Secondary Math 2 Honors Name_____

Unit 5 Functions Review

Date_____ Period____

Transform the given function $f(x)$ as described and write the resulting function as an equation.

1) $f(x) = |x|$
expand vertically by a factor of 3
reflect across the x-axis
translate right 2 units
translate up 3 units

$g(x) = -3|x-2| + 3$

2) $f(x) = x^2$
compress vertically by a factor of 2
reflect across the x-axis
translate left 2 units
translate up 2 units

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

3) $f(x) = x^3$
compress vertically by a factor of 2
reflect across the x-axis
translate left 3 units
translate down 1 unit

$g(x) = -\frac{1}{2}(x+3)^3 - 1$

Describe the transformations necessary to transform the graph of $f(x)$ into that of $g(x)$.

4) $f(x) = \sqrt{x}$
$g(x) = -2\sqrt{x+1} + 2$

stretch vertically by a factor of 2
reflect across the x-axis
translate left 1 unit
translate up 2 units

5) $f(x) = |x|$
$g(x) = -\frac{1}{2} \cdot |x+2| - 3$

compress vertically by a factor of 2
reflect across the x-axis
translate left 2 units
translate down 3 units

6) $f(x) = x^2$
$g(x) = -\frac{1}{3}(x+1)^2 - 3$

compress vertically by a factor of 3
reflect across the x-axis
translate left 1 unit
translate down 3 units

For each problem, find the average rate of change of the function over the given interval.

7) $f(x) = -x^2 + 1;\quad [-2, 1]$

1

8) $f(x) = 2x^2 + 2x + 2;\quad [-2, -\frac{5}{3}]$

$-\frac{16}{3}$

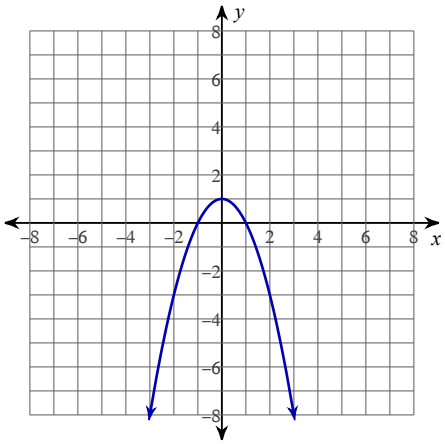
9) $y = -2|x - 3| - 1;\quad [-1, 4]$

$\frac{6}{5}$

10) $y = \frac{1}{2} \cdot 4^x;\quad [2, 4]$

60

11) $y = -x^2 + 1;\quad [-1, 0]$



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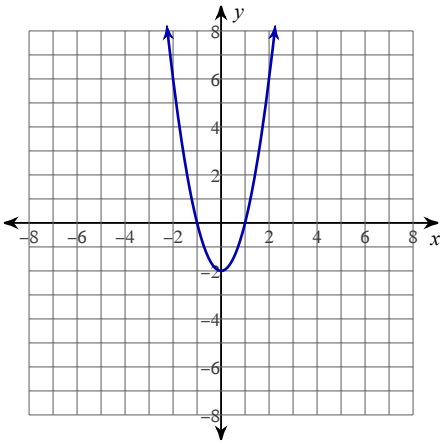
12) $y = 2x^2 - 2;\quad [0, 2]$



4

13) A savings account starts with $1,500. It gains 2.5% interest each month. How much is in the account after one year?

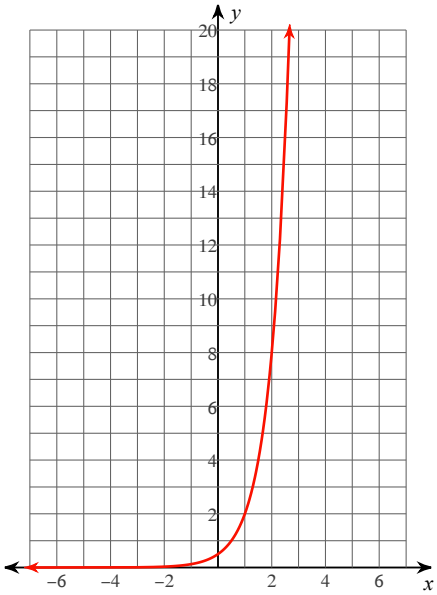
$2,017.33

14) A radioactive substance decays by 10% each year. If there was originally 50 grams of the substance, how much would be left after 5 years?

29.52 grams

Sketch the graph of each function. Then state the domain, range, intervals of increasing and decreasing, and the end behavior.

15) $y = \frac{1}{2} \cdot 4^x$



16) a. Domain: a. $(-\infty, \infty)$

b. Range: b. $(0, \infty)$

c. Increasing: c. $(-\infty, \infty)$

d. Decreasing: d. None

e. End behavior: e. As $x \to -\infty$, $y \to 0$
As $x \to \infty$, $y \to \infty$

17) a. Domain: a. $(-\infty, \infty)$

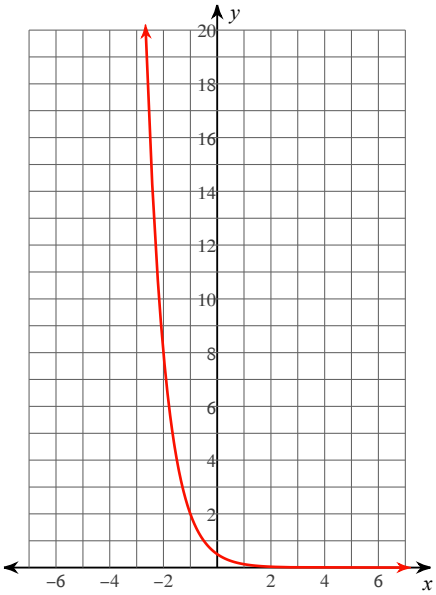
b. Range: b. $(0, \infty)$

c. Increasing: c. None

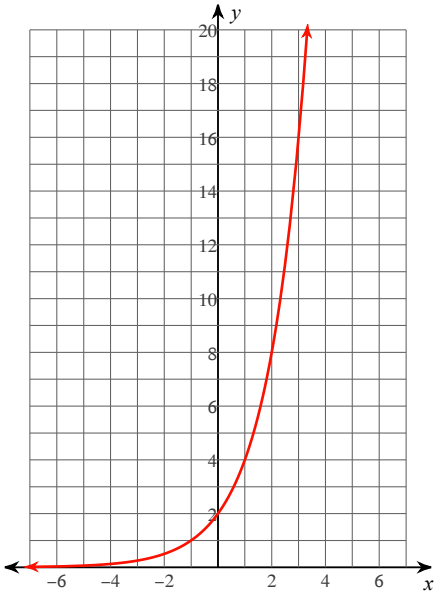
d. Decreasing: d. $(-\infty, \infty)$

e. End behavior: e. As $x \to -\infty$, $y \to \infty$
As $x \to \infty$, $y \to 0$

18) $y = \frac{1}{2} \cdot \left(\frac{1}{4}\right)^x$



19) $y = 2 \cdot 2^x$



20) a. Domain: a. $(-\infty, \infty)$

b. Range: b. $(0, \infty)$

c. Increasing: c. $(-\infty, \infty)$

d. Decreasing: d. None

e. End behavior: e. As $x \to -\infty$, $y \to 0$
As $x \to \infty$, $y \to \infty$

21) a. Domain: a. $(-\infty, \infty)$

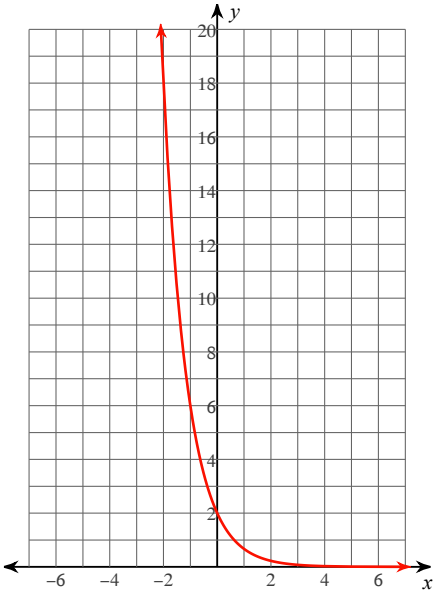
b. Range: b. $(0, \infty)$

c. Increasing: c. None

d. Decreasing: d. $(-\infty, \infty)$

e. End behavior: e. As $x \to -\infty$, $y \to \infty$
As $x \to \infty$, $y \to 0$

22) $y = 2 \cdot \left(\frac{1}{3}\right)^x$



Identify the initial value, growth or decay factor, and growth or decay rate.

23) $y = 12 \cdot 0.87^x$

Initial: 12
Decay factor: 0.87
Decay rate: 13%

24) $y = 25 \cdot 0.93^{4x}$

Initial: 25
Decay factor: 0.75
Decay rate: 25%

25) $y = 1.07^{3x}$

Initial: 1
Decay factor: 1.23
Decay rate: 23%

26) $y = 35 \cdot 1.14^x$

Initial: 35
Decay factor: 1.14
Decay rate: 14%

Evaluate.

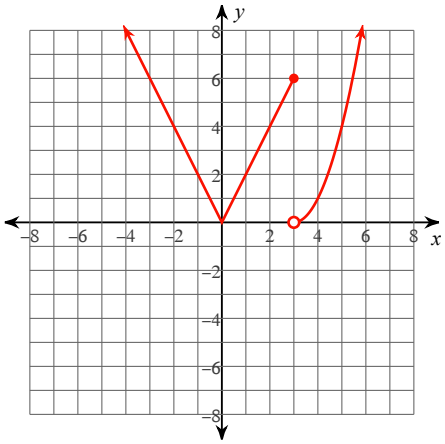
27) $h(x) = \begin{cases} 2|x| - 3, & x \le -4 \\ 3x^2 - 1, & x = -3 \\ -x^2 + 3, & x \ge 0 \end{cases}$

a. $h(-2)$ b. $h(-3)$ c. $h(2)$ d. $h(-10)$

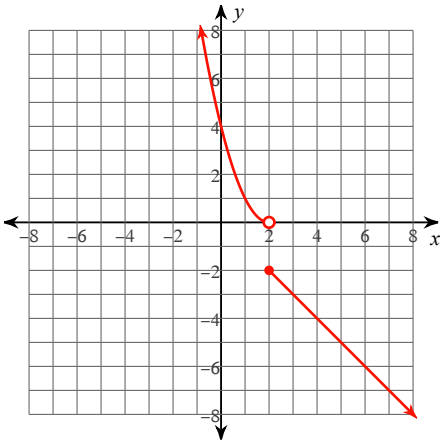
a. Undefined
b. 26
c. -1
d. 17

Sketch the graph of each function.

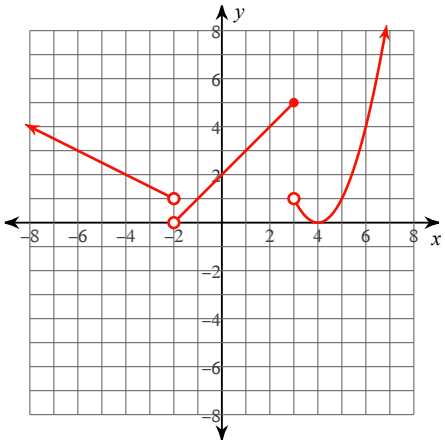
28) $g(x) = \begin{cases} 2|x|, & x \le 3 \\ (x-3)^2, & x > 3 \end{cases}$



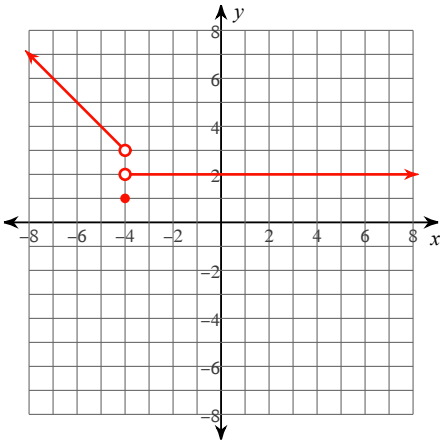
29) $g(x) = \begin{cases} (x-2)^2, & x < 2 \\ -|x|, & x \ge 2 \end{cases}$



30) $g(x) = \begin{cases} \dfrac{|x|}{2}, & x < -2 \\ x + 2, & -2 < x \le 3 \\ (x-4)^2, & x > 3 \end{cases}$

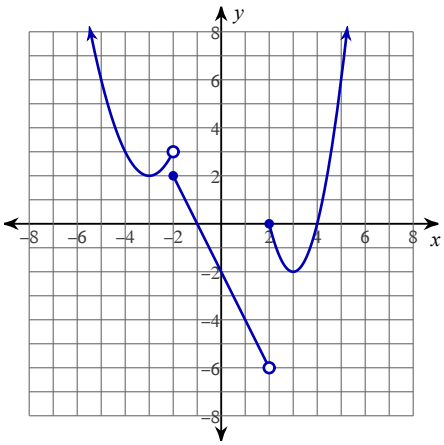


31) $w(x) = \begin{cases} -x - 1, & x < -4 \\ (x+5)^2, & x = -4 \\ 2, & x > -4 \end{cases}$



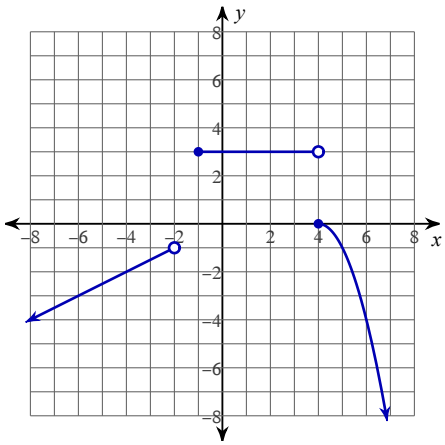
Write an equation for each piecewise function.

32)



$$f(x) = \begin{cases} (x+3)^2 + 2, & x < -2 \\ -2x - 2, & -2 \le x < 2 \\ 2(x-3)^2 - 2, & x \ge 2 \end{cases}$$

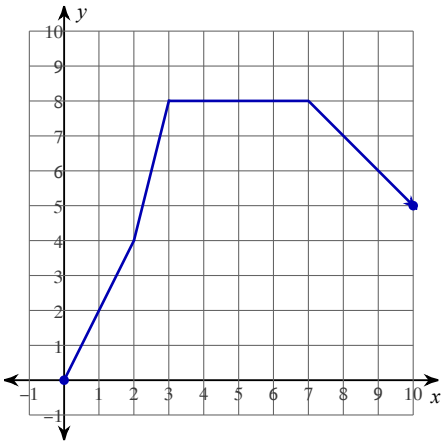
33)



$$g(x) = \begin{cases} \frac{1}{2}x, & x < -2 \\ 3, & -1 \le x < 4 \\ -(x-4)^2, & x \ge 4 \end{cases}$$

Write a scenario that can be modeled by the graph.

34)



Jane is warming up for a run. She jogs at a certain pace for the first 2 minutes increases her speed for the next minute, and then she rests and stretches for 5 She then starts jogging back to where she started at a cool-down pace.

Determine if each situation represents linear, quadratic, exponential, or none.

35) A salary scale starts at \$45,000 plus 10% commission for every sale.

Linear

36) $\{(-1, 4), (0, 8), (2, 32), (4, 128)\}$

Exponential

37) $\{(-4, -2), (-2, 8), (-1, -3), (0, 12)\}$

None

38) $\{(-2, 16), (-1, 7), (0, 0), (1, -5), (2, -8)\}$

Quadratic

39) A radioactive substance decays by 50% every 12 years.

Exponential