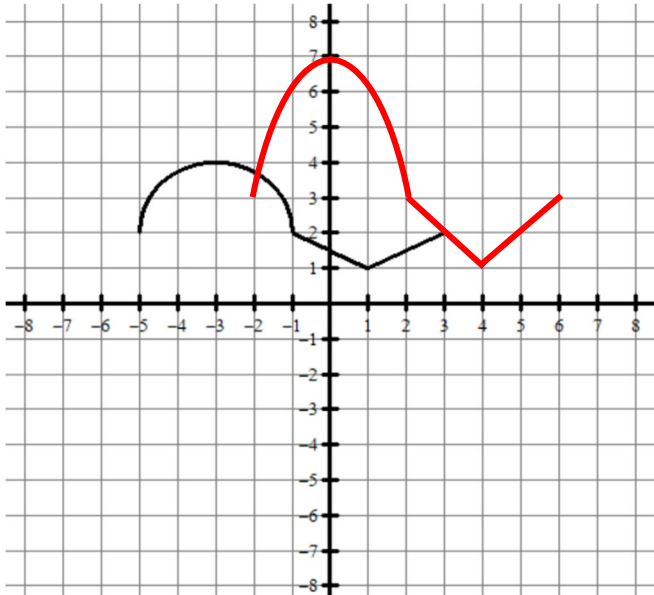
$$[-4, 8]$$

Range shifts up 5

$$(-1, 13)$$

Use the graph f to answer the following.

17.



Let the $g(x) = 2f(x-3) - 1$

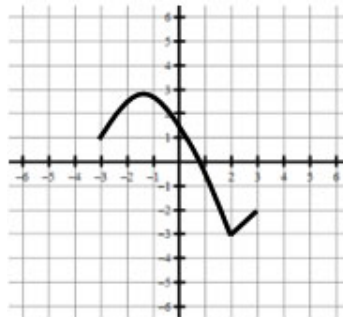
- Graph the $g(x)$.
- State the domain of $g(x)$. $[-2, 6]$
- State the range of $g(x)$. $[1, 7]$
- Find $g(-2)$. $= 3$
- Find the zeroes of $g(x)$. none
- Find the y-intercept of $g(x)$. 7

1.12B Dilations of Functions

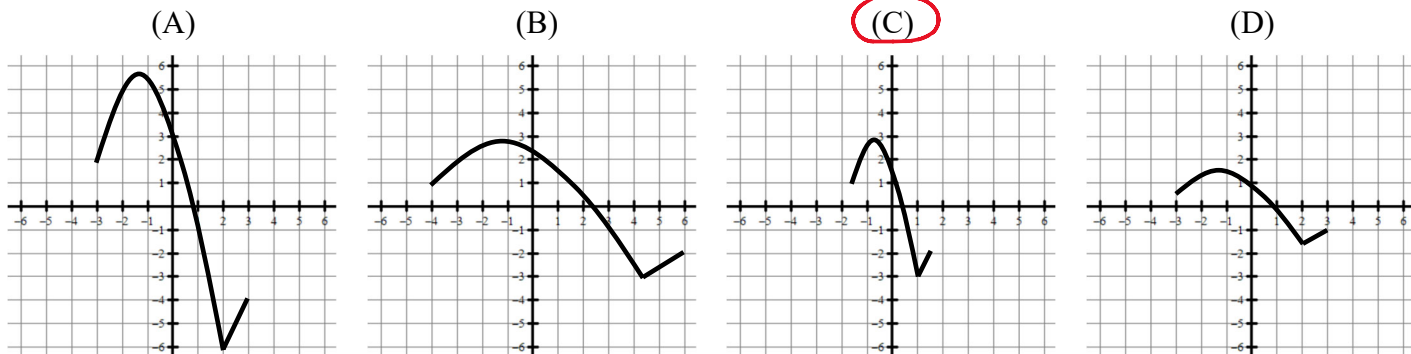
1.12B Test Prep

Multiple Choice

18. The graph of $y = f(x)$ is shown for $-3 \leq x \leq 4$.



Which of the following is the transformed graph for $y = f(2x)$? *compress horizontally $\frac{1}{2}$*



19. The table gives values for a polynomial function f at selected values of x .

x	-2	0	2	4	8	16
$f(x)$	38	12	-24	-32	-12	-48

In the xy -plane, the graph of g is constructed by applying three transformations to the graph of f in this order: a horizontal dilation of $\frac{1}{2}$, a vertical dilation of 4 and vertical translation by 6 units. What is the value of $g(4)$?

- (A) 3
 - (B) -42**
 - (C) -90
 - (D) 0
- Handwritten work:*
 $g(x) = 4 \cdot f(2x) + 6$
 $g(4) = 4 \cdot f(2 \cdot 4) + 6$
 $g(4) = 4 \cdot f(8) + 6$
 $g(4) = 4(-12) + 6$
 $g(4) = -48 + 6$

20. The function g is defined by f such that $g(x) = 3f(2x) - b$. If $f(2) = a$, $f(4) = 8$, $g(1) = 7$ and $g(2) = 19$ what is the value of a ?

- (A) 6
 - (B) 4**
 - (C) 2
 - (D) -2
- Handwritten work:*
 $g(2) = 3 \cdot f(2 \cdot 2) - b = 19$
 $3 \cdot f(4) - b = 19$
 $3 \cdot 8 - b = 19$
 $24 - b = 19$
 $b = 5$
- Handwritten work:*
 $g(x) = 3 \cdot f(2x) - 5$
 $g(1) = 3 \cdot f(2 \cdot 1) - 5 = 7$
 $3 \cdot f(2) - 5 = 7$
 $3 \cdot a - 5 = 7$
 $3a = 12$
 $a = 4$