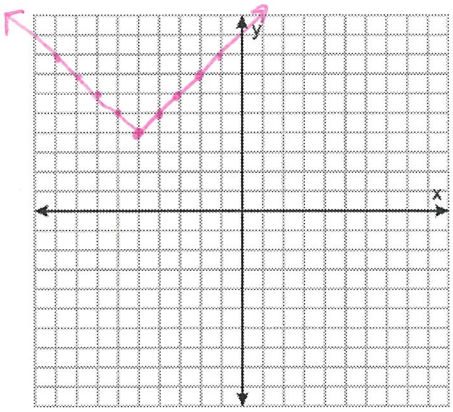
Honors Math 2 Name Key

3.1 WS graphing absolute value function Period_____ Date_____

Graph $g(x)$. Describe the transformation(s) from $f(x) = |x|$ to $g(x)$. State the domain and range.

1. $g(x) = |x+5| + 4$



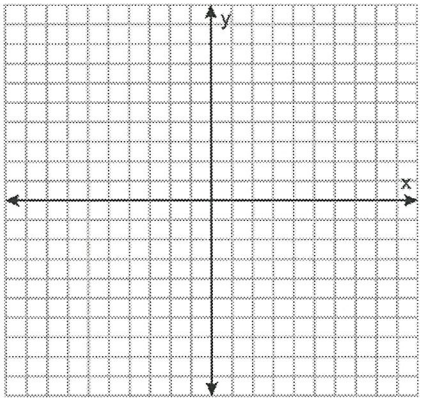
Transformations: left 5 up4

Domain: $\mathbb{R}$

Range: $[4, \infty)$

Vertex: $(-5, 4)$

2. $g(x) = -\frac{1}{2}|x-3| - 6$



Transformations: reflect in x-axis, vertical shrink, right 3, down6

Domain: $\mathbb{R}$

Range: $(-\infty, -6]$

Vertex: $(3, -6)$

Write an equation that represents the given transformation(s) of the graph of $f(x) = |x|$.

3. horizontal translation 9 units right

$f(x) = |x-9|$

4. vertical translation 4 units up

$f(x) = |x| + 4$

5. vertical shrink by a factor of $\frac{1}{3}$

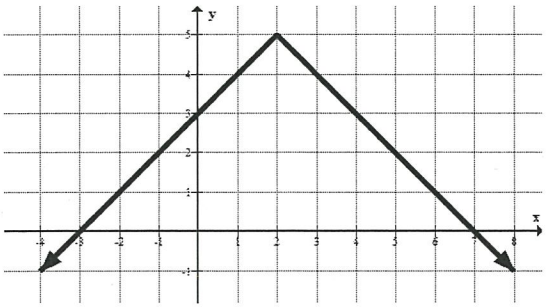
$f(x) = \frac{1}{3}|x|$

6. reflection in the x-axis and a horizontal translation 5 units left

$f(x) = -|x+5|$

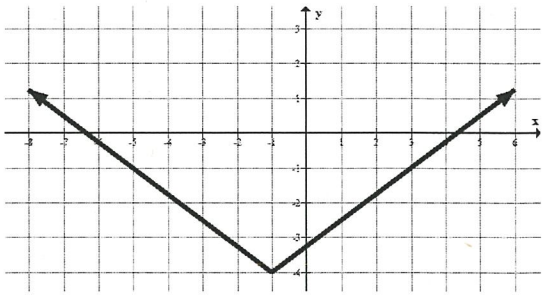
Write the equation for the given graph.

7.



$g(x) =$ $-|x-2| + 5$

8.



$y =$ $3/4\ |x+1| - 4$

Name the vertex.

9. $f(x) = |x-2| + 5$

$(2, 5)$

10. $y = \frac{1}{2}|x+9|$

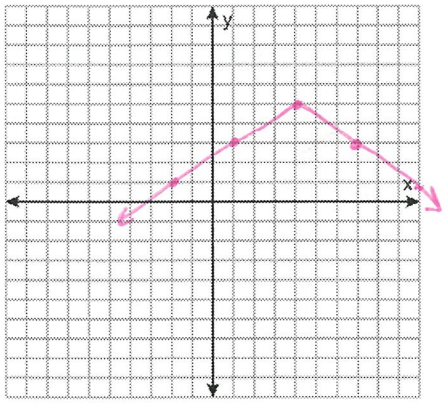
$(-9, 0)$

11. $g(x) = |x| - 3$

$(0, -3)$

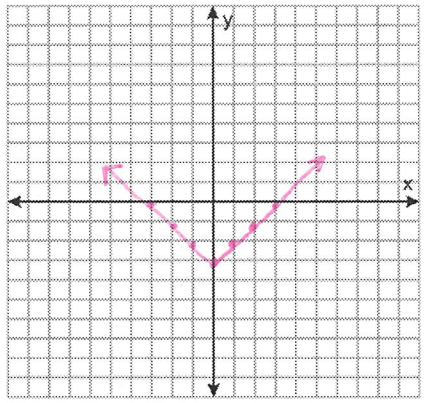
Graph the function. State the Domain and Range in Interval Notation: (parenthesis) and [brackets]

12. $f(x) = -\frac{2}{3}|x-4| + 5$



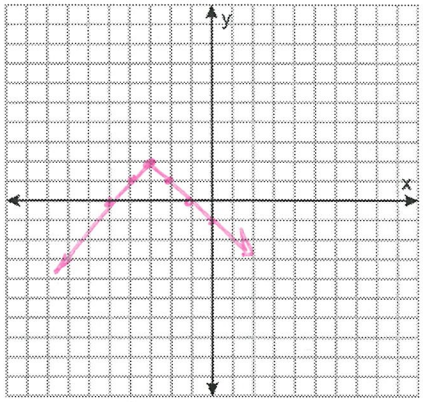
Vertex: (4, 5)
Domain: $\mathbb{R}$
Range: $(-\infty, 5]$

13. $f(x) = |x| - 3$



Vertex: (0, -3)
Domain: $\mathbb{R}$
Range: $[-3, \infty)$

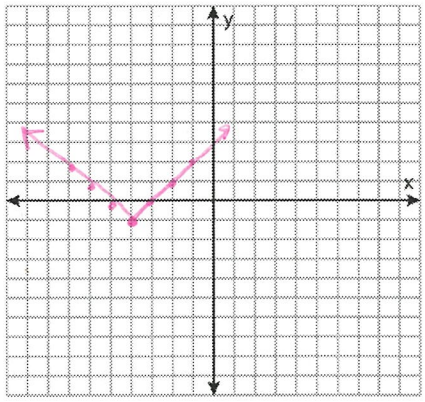
14. $f(x) = -|x+3| + 2$



Vertex: (-3, 2)
Domain: $\mathbb{R}$
Range: $(-\infty, 2]$

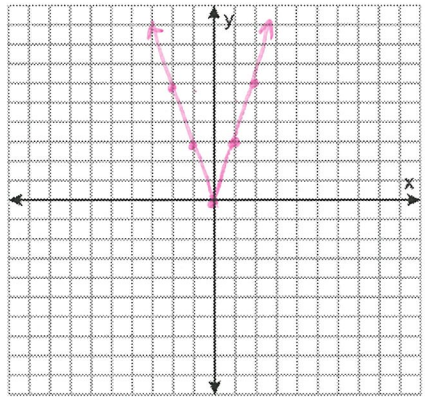
Graph the function. State the Domain and Range in Inequality Notation: <,>,≤,≥

15. $f(x) = |x+4| - 1$



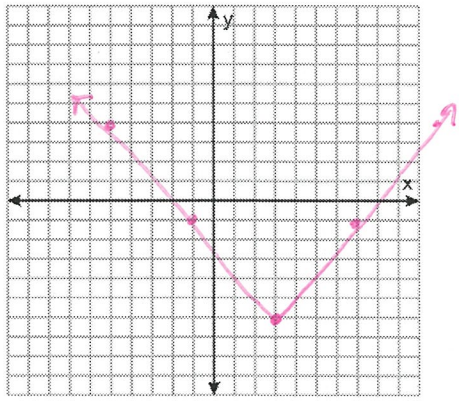
Vertex: (-4, -1)
Domain: $\mathbb{R}$
Range: $y \geq -1$

16. $f(x) = 3|x|$



Vertex: (0, 0)
Domain: $\mathbb{R}$
Range: $y \geq 0$

17. $f(x) = \frac{5}{4}|x-3| - 6$



Vertex: (3, -6)
Domain: $\mathbb{R}$
Range: $y \geq -6$

18. If $f(x) = |x+3| - 8$, write the new equation $f'(x)$is shifted 5 units left and 2 unit up.

$f'(x) = |x+8| - 6$

19. If $f(x) = |x-1| + 2$, write the new equation $f'(x)$ is shifted 2 units right and 1 unit down.

$f'(x) = |x-3| + 1$

20. Compare the graph of $f(x) = |x-4| + 1$ to the graph of $f'(x) = |x+5| - 9$

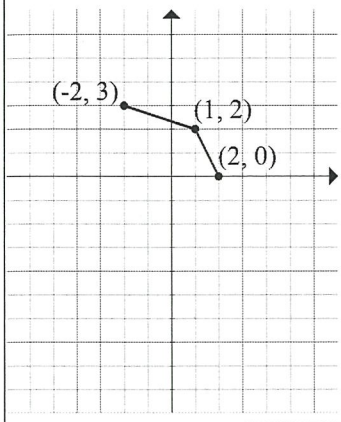
left 9 , down 10

21. Compare the graph of $f(x) = \frac{2}{3}|x| - 3$ to the graph of $f'(x) = \frac{2}{3}|x-5| + 12$

right 5, up 15

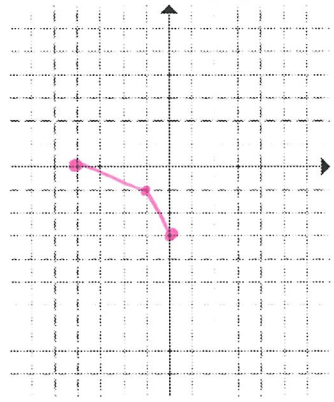
Use the graph of $y = f(x)$ shown to sketch the graph of the given function.

$f(x)$



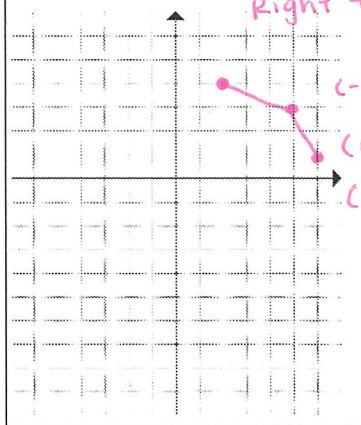
21. $y = f(x+2) - 3$

left 2 down 3



22. $y = f(x-4) + 1$

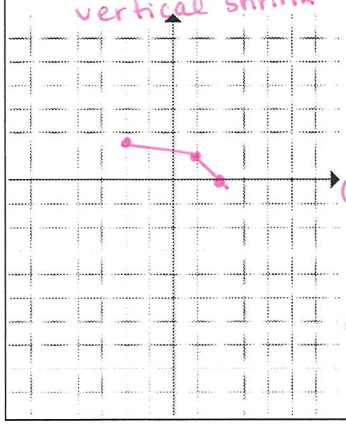
Right 4 up 1



(-2,3) → (2,4)
(1,2) → (5,3)
(2,0) → (6,1)

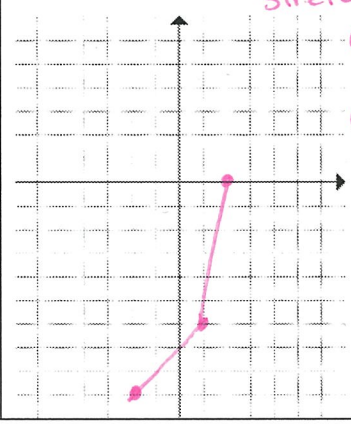
23. $y = \frac{1}{2}f(x)$

vertical shrink



(-2,3)
↓
(-2,1.5)
(1,2)
↓
(1,1)
(2,0)
↓
(2,0)

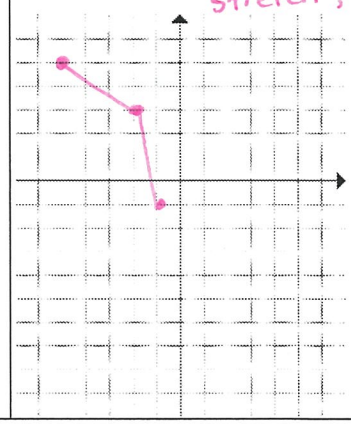
24. $y = -3f(x)$ reflect stretch



(-2,3)
↓
(-2,-9)
(1,2)
↓
(1,-6)
(2,0)
↓
(2,0)

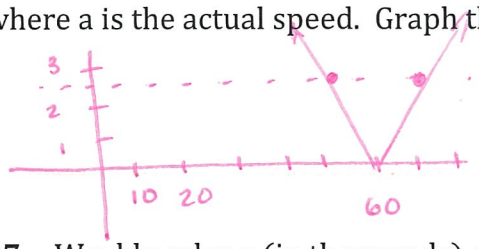
25. $y = 2f(x+3) - 1$

stretch, left 3 down 1



(-2,3) → (-2,6)
(1,2) → (1,4)
(2,0) → (2,0)

26. A car's speedometer reads 60 miles per hour. The error E in this measurement is $E = |a - 60|$ where a is the actual speed. Graph the function. For what value(s) of a will E be 2.5 miles per hour?

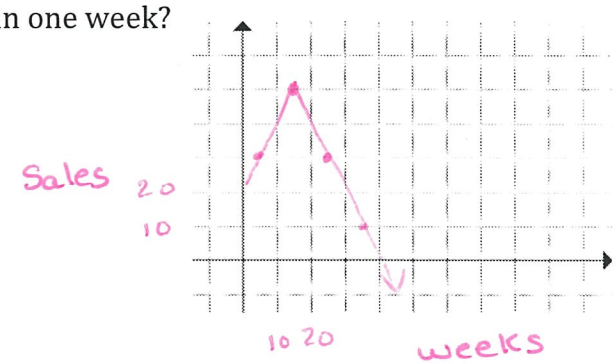


60 + 2.5 = 62.5 mph
60 − 2.5 = 57.5 mph

27. Weekly sales s (in thousands) of a new basketball shoe increase steadily for a while and then decrease as described by the function $s = -2|t - 15| + 50$ where t is the time (in weeks). Graph the function. What is the greatest number of pairs of shoes sold in one week?

V: (15, 50)

50 thousand pairs



Factor.

28. $16x^2 - 49$

$(4x+7)(4x-7)$

29. $4x^2 - 20x + 25$

$(2x-5)^2$

30. $x^2 + 5x - 6$

$(x+6)(x-1)$