AP Precalc

Write your questions and thoughts here!

1.12A Translations of Functions

1.12A Notes

Additive Transformations

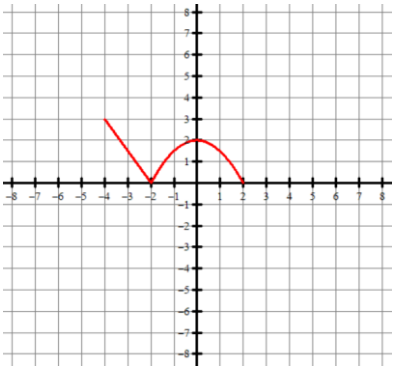
Translations =

Graphically

Example #1

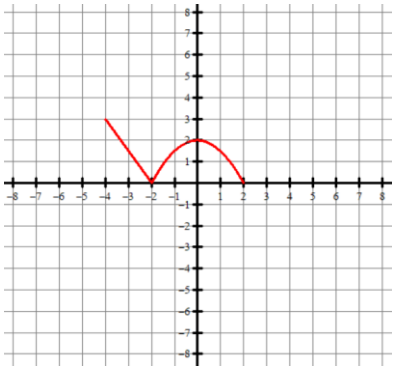
Given the graph f.

Let $g(x) = f(x) + 4$, graph $g(x)$



Given the graph f.

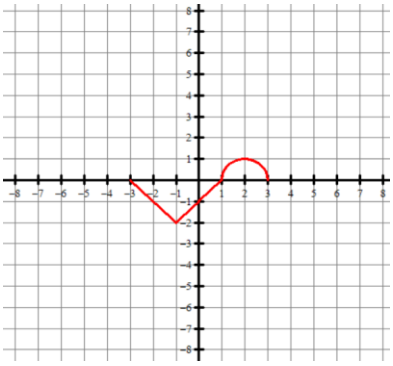
Let $g(x) = f(x + 4)$, graph $g(x)$



Example #2

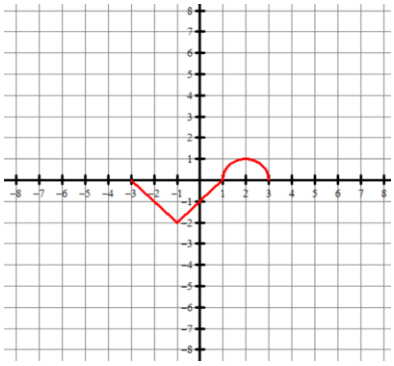
Given the graph f.

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



Given the graph f.

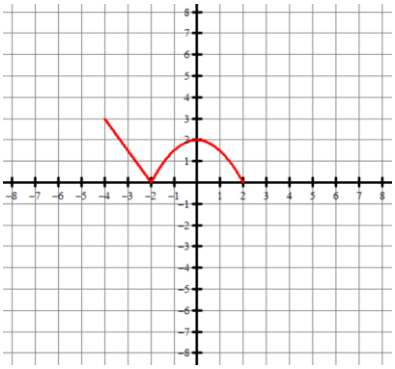
Let $g(x) = f(x - 4)$, graph $g(x)$.



Example #3 Vertical Reflection

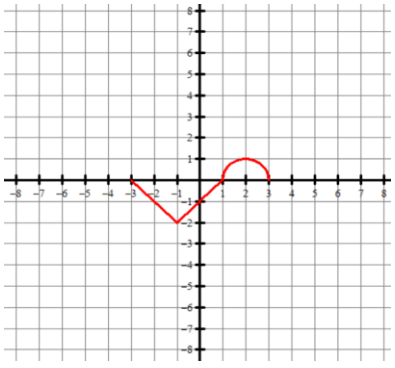
Given the graph f.

Let $g(x) = -f(x)$, graph $g(x)$.



Given the graph f.

Let $g(x) = -f(x - 2) + 5$, graph $g(x)$.



Write your questions and thoughts here!

Algebraically

Example 4:

Given $f(x) = x^2 - 3x + 2$

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

Given $f(x) = x^2 - 3x + 2$

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

Numerically

Example #5

Given the table of values for f.

x	$f(x)$
-2	21
-1	12
0	18
1	14
2	10

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

Given the table of values for f.

x	$f(x)$
0	-20
1	-12
2	0
3	8
4	14

Let $g(x) = f(x - 2) + 1$, find $g(4)$.

Domain and Range

Example #6

Given the graph for f has a domain of $[-4,3]$ and range of $(3, 9)$. Let $g(x) = -f(x + 5) + 2$. Find the domain and range of $g(x)$.

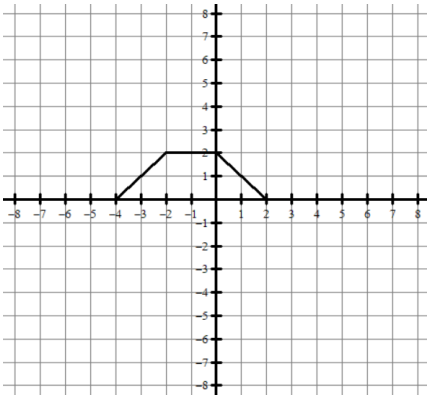
1.12A Translations of Functions

AP Precalculus

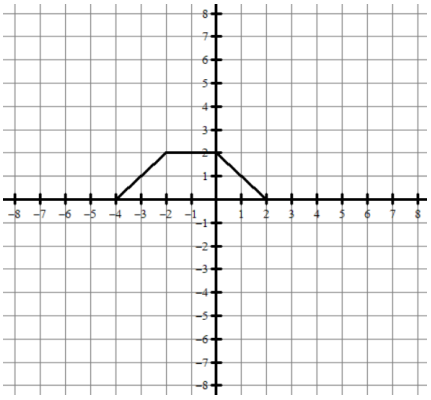
1.12A Practice

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

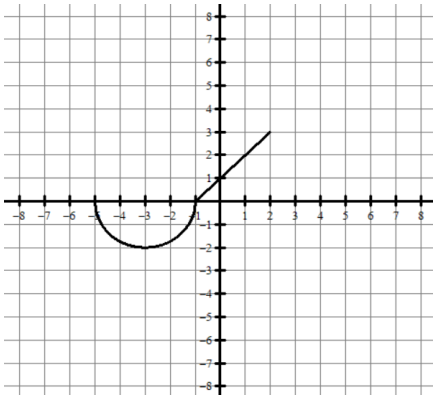
1. $g(x) = f(x-2) + 4$



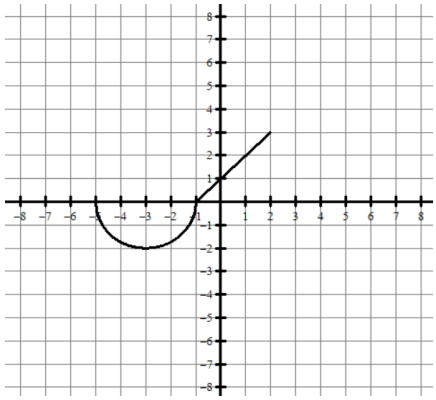
2. $g(x) = -f(x+3)$



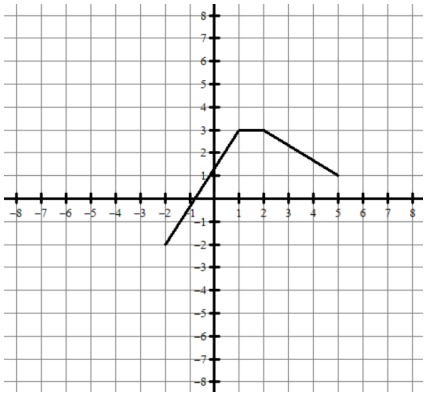
3. $g(x) = -f(x) + 5$



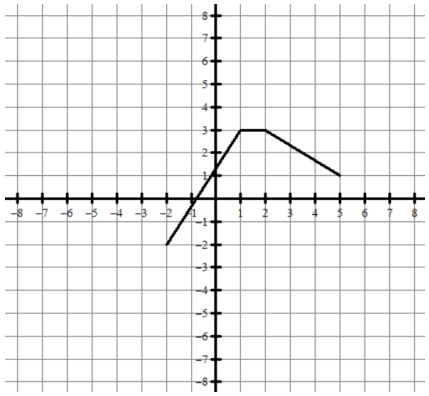
4. $g(x) = f(x-5) - 3$



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



6. $g(x) = -f(x-3) + 1$



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

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

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

8. $f(x) = 2x - 5$

   $g(x) = f(x+3) + 4$, find $g(x)$.

9. $f(x) = x^3 + 2x^2$

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

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

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

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

11. Given the table of values for f.

x	$f(x)$
-6	2
-3	8
2	15
5	-2
8	-13

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

12. Given the table of values for f.

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

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

13. Given the table of values for f.

x	$f(x)$
-4	-32
-2	6
0	-8
2	21
4	14

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

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

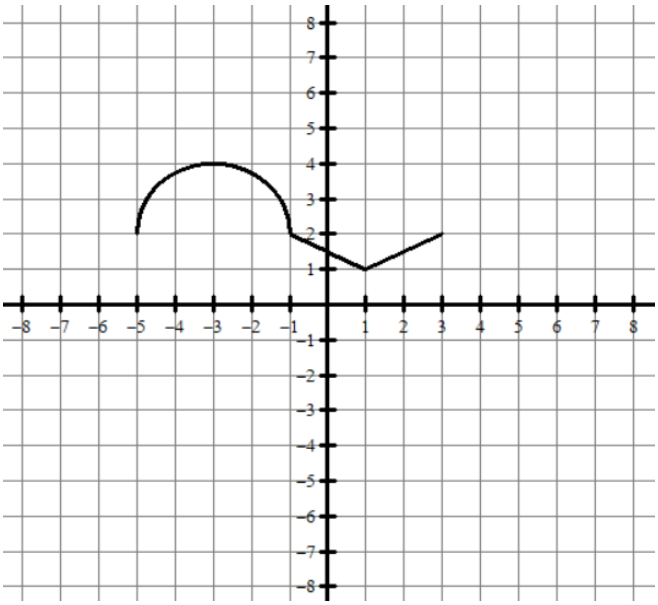
14.
Given the graph for f has a domain of $(-5,3]$ and range of $[-4,8]$.
Let $g(x) = f(x + 5)$.
Find the domain and range of $g(x)$.

15.
Given the graph for f has a domain of $(0,5)$ and range of $[-10,4]$.
Let $g(x) = f(x - 2) + 4$.
Find the domain and range of $g(x)$.

16.
Given the graph for f has a domain of $[-2,4]$ and range of $(-1,8)$.
Let $g(x) = -f(x + 3) + 5$.
Find the domain and range of $g(x)$.

Use the graph f to answer the following.

17.



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

a. Graph the $g(x)$.

b. State the domain of $g(x)$.

c. State the range of $g(x)$.

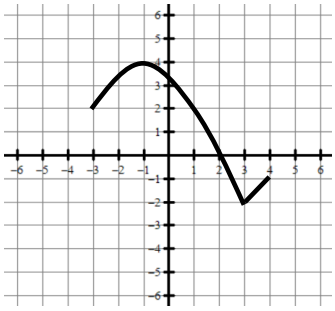
d. Find $g(-2)$.

e. Find the zeroes of $g(x)$.

f. Find the y-intercept of $g(x)$.

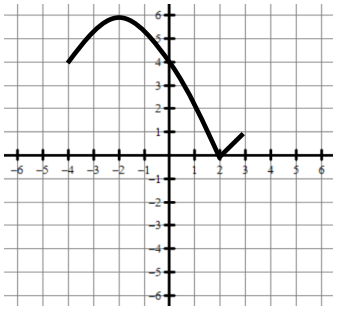
Multiple Choice

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

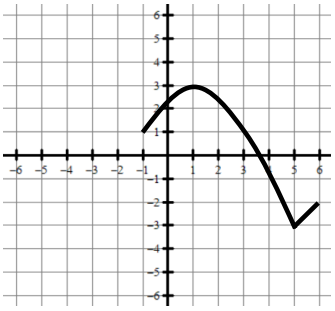


Which of the following is the transformed graph for $y = f(x + 2) - 1$?

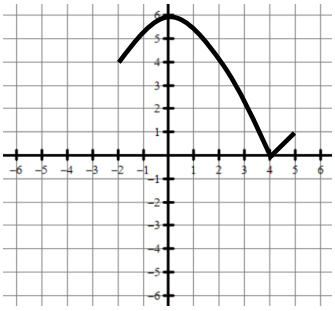
(A)



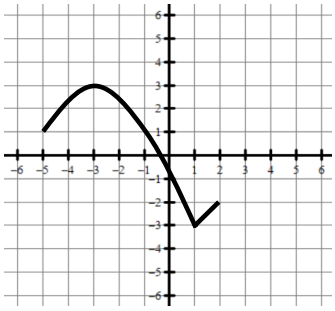
(B)



(C)



(D)



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19. The functions f and g are defined for all real numbers such that $g(x) = -f(x) + 5$. Which of the following sequences of transformations maps the graph of f to the graph of g in the same xy-plane?

(A) A horizontal translation of the graph of f by 5 units, followed by a vertical reflection of the graph of f.

(B) A vertical translation of the graph of f by 5 units, followed by a vertical reflection of the graph of f.

(C) A vertical reflection of the graph of f, followed by a horizontal translation of the graph of f by 5 units.

(D) A vertical reflection of the graph of f, followed by a vertical translation of the graph of f by 5 units.

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20. The function f is given by $f(x) = -x^2 + 3x + 2$. The graph of which of the following functions is the image of the graph of f after a vertical translation of the graph of f by 4 units ?

(A) $m(x) = -(x + 4)^2 + 3(x + 4) + 2$, because this is an additive transformation of f that results from adding to each input value of x.

(B) $n(x) = -(x - 4)^2 + 3(x - 4) + 2$, because this is an additive transformation of f that results from adding to each input value of x.

(C) $p(x) = -x^2 + 3x + 6$, because this is an additive transformation of f that results from adding to the $f(x)$.

(D) $q(x) = -x^2 + 3x - 2$, because this is an additive transformation of f that results from adding to the $f(x)$.