

Unit 3 Test Study Guide

1. Which value could represent a in the equation of an absolute value graph that is stretched or narrower than normal?

- a. 1 b. $\frac{2}{7}$ **c. $\frac{7}{2}$** d. $-\frac{3}{4}$

2. Which value could represent a in the equation of an absolute value graph that is reflected over the x-axis.

- a. 1 b. $\frac{2}{7}$ c. $\frac{7}{2}$ **d. $-\frac{3}{4}$**

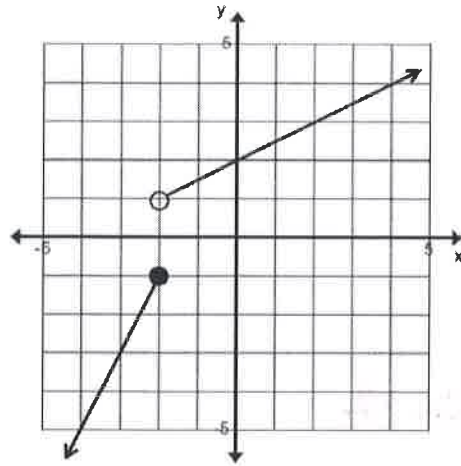
3. Which of the following piecewise functions matches the graph provided?

a. $f(x) = \begin{cases} \frac{1}{2}x + 2 & \text{if } x > -2 \\ 2x + 3 & \text{if } x \leq -2 \end{cases}$

b. $f(x) = \begin{cases} \frac{1}{2}x + 2 & \text{if } x \geq -2 \\ 2x + 3 & \text{if } x < -2 \end{cases}$

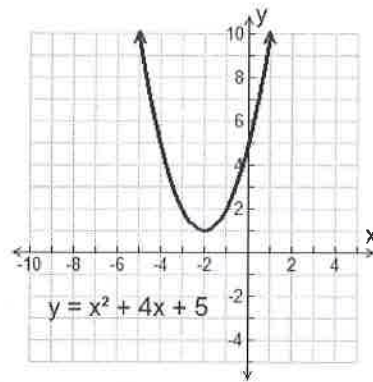
c. $f(x) = \begin{cases} \frac{1}{2}x + 2 & \text{if } x < -2 \\ 2x + 3 & \text{if } x \geq -2 \end{cases}$

d. $f(x) = \begin{cases} \frac{1}{2}x + 2 & \text{if } x \leq -2 \\ 2x + 3 & \text{if } x > -2 \end{cases}$



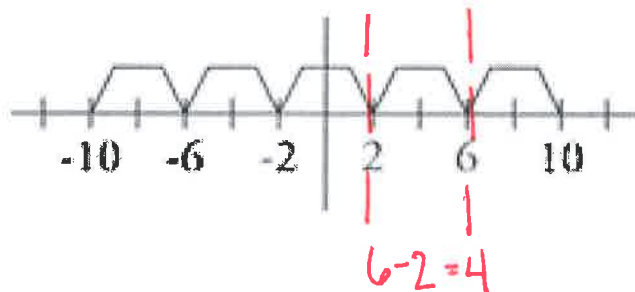
4. Which of the following describes $f(x) = x^2 + 4x + 5$?

- a. Even
 b. Odd
 c. Both Even and Odd
d. Neither Even nor Odd



5. The following function is considered periodic. Identify its period below.

- a. 10
 b. 20
 c. 2
d. 4

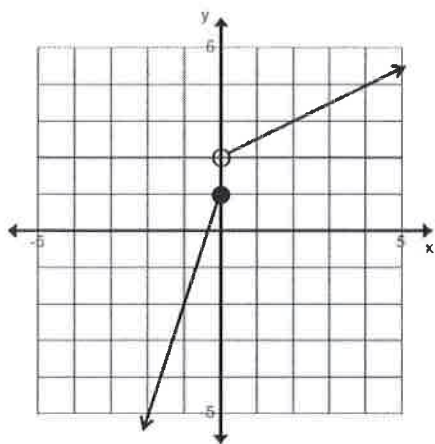


6. What does the "a" value in the absolute value equation represent and what does it do?

It represents slope - it tells you the steepness of the graph.
 It tells us the direction of opening.

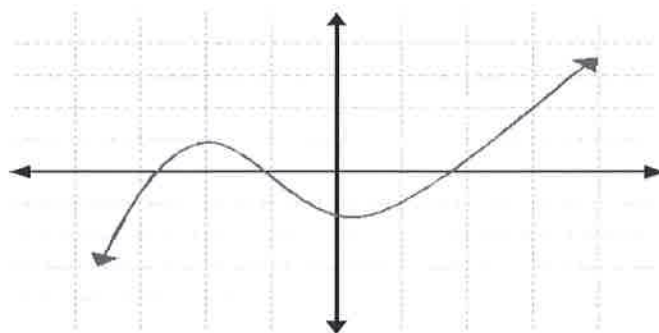
For questions #7-9, fill in all blanks:

7.



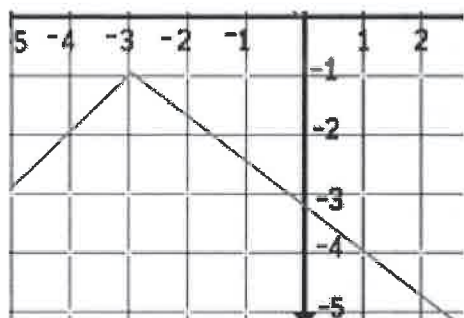
$$f(x) = \begin{cases} 3x + 1 & \text{if } x \leq 0 \\ \frac{1}{2}x + 2 & \text{if } x > 0 \end{cases}$$

8.



As $x \rightarrow \infty, f(x) \rightarrow \infty$
 As $x \rightarrow -\infty, f(x) \rightarrow -\infty$

9.



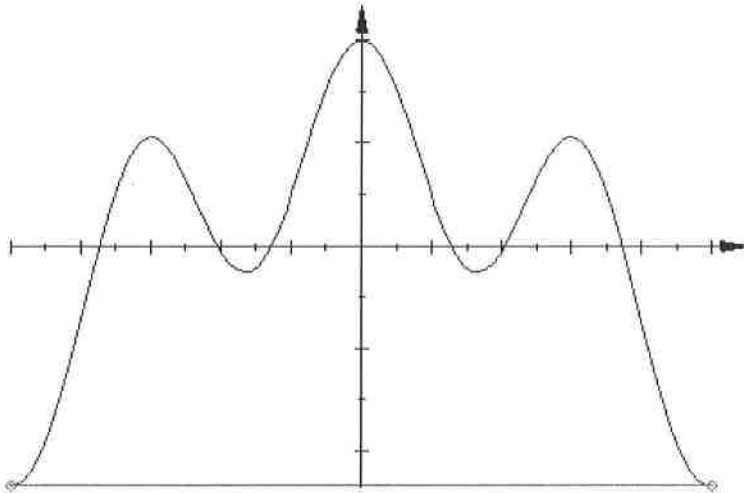
Slopes of the Rays: $\pm \frac{3}{4}$

Vertex: $(-3, -1)$

Direction of Opening: down

Transformation(s): reflect over the x-axis, compresses by 3/4, left 3, down 1.

9. Evaluate the following key features.



Relative Minimum(s) $(-10, -5), (10, -5), (-3.2, -5), (3.2, -5)$

Relative Maximum(s) $(-6, 2), (6, 2), (0, 4)$

Absolute Minimum(s) $(-10, -5), (10, -5)$

Absolute Maximum(s) $(0, 4)$

X-intercept(s) $(7.5, 0), (4, 0), (2.5, 0), (-7.5, 0), (-4, 0), (-2.5, 0)$

Y-intercept(s) $(0, 4)$

Increasing Intervals(s) $(-10, -6) \cup (-3.2, 0) \cup (3.2, 6)$

Decreasing Interval(s) $(-6, -3.2) \cup (0, 3.2) \cup (6, 10)$

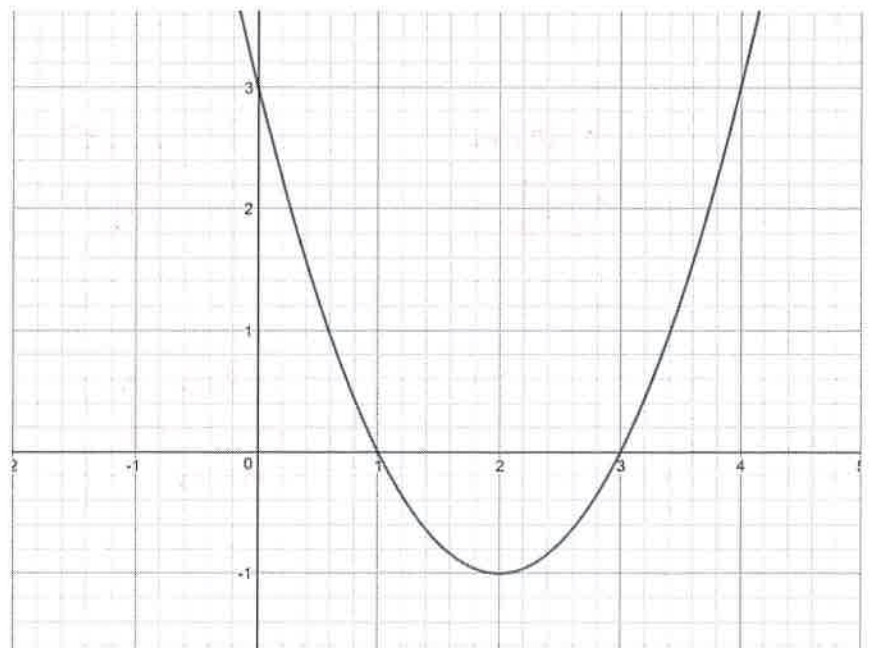
Constant Interval(s) —

Domain $(-10, 10)$

Range $(-5, 4]$

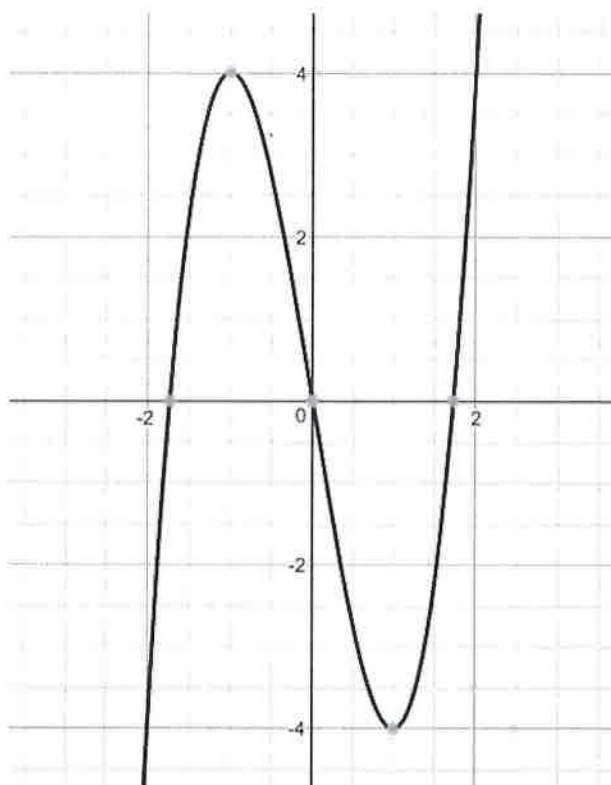
10. Determine the key features from the following graph:

- X-Intercepts: $(1, 0), (3, 0)$
- Y-Intercepts: $(0, 3)$
- Relative Minimum: $(2, -1)$
- Relative Maximum: none
- Absolute Minimum: $(2, -1)$
- Absolute Maximum: none
- Increasing Interval: $(2, \infty)$
- Decreasing Interval: $(-\infty, 2)$
- Domain: $(-\infty, \infty)$
- Range: $[-1, \infty)$
- End Behavior: $x \rightarrow -\infty, f(x) \rightarrow \infty$
 $x \rightarrow \infty, f(x) \rightarrow \infty$
- Odd or Even: Neither



11. Determine the key features from the following graph:

- X-Intercepts: $(-1.5, 0), (0, 0), (1.5, 0)$
- Y-Intercepts: $(0, 0)$
- Relative Minimum: $(1, -4)$
- Relative Maximum: $(-1, 4)$
- Absolute Minimum: none
- Absolute Maximum: none
- Increasing Interval: $(-\infty, -1) \cup (1, \infty)$
- Decreasing Interval: $(-1, 1)$
- Domain: $(-\infty, \infty)$
- Range: $(-\infty, \infty)$
- End Behavior: $x \rightarrow -\infty, f(x) \rightarrow -\infty$
 $x \rightarrow \infty, f(x) \rightarrow \infty$
- Odd or Even: **Odd**



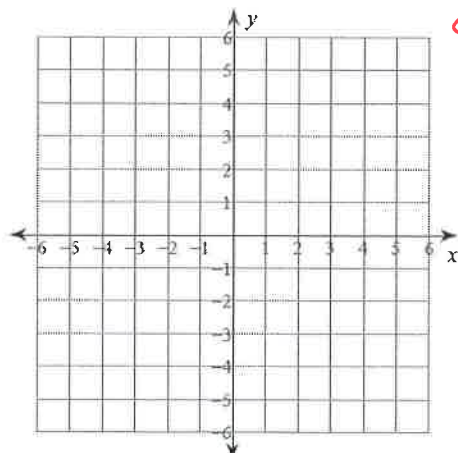
12. Given the function $f(x) = \begin{cases} x + 1 & \text{if } x < 3 \\ 6 - x & \text{if } x \geq 3 \end{cases}$, evaluate the following:

a. $f(0) = (0) + 1$
 $= \boxed{1}$

b. $f(3) = 6 - (3)$
 $= \boxed{3}$

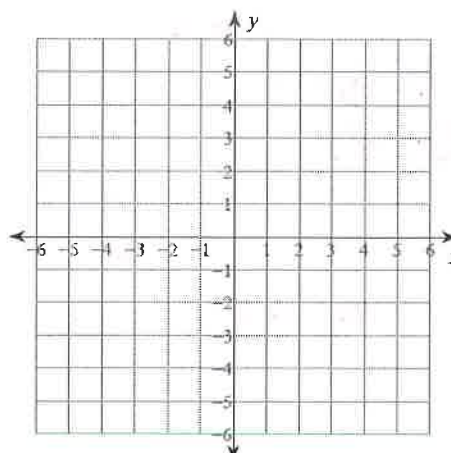
c. $f(6) = 6 - (6)$
 $= \boxed{0}$

13. Sketch a graph of an odd function and explain why it is odd.



Symmetric about the origin

14. Sketch a graph of an even function and explain why it is even.



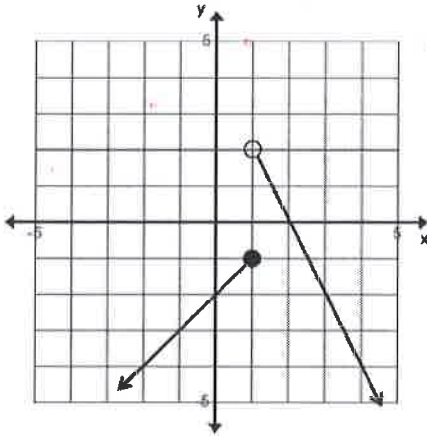
Symmetric about the y-axis.

15. Write an absolute value equation with a vertex of $(-7, 1)$ that passes through the point $(-1, 5)$.

Function: $f(x) = \frac{2}{3}|x+7|+1$

$$m = \frac{5-1}{-1-(-7)} = \frac{4}{6} = \frac{2}{3}$$

16. Write a piecewise function that matches the graph provided below.



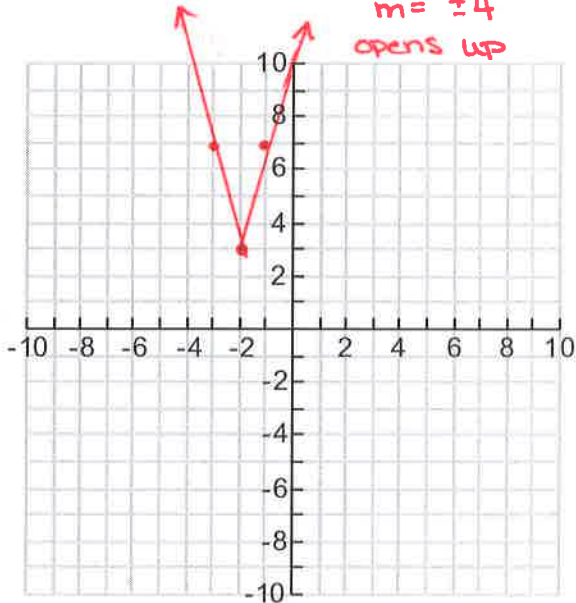
Function:

$$f(x) = \begin{cases} -2x + 4 & \text{if } x > -1 \\ x - 2 & \text{if } x \leq 1 \end{cases}$$

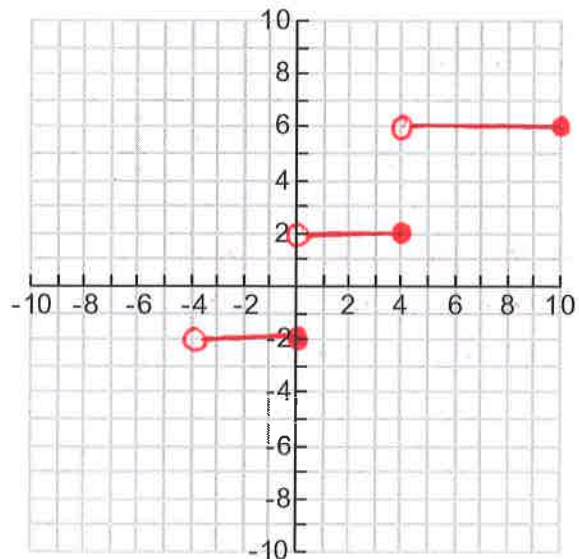
For questions #17-20, graph the indicated functions on the coordinate plane provided.

17. $f(x) = 4|x + 2| + 3$

vertex: $(-2, 3)$
 $m = \pm 4$
 opens up

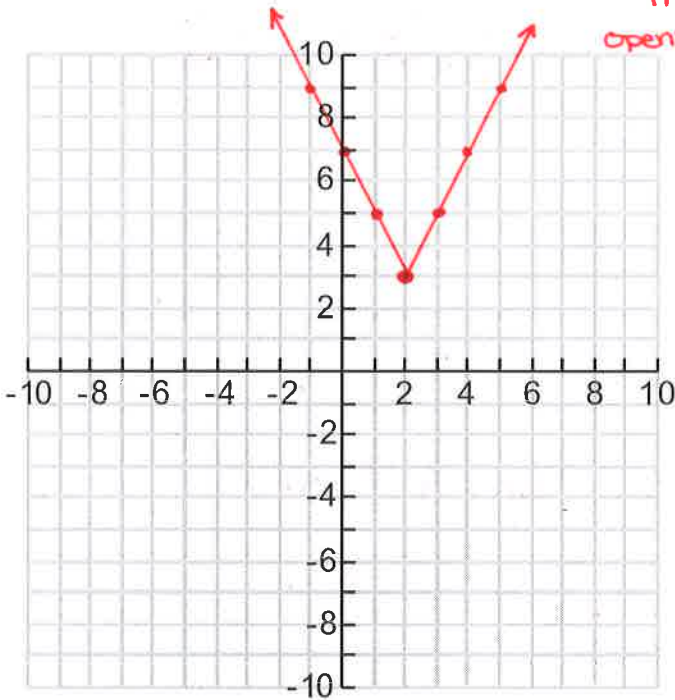


$$18. f(x) = \begin{cases} -2 & \text{if } -4 < x \leq 0 \\ 2 & \text{if } 0 < x \leq 4 \\ 6 & \text{if } 4 < x \leq 10 \end{cases}$$



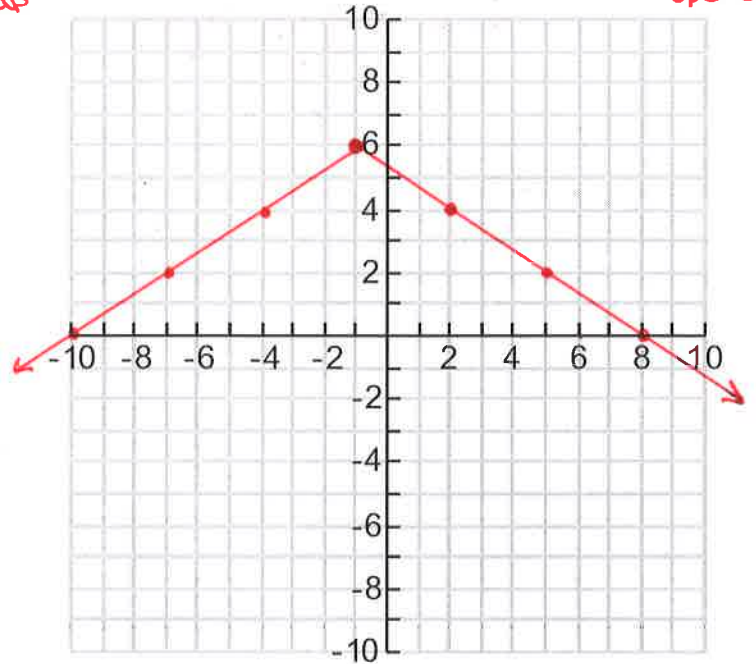
19. Graph the following $y = 2|x - 2| + 3$

vertex: (2, 3)
m = ±2
opens up



20. Graph the following $y = \frac{-2}{3}|x + 1| + 6$

vertex: (-1, 6)
m = ±2/3
opens down



21. Determine the following from the graph:

Slopes of the rays: ±2

Vertex: (-4, 5)

Direction of the opening: down

Transformations:

reflects over the x-axis,
stretches by 2, left 4,
and up 5.

