Secondary Math 2   Name_____

Unit 8 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

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

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

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

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

4) $f(x) = x^2$
   $g(x) = -3(x + 2)^2 - 2$

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

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

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

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

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

1

8) $f(x) = 2x^2 + 2x + 2$; $[-2, -\frac{5}{3}]$
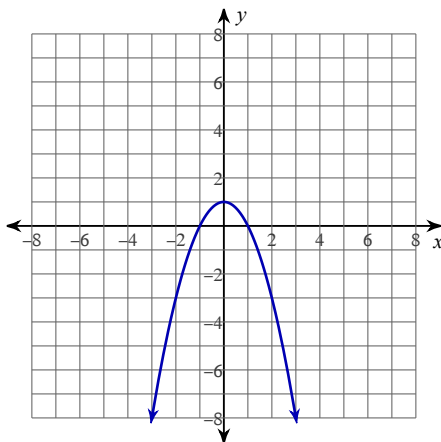
$-\frac{16}{3}$

9) $y = -2|x - 3| - 1$; $[-1, 4]$
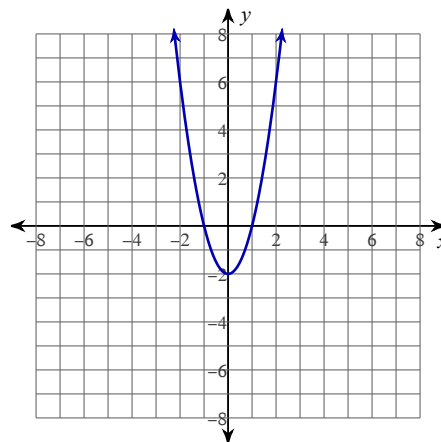
$\frac{6}{5}$

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

60

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

1

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

4

Use the information to answer the question.

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

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

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

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

16) $y = 35 \cdot 1.14^x$ Initial: 35
Growth factor: 1.14
Growth rate: 14%

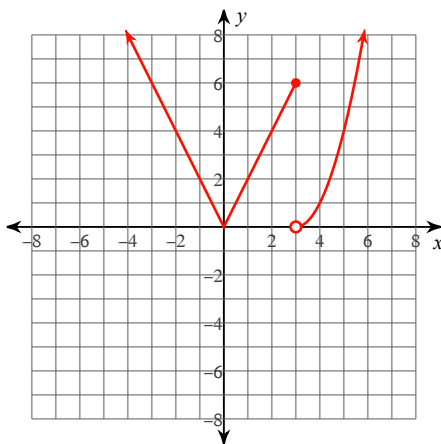17) $y = 140 \cdot 0.86^x$ Initial: 35
Decay factor: 0.86
Decay rate: 14%

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

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

19) $y = 1.07^{3x}$ Initial: 1
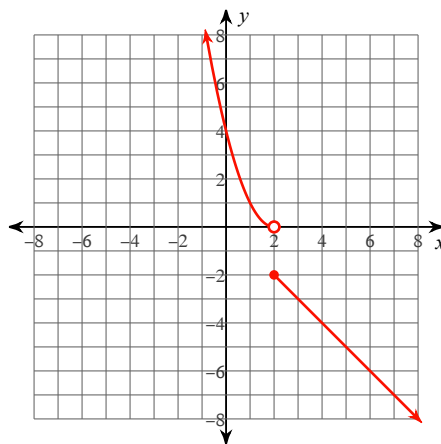Growth factor: 1.23
Growth rate: 23%

20) $y = 500 \cdot 1.02^{5x}$

Initial: 1
Growth factor: 1.40
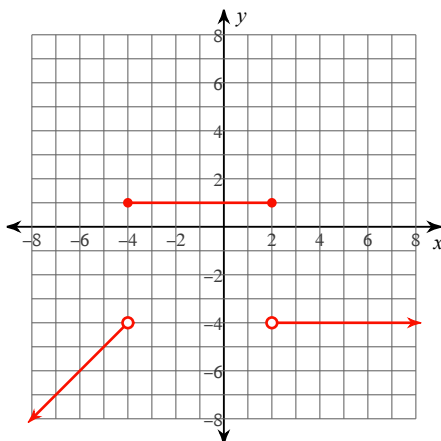Growth rate: 40%

Sketch the graph of each function.

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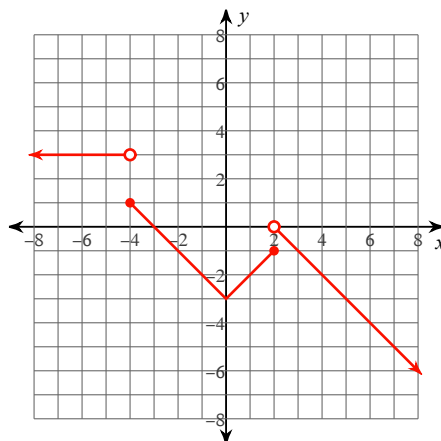

22) $g(x) = \begin{cases} (x-2)^2, & x < 2 \\ -|x|, & x \ge 2 \end{cases}$

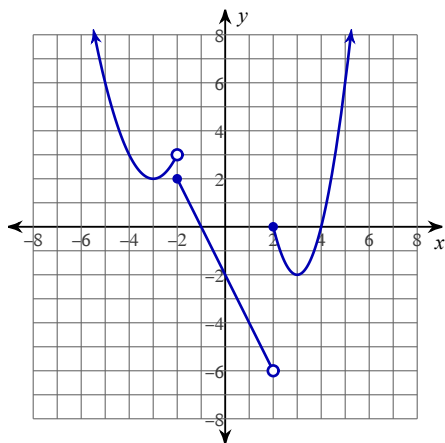23) $g(x) = \begin{cases} -|x|, & x < -4 \\ 1, & -4 \le x \le 2 \\ -4, & x > 2 \end{cases}$

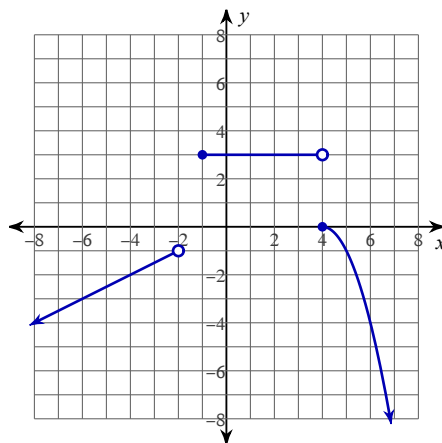24) $g(x) = \begin{cases} 3, & x < -4 \\ |x| - 3, & -4 \le x \le 2 \\ -x + 2, & x > 2 \end{cases}$

Write an equation for each piecewise function.

25)

$$f(x) = \begin{cases} (x+3)^2 + 2, & x < -2 \\ -2x - 2, & -2 \le x < 2 \\ 2(x-3)^2 - 2, & x \ge 2 \end{cases}$$
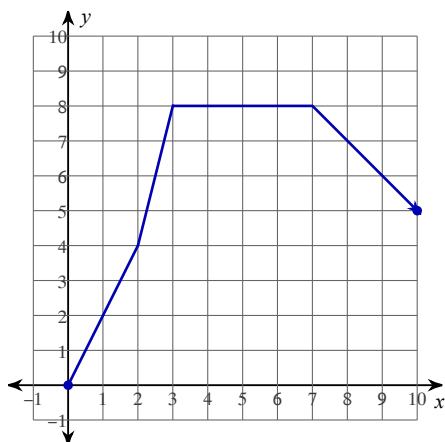
26)

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

Write a scenario that can be modeled by the graph.

27)

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.

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

Linear

29) $\{(-1, 4), (0, 8), (2, 32), (4, 128)\}$

Exponential

30) $\{(-4, -2), (-2, 8), (-1, -3), (0, 12)\}$

None

31) $\{(-2, 16), (-1, 7), (0, 0), (1, -5), (2, -8)\}$

Quadratic

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

Exponential