Name: _____ Date: _____

UNIT #2 – TRANSFORMATIONS OF FUNCTIONS

Be sure you review Unit 1 as test will be cumulative – 10% or test will include review materials.

2-1 - Review of Quadratics:

2-2 – More Useful Functions:

2-3/2-4 – Function Transformations:

Rules for Transformation of Functions

Transformation	Function	Description
Horizontal Shift	$f(x + h)$	Shift left h units
	$f(x - h)$	Shift right h units
Vertical Shift	$f(x) + k$	Shift up k units
	$f(x) - k$	Shift down k units
Reflection	$-f(x)$	Reflect across x-axis
	$f(-x)$	Reflect across y-axis
Vertical Stretch/Compress	$a\ f(x)$, $a > 1$	Stretch vertically by a factor of a
	$a\ f(x)$, $0 < a < 1$	Compress vertically by a factor of a
Horizontal Stretch/Compress	$f(ax)$, $a > 1$	Compress horizontally by a factor of $\frac{1}{a}$
	$f(ax)$, $0 < a < 1$	Stretch horizontally by a factor of $\frac{1}{a}$

2-5 More work with Piecewise:

2-6 Factoring (All Types)

2-7 Zero Product

2-8 – Complete the Square

Part I Practice Questions

1. The quadratic function $f(x)$ has a turning point at $(5,-8)$. If $g(x)=f(x+7)-3$, then at which of the following does $g(x)$ have a turning point?

   (1) $(-2,-11)$ (3) $(-7,-3)$

   (2) $(12,-11)$ (4) $(12,-5)$

2. Where does the absolute value function $y=\frac{1}{2}|x-8|+3$ have a turning point?

   (1) $(-4,3)$ (3) $(8,3)$

   (2) $(4,-3)$ (4) $(8,-3)$

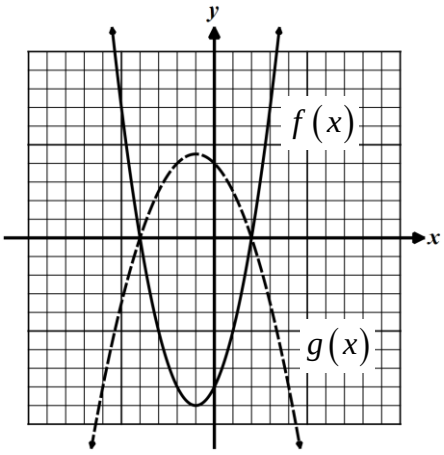
3. The function $f(x)$ is shown below graphed in solid while the function $g(x)$ is shown dashed. Which of the following equations describes the relationship between the two functions?

   (1) $g(x)=f(x)-6$

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

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

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



4. Given that the function $y=x^2+6x-27$ has x-intercepts at $x=-9$ and $x=3$, where does the function $y=(3x)^2+6(3x)-27$ have x-intercepts?

   (1) $x=\pm 6$ (3) $x=-27$ and $x=9$

   (2) $x=-12$ and $x=0$ (4) $x=-3$ and $x=1$

5.If the point $(-3,7)$ lies on the graph of $f(x)$, then which of the following points must lie on the graph of $y=5f(x)-20$?

   (1) $(-15,-13)$ (3) $(2,-13)$

   (2) $(-3,15)$ (4) $(1,25)$

6. The range of the function $f(x)$ is $-4 \le y \le 10$. If $g(x) = -f(x) + 3$ then which of the following is the range for $g(x)$?

(1) $-7 \le y \le 7$ (3) $-13 \le y \le 1$

(2) $5 \le y \le 15$ (4) $-3 \le y \le 8$

7. The trinomial $4x^2 - 3x - 10$ can be written equivalently as

(1) $(2x-5)(2x+2)$ (3) $(4x+1)(x-10)$

(2) $(2x-1)(x+10)$ (4) $(4x+5)(x-2)$

8. The cubic polynomial $3x^3 + 5x^2 + 12x + 20$ can be factored as

(1) $(3x+5)(x+2)^2$ (3) $(x+5)(3x+2)$

(2) $(3x+5)(x^2+4)$ (4) $(x+5)(x-2)(x+2)$

9. The equation $5x(x-7)^2(3x+2) = 0$ has a solution set of

(1) $\left\{-5, -\frac{2}{3}, \pm 7\right\}$ (3) $\left\{-\frac{2}{3}, 0, 7\right\}$

(2) $\{-5, -2, 7\}$ (4) $\{-2, 0, \pm 7\}$

10. The quadratic function $f(x) = 10x^2 + 11x - 6$ has one zero at $x = -\frac{3}{2}$. At which of the following x-values is its other zero?

(1) $x = 6$ (3) $x = \frac{1}{6}$

(2) $x = \frac{2}{5}$ (4) $x = -4$

11. The parabola $y = 3x^2 - 24x + 55$ can be written in the form

(1) $y = 3(x-2)^2 + 2$ (3) $y = 3(x+2)^2 - 11$

(2) $y = 3(x-8)^2 + 55$ (4) $y = 3(x-4)^2 + 7$

12. Which equation below represents the graph shown?

(1) $y=\sqrt{x-2}-5$

(2) $y=-\sqrt{x+2}+5$

(3) $y=-\sqrt{x-2}+5$

(4) $y=\sqrt{x+2}+5$

Free Response

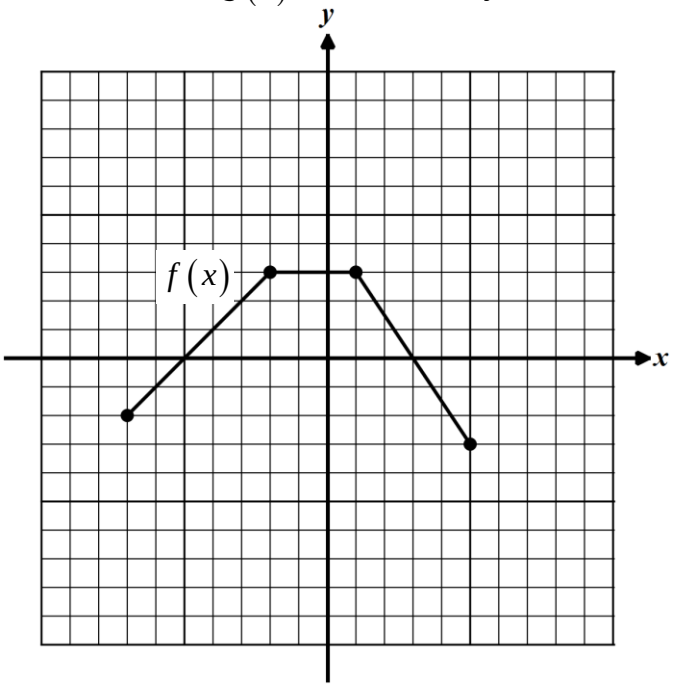
13. For the function $f(x)$ it is known that $(-12, 4)$ lies on the function. A second function, $g(x)$, is defined by the formula $g(x)=f(2x)-3$.

Describe the transformations that occur to the graph of *f* in order to produce the graph of *g*.

Based on the fact that the point $(-12, 4)$ lies on $f(x)$, what point must lie on $g(x)$?

14. The graph of the function $f(x)$ is shown below. The function $g(x)$ is defined by the formula $g(x)=-2f(x)$ for all values of *x*.

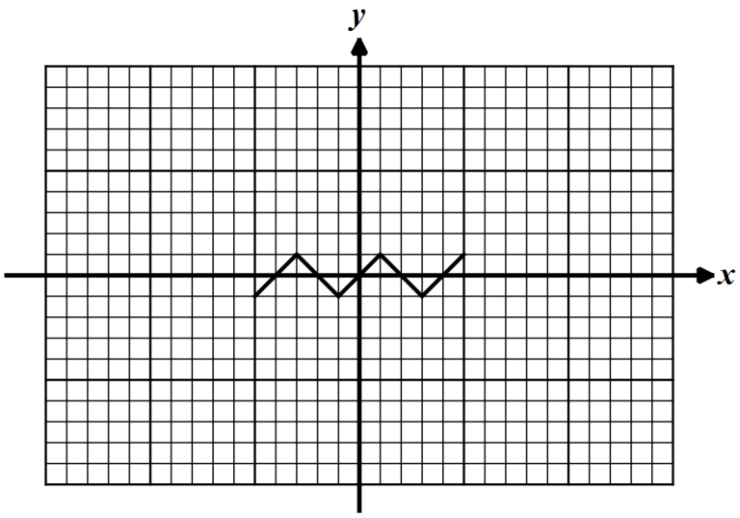
Produce the graph of *g* on the same grid.



Solve the equation $f(x)=g(x)$ for all values of *x*.

15. The graph of $f(x)$ is shown below. The function $g(x)$ is defined by $g(x)=5f\left(\frac{x}{2}\right)$.

Explain the transformations that will transform the graph of $f(x)$ into the graph of $g(x)$ and then produce it on the same grid.



16. Given the parabola $f(x)=-(x-8)^2+5$, describe three transformations which would transform the graph of $y=x^2$ into the graph of $f(x)$. Give both the transformations and the order.

17. Describe the difference between the transformations $f(-x)$ and $-f(x)$ on the graph of $f(x)$.

18. Factor the expression below completely.

$8x^2 + 12x - 8$ $12x^3 + 20x^2 - 3x - 5$ $27x^3 - y^3$

19. Shana believes one of the two binomial factors of $12x^2 + 35x + 8$ is $3x + 2$. Is she correct? Explain your answer.

20. Find each of the following cube roots without the use of your calculator. Justify your answer based on a multiplication statement.

(a) $\sqrt[3]{8}$ (b) $\sqrt[3]{-1}$ (c) $\sqrt[3]{125}$ (d) $\sqrt[3]{0}$

(e) $\sqrt[3]{-8}$ (f) $\sqrt[3]{27}$ (g) $\sqrt[3]{\frac{1}{64}}$ (h) $\sqrt[3]{-\frac{1}{1000}}$