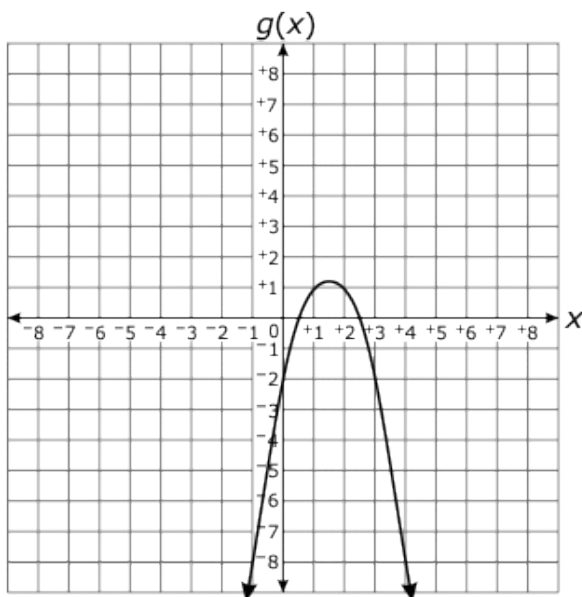TEST NAME: **Math 1 online April 4**
TEST ID: **3022343**
GRADE: **09 - Ninth Grade**
SUBJECT: **Mathematics**
TEST CATEGORY: **My Classroom**

Student: _____

Class: _____

Date: _____

1. Leo compared the graph of $f(x) = x^2 + 9x + 18$ with the function graphed below.

Which statement is true about the two functions?

A. Both functions have a minimum.

B. Both functions have a maximum.

C. $f(x)$ has a minimum and $g(x)$ has a maximum.

D. $g(x)$ has a minimum and $f(x)$ has a maximum.

2. Jasmine compared the *x*-intercept of $f(x) = 2x - 8$ to the *x*-intercept of the function shown in the table below.

x	g(x)
0	16
2	32
4	48
6	64

What is the value of the larger *x*-intercept of the two functions?

A. ⁻8

B. ⁻2

C. 4

D. 16

3. Joseph and Brett are standing on the roof of their houses. Both threw a ball into the air. The height of the ball, x seconds after Joseph threw it, is represented by the function $f(x) = -16x^2 + 24x + 5.$ The height of the ball t seconds after Brett threw it is represented by the graph below.

PATH FOLLOWED BY BRETT'S BALL
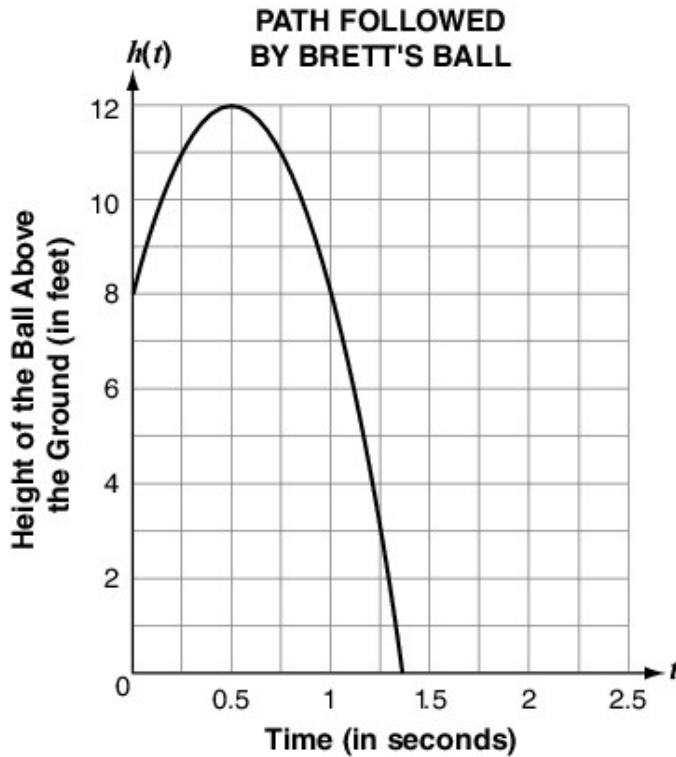
Which of these statements comparing the paths of the balls is **correct**?

A. The height from which Joseph threw the ball was 2 feet greater than the height from which Brett threw the ball.

B. The ball that Joseph threw was in the air for approximately 0.25 second more than the time that the ball thrown by Brett was in the air.

C. The ball that Joseph threw was in the air for approximately 0.32 second more than the time that the ball thrown by Brett was in the air.

D. The ball that Joseph threw went 14 feet above the roof of his house as compared to the ball that Brett threw which went 12 feet above the roof of his house.

4. Both $f(x)$ and $g(x)$, below, are quadratic functions modeled by parabolas.
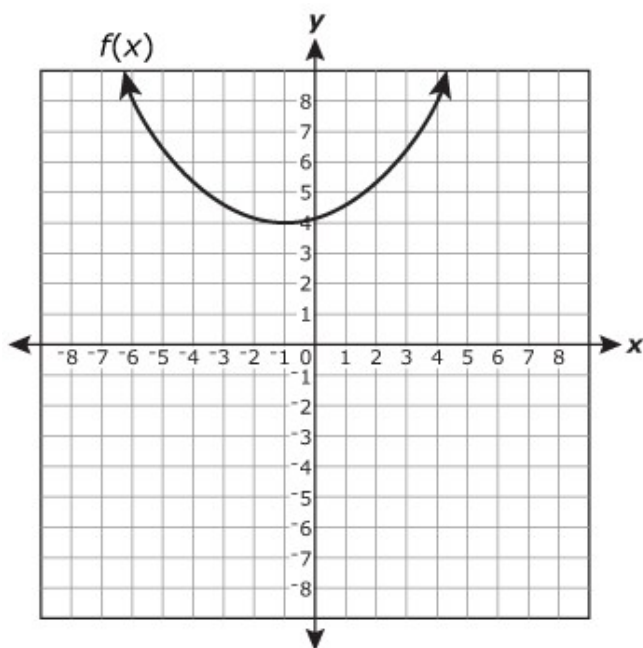
$$g(x) = -2x^2 + 6x$$

Each function has a vertex. What is the height of the higher vertex?

A. $f(x)$ has the higher vertex at 4.

B. $g(x)$ has the higher vertex at $\dfrac{9}{2}$.

C. $f(x)$ has the higher vertex, because $g(x)$ does not have a vertex.

D. $f(x)$ increases without bound, so the height of its vertex is infinite.

5. Jason compared the function $f(x) = 20(1.2)^x$ to the function that fits the values in the table below.

x	1	2	3	4	5
$g(x)$	12	24	48	96	192

What is the distance between the y-intercepts of the two functions?

A. 14

B. 8

C. 6

D. 4

6. The graph of $h(x)$ is shown below.
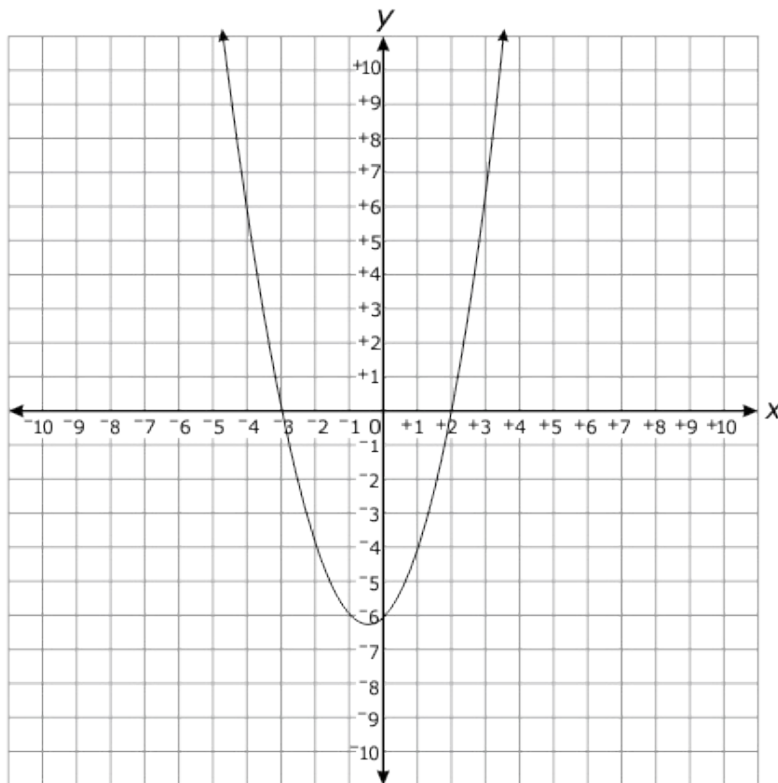
Which function has the same x-intercepts as the graph of $h(x)$, but has different end behaviors?

A. $y = x^2 - x - 6$

B. $y = 3x^2 + 3x - 18$

C. $y = -x^2 - x + 6$

D. $y = -2x^2 + 2x + 6$

7. Angela earns $8 for every hour she works at her job. The amount of money Kelly earns at her job is modeled by the function $f(x) = 15t$, where t represents hours worked. Angela and Kelly both worked 38 hours last week. Which statement accurately describes the amount of money Angela and Kelly earned last week?

A. Angela made $38 more than Kelly.

B. Kelly made $266 more than Angela.

C. Angela made $304 more than Kelly.

D. Kelly made $570 more than Angela.

8. Maria compared the maximum value of the function $f(x) = {}^-x^2 + 4x - 1$ to the maximum value of the quadratic function that fits the values shown in the table below.

x	g(x)
⁻5	⁻41
⁻4	⁻20
⁻3	⁻5
⁻2	4

What is the value of the smaller maximum?

A. ⁻41

B. ⁻1

C. 3

D. 7

9. Suppose a bacteria is introduced to two different solutions in separate petri dishes. The bacteria in the first solution grow at a rate modeled by the function $G(t) = (1.40)^t$. The bacteria in the second solution grow in accordance with the data displayed in the table below.

t	1	2	3	4	5	6
H(t)	3.6	4.3	5.2	6.2	7.5	9.0

Which statement **best** describes the growth rates exhibited within the two different solutions?

A. The bacteria grow at the same rate in both solutions.

B. The bacteria grow at a slower rate in the first solution.

C. The bacteria grow at a faster rate in the first solution.

D. The bacteria decay in the first solution and grow in the second solution.

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10. Which scenario would **best** be modeled by an exponential growth function?

    A. the salary of a worker who makes $8 every hour

    B. the population of a town that is doubling every decade

    C. the population of a virus that is reducing in number by half every hour

    D. the amount of commision a worker makes who earns 8% commission on his total sales

11. Two functions are shown in the table below.

x	$f(x)$	$g(x)$
$^-3$	1	8
$^-2$	4	4
$^-1$	7	2
0	10	1

Which statement is true about the two functions when $x = {}^-6$?

    A. The value of $f(x)$ exceeds the value of $g(x)$ by 56.

    B. The value of $g(x)$ exceeds the value of $f(x)$ by 56.

    C. The value of $f(x)$ exceeds the value of $g(x)$ by 72.

    D. The value of $g(x)$ exceeds the value of $f(x)$ by 72.

12. Which of these represents a situation in which one quantity changes at a constant rate per unit interval?

    A. The population of a sample of bacteria decreases by 25% every hour.

    B. Every year, Albert's salary increases by 5%.

    C. The value of a machine depreciates at the rate of 12% every year.

    D. Every month, John saves 5% of his salary.

13. Kyle initially deposited $235 into a bank account. The bank account earns interest at a rate of 1.2%, compounded monthly. What type of function **best** models the value of the bank account over time?

A. a linear function, because the value is increasing at a constant unit rate each month

B. a linear function, because the value is increasing at a constant percent rate each month

C. an exponential function, because the value is increasing at a constant unit rate each month

D. an exponential function, because the value is increasing at a constant percent rate each month

14. Two functions are listed below.

$$f(x) = 100 + 20x$$
$$g(x) = 20(1.5)^x$$

Which statement is true when $x = 6$?

A. The value of $f(x)$ exceeds the value of $g(x)$ by about 8.

B. The value of $g(x)$ exceeds the value of $f(x)$ by about 8.

C. The value of $f(x)$ exceeds the value of $g(x)$ by about 48.

D. The value of $g(x)$ exceeds the value of $f(x)$ by about 48.

15. Two functions are shown below.

$$f(x) = 15 + (1.1)^x$$
$$g(x) = 115 + 1.1x$$

For what integer value of x does the value of $f(x)$ first exceed the value of $g(x)$?

A. 54

B. 60

C. 181

D. 187

16. The table below lists the number of items, *N*, manufactured by a factory and the corresponding cost, *C*, to manufacture that many items.

Number of Items (N)	Cost (C) (in dollars)
4	1,700
8	1,800
12	1,900
16	2,000
18	2,050
21	2,125
22	2,150

Which of these **best** identifies the interval where the cost is increasing at a constant rate?

A. when $N \leq 16$ only

B. when $N \geq 16$ only

C. for no values of *N*

D. for all the values of *N*

17. Clara's and Michelle's parents started saving for college in 1998.

- Clara's college fund can be modeled by the function $f(x) = 500x + 2,500$, where *x* is the number of years since 1998.
- Michelle's college fund can be modeled by the function $g(x) = 2,500(1.1)^x$, where *x* is the number of years since 1998.

*About* what year will Michelle's college fund first exceed Clara's college fund?

A. 2013

B. 2015

C. 2017

D. 2019

18. Which choice could be modeled by an exponential function?

    A. the speed of a car that is decreasing by 3 mph every minute

    B. the number of push-ups a person does each day if the number of push-ups increases by 2 each day

    C. the amount a person gets paid if the person's pay increases by 2 percent each year

    D. the number of students in a class if no students join or leave the class

19. Which graph shows a function that is growing by a constant percentage rate per unit interval?
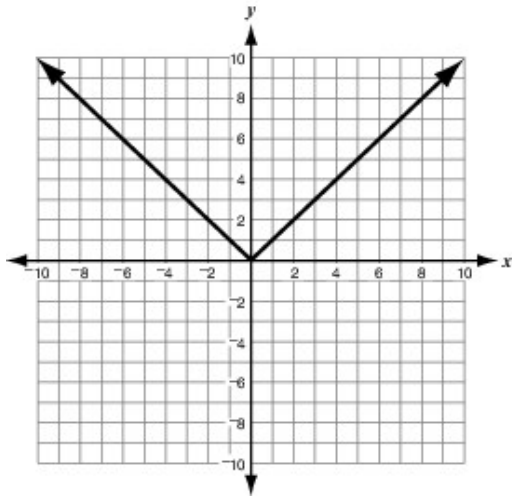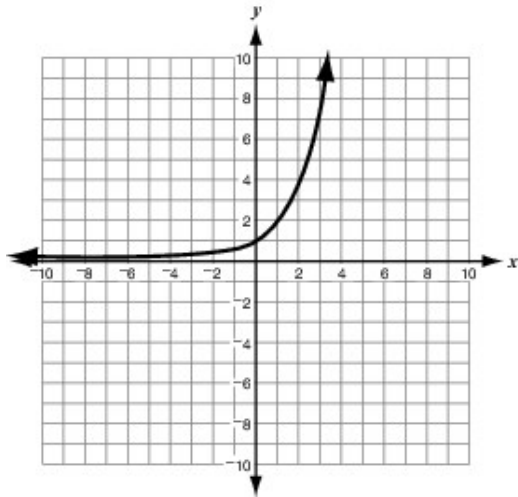
A.
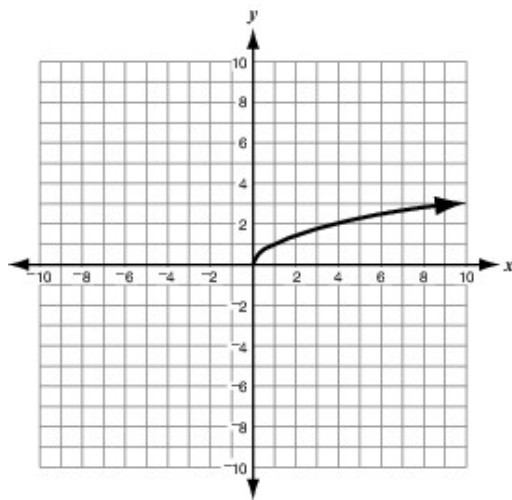
B.
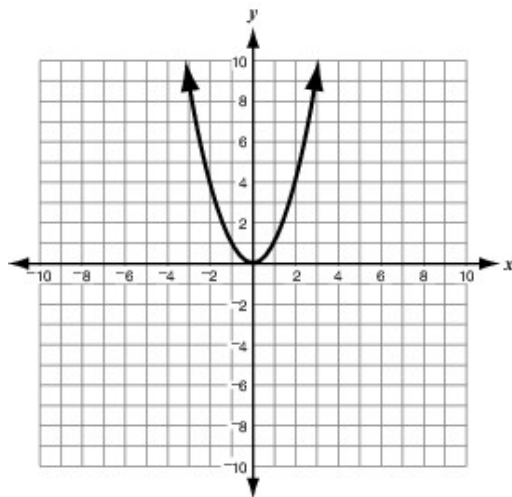
C.

D.

20. **After a dose of an antibiotic, the number of bacteria decreases. If the equation $y = 27{,}000\left(\frac{1}{3}\right)^x$ models this "decay" situation, which value represents the original number of bacteria?**

A. 3000

B. 9000

C. 27,000

D. 81,000

21. After traveling a while, Karen begins to keep track of her time and mileage. In the equation $d = 50t + 40$, d represents the total distance traveled in miles, and t represents the time in hours. How far had Karen traveled before she began keeping track of her mileage?

   A. 90 miles

   B. 50 miles

   C. 40 miles

   D. 10 miles

22. The equation $y = 250(1.05)^x$ models the value of an investment after x years. Which statement is true about the value of the investment?

   A. The value of the investment is growing by $250 each year.

   B. The value of the investment is growing by 5% each year.

   C. The value of the investment is decreasing by $250 each year.

   D. The value of the investment is decreasing by 5% each year.

23. A lawn service company uses the function $f(x) = 2.5x + 25$ to determine the cost for x hours of service. What does the constant term in the equation represent?

   A. the total number of hours of lawn service provided

   B. the initial fee the company charges before providing lawn service

   C. the total cost for the lawn service

   D. the cost per hour of lawn service

24. A taxi company uses the function $f(x) = 0.45x + 3.50$ to determine the cost to take a taxi x miles. What is the meaning of the coefficient of x?

   A. the cost per mile

   B. the number of miles

   C. the total cost to ride a taxi

   D. the fixed fee the company charges

25. A research laboratory studied the decay rate of two radioactive elements, *A* and *B*. The amount of element *A* present after *t* days is modeled by $A = 10(1-0.12)^t$, and the amount of element *B* after the same number of days is modeled by $B = 20(0.88)^t$. Which conclusion is **correct** based on the study?

   A. The ratio of the amounts of element *A* to element *B* that remain after time, *t*, is 2:1.

   B. The initial amount of element *A* is twice the initial amount of element *B*.

   C. Element *A*'s decay rate is 12% while element *B*'s decay rate is 88%.

   D. Both elements have the same decay rate.

26. To calculate the charge for a load of bricks, including delivery, the Pine Ridge Brick Company uses the function *c* = 0.42*b* + 25, where *c* is the charge and *b* is the number of bricks. What is the meaning of the coefficient of *b*?

   A. the delivery charge per load

   B. the total delivery charge

   C. the total cost of the bricks

   D. the cost per brick

27. The decline in the annual fuel consumption in million gallons, *F*, of a domestic airline since 2000 is modeled by the function $F = 13903(2)^{-0.019t}$, where *t* represents the number of years. How many millions of gallons of fuel were consumed by the airline in 2000?

   A. 2

   B. 38

   C. 13,903

   D. 27,806

28. Alma invests $300 in an account that compounds interest annually. After 2 years, the balance of the account is $329.49. To the nearest tenth of a percent, what is the rate of interest on the account?

A. 6.9%

B. 5.4%

C. 4.8%

D. 4.4%