Name: ___Key___   Date: _____

Part I 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) $(12, -5)$

   $\frac{-5}{-7} \quad \frac{-8}{-3}$ $\overset{\leftarrow 7}{\underset{\downarrow 3}{}}$

   $(-2, -11)$

   ___1___

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) $(8, -3)$
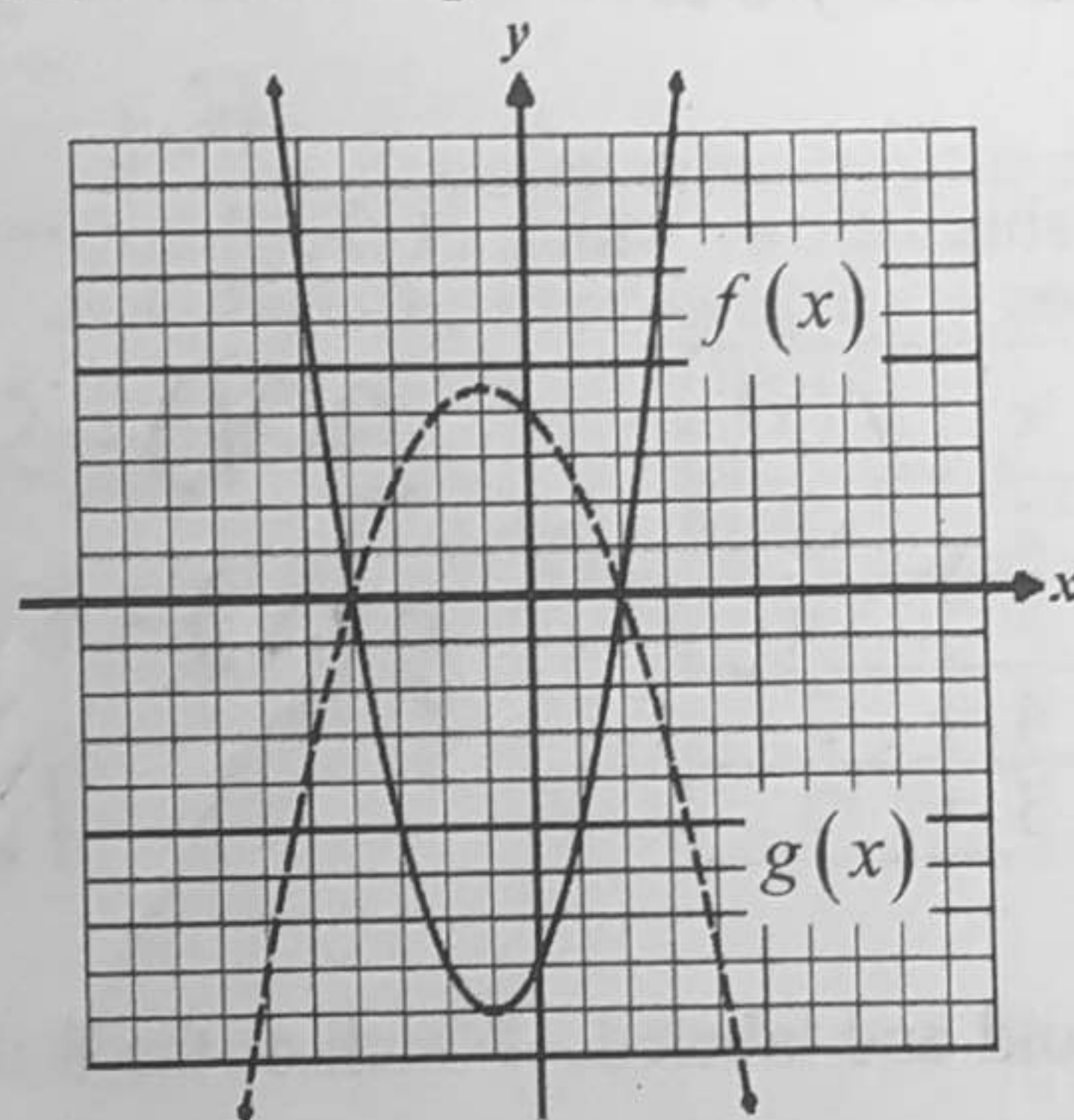
   $(8, 3)$

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

   Graph was flipped so need negative in front

   ___2___

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?

   Graph in calculator.

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

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

   ___4___

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 $y = 5f(x) - 20$?

$(-3, 7) \rightarrow (-3, 15)$

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

$5(7) - 20$

$35 - 20 = 15$ $\underline{2}$

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

$\begin{array}{l} -4 \\ \cdot -1 \end{array}$ $\begin{array}{l} 10 \\ \cdot -1 \end{array}$ $7 \le x \le 7$

$\dfrac{}{\begin{array}{l}4 \\ +3\end{array}}$ $\dfrac{-10}{+3}$ $\underline{}$

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

7. If the domain of $f(x)$ is $-3 \le x \le 9$ and the range of $f(x)$ is $2 \le y \le 15$, then which of the following statements is correct about the domain and range of $g(x) = f(x-2) - 8$?

(1) Its domain is $-1 \le x \le 11$ and its range is $10 \le y \le 23$.

$\begin{array}{l} \rightarrow 2 \\ \searrow 8 \end{array}$ $\begin{array}{l} -3 \\ +2 \end{array}$ $\begin{array}{l} 9 \\ +2 \end{array}$

(2) Its domain is $-5 \le x \le 7$ and its range is $-6 \le y \le 7$.

$D: -1 \le x \le 11$

(3) Its domain is $-1 \le x \le 11$ and its range is $-6 \le y \le 7$.

$\begin{array}{l} 2 \\ -8 \end{array}$ $\begin{array}{l} 15 \\ -8 \end{array}$ $\underline{3}$

(4) Its domain is $-5 \le x \le 7$ and its range is $10 \le y \le 23$.

$R: -6 \le y \le 7$

8. Given the function $f(x)$ shown in the table below, which of the following represents the value of $g(4)$ given that $g(x) = 5f(x) + 1$?

x	$f(x)$
2	-8
3	-1
4	3
5	7

$g(4) = 5f(4) + 1$
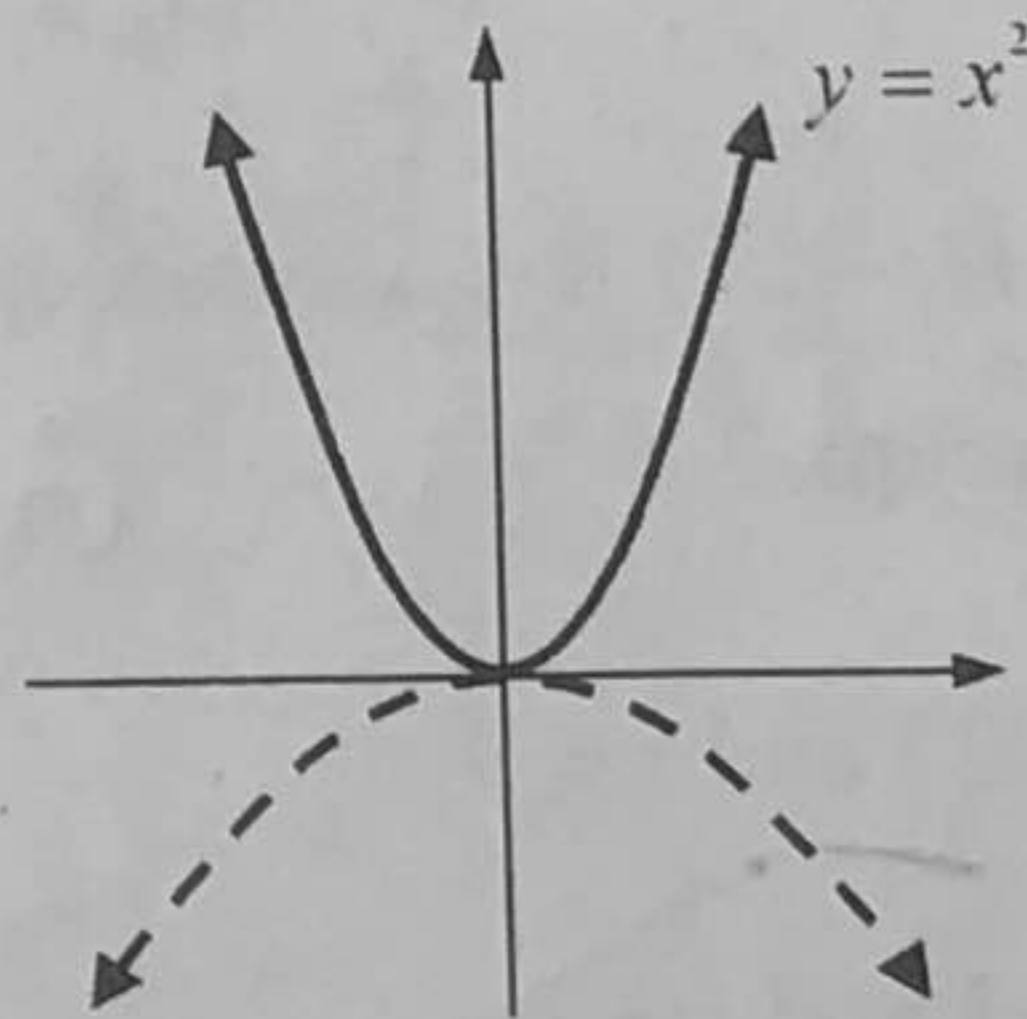
(1) 16   (3) 35

$g(4) = 5(3) + 1$

(2) 40   (4) 0

16

9. The graph of $y = x^2$ is shown below in bold and labeled. Which of the following could be the equation of the graph shown in dashed?

$y = x^2$

Graph in calc

(1) $y = 2x^2$ (3) $y = \dfrac{1}{3}x^2$

(2) $y = -\dfrac{1}{2}x^2$ (4) $y = -4x^2$

Free Response

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

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

$$f(x)$$
$$(-12, 4) \rightarrow (-6, 1)$$
$$-12 * .5 \qquad 4-3$$

11. Describe the transformations that occur to the function $y = |x|$ that produce the function $y = |x + 4| - 3$.
Give both the transformations that occur.

Left 4
Down 3

12. 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.

Flip over x-axis
Right 8
up 5

13. A function $g(x)$ has a domain of $-5 \le x \le 10$ and a range of $y \le 15$. If a new function is defined by $y = 5g(-x) + 3$, then what are its domain and range? Explain how you found your answer.
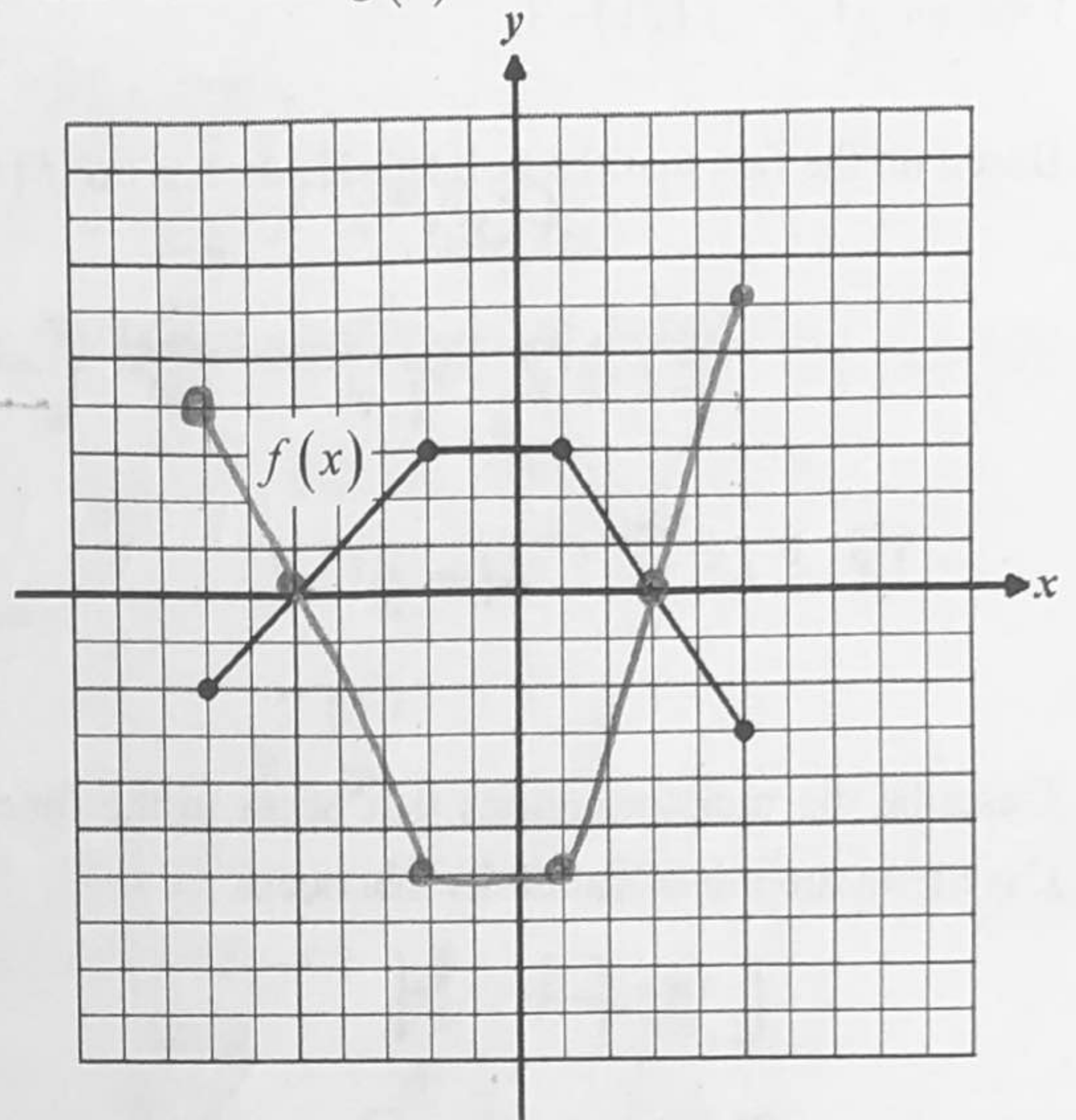
D: $-10 \le x \le 5$

R: $y \le 78$

$15 \times 5 = 75 + 3 = 78$

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.

$(-7, -2) \longrightarrow (-7, 4)$

$(-2, 3) \longrightarrow (-2, -6)$

$(1, 3) \longrightarrow (1, -6)$

$(5, -3) \longrightarrow (5, 6)$

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

intersect

$x = -5$

$x = 3$

15, The function $f(x)$ is shown graphed below. If the function $g(x)$ is defined by the formula $g(x) = -\frac{1}{2}f(x)$, answer the following questions.

(a) Determine the value of $g(5)$.

$g(5) = -3.5$

(b) Graph $g(x)$ on the same grid.

$(-6, -6) \longrightarrow (-6, 3)$

$(-2, 6) \longrightarrow (-2, -3)$

$(4, 2) \longrightarrow (1, -1)$

$(8, 9) \longrightarrow (8, -4.5)$