Your Name: Solutions

ID #:

Worksheet: Transformations of Graphs

1. Explain how the graph of $y = g(x)$ is obtained from the graph of $y = f(x)$.

   (a) $g(x) = f(-x)$

   Solution: Reflect the graph of $y = f(x)$ about the $y - axis$.

   (b) $g(x) = 7f(x) - 3$

   Solution: Stretch the graph of $y = f(x)$ vertically by a factor of 7, and then shift downward 3 units.

   (c) $g(x) = 4f(x + 5) - 3$

   Solution: Shift the graph of $y = f(x)$ to the left 5 units, stretch vertically by a factor of 4, and then shift downward 3 units.

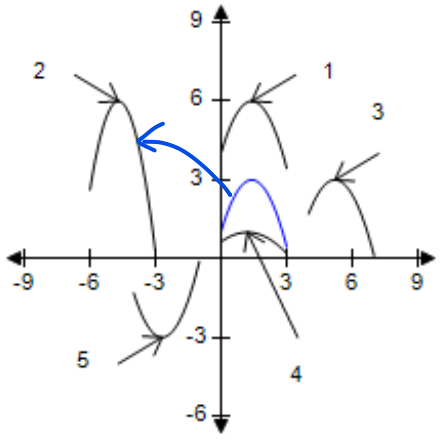
   (d) $f(x) = x^2$, $g(x) = x^2 + 2$

   Solution: The graph of $g(x)$ is obtained by shifting the graph of $f(x)$ upward 2 units.

   (e) $f(x) = \sqrt{x}$, $g(x) = \frac{1}{2}\sqrt{x - 5}$

   Solution: The graph of $g(x) = \frac{1}{2}\sqrt{x - 5}$ is obtained by shifting the graph of $f(x) = \sqrt{x}$ to the right 5 units, and then shrinking the graph vertically by a factor of $\frac{1}{2}$.

2. The graph of $y = h(r)$ is given in the blue graph. Determine the number of the graph of the function $2h(r + 6)$.



A. 1
B. 2
C. 3
D. 4
E. 5

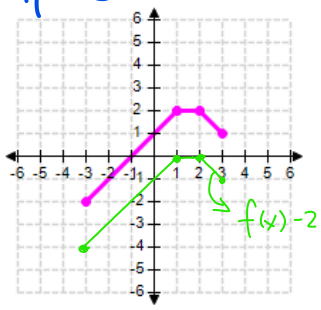
S1: $h(r) \to h(r+6)$ shift left 6 units

S2: $h(r+6) \to 2h(r+6)$ stretch vertically by a factor of 2

3. The graph of $f(x)$ is given in pink, sketch the graph of the function $g(x)$ in the same coordinates.

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

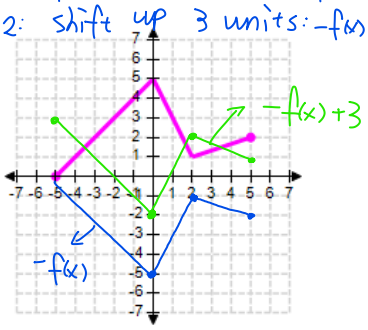
Shift down 2 units



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

S1: reflect about x-axis: $-f(x)$

S2: shift up 3 units: $-f(x)+3$

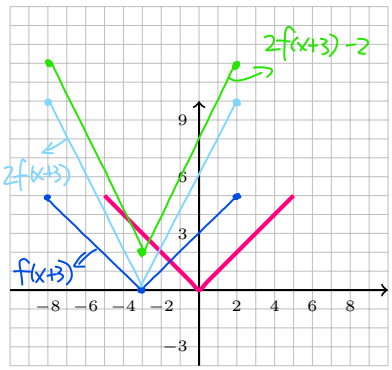


3). $g(x) = 2f(x+3) + 2$

S1: shift left 3 units $f(x+3)$

S2: $f(x+3) \to 2f(x+3)$

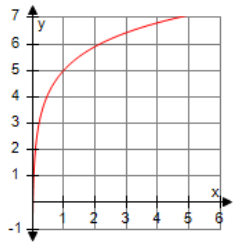
S3: $2f(x+3) \to 2f(x+3)+2$



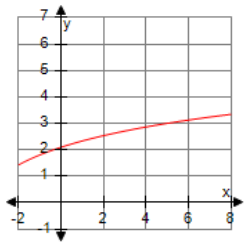
4. Identify the graph of $g(x) = 3\log x + 5$

base = 10, increasing

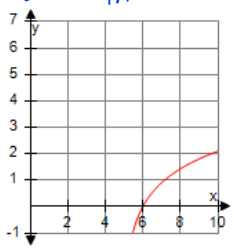
Domain: $x > 0$, passes $(1, 5)$



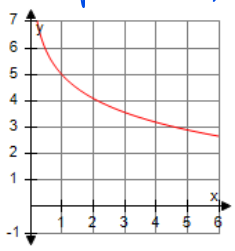
(A)



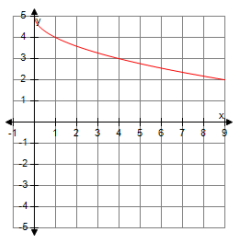
(B)



(C)



(D)

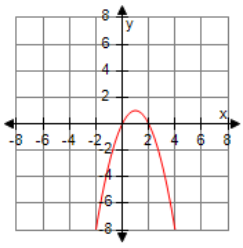


(E)

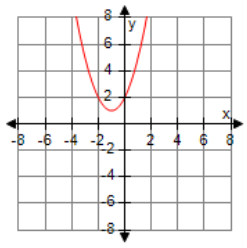
5. Which one of the following graphs illustrate the function $f(x) = -(x+1)^2 + 1$

$a<0 \Rightarrow$ opens down

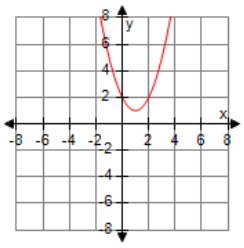
Symmetric axis: $x = -1$



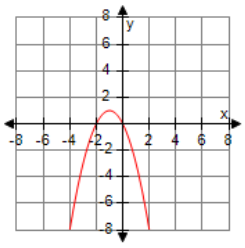
(A)



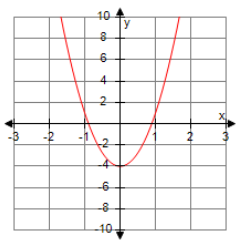
(B)



(C)



(D)



(E)

6. Which one of the following functions translates the graph of $f(x) = 4^x$ to a new graph $g(x)$ with a reflection about the $x-axis$, a vertical stretch by a factor of 5, and a horizontal shift left 8 units.

A. $f(x) = -5 \cdot 4^{x-8}$

B. $f(x) = -5 \cdot 4^x + 8$

C. $f(x) = -5 \cdot 4^{x+8}$

D. $f(x) = 5 \cdot 4^{x-8}$

$4^x \xrightarrow{(1)} -4^x \xrightarrow{(2)} -5 \cdot 4^x \xrightarrow{(3)} -5 \cdot 4^{x+8}$