Student Name:

Benchmark Assessments

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2017-2018

Math I

(1st Semester)

1st Benchmark

Thomasville City School District
North Carolina

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CALCULATOR INACTIVE

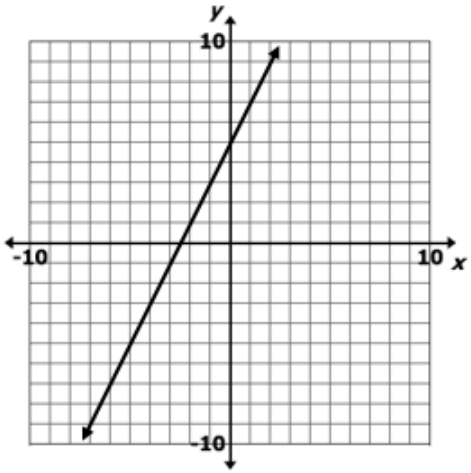
The items in this test are based on the North Carolina High School Standard Course of Study.

DIRECTIONS FOR THE CALCULATOR INACTIVE SECTION OF THE TEST:

- **Calculators <u>may not</u> be used during this test.**
- **Read each problem carefully.**
- **Choose the best answer from the choices given.**
- **Fractions in some answer choices may have been simplified. Check each answer choice to see if this has been done.**
- **Diagrams used in the test may not be drawn to scale.**
- **Stop when you see the words "STOP. END OF CALCULATOR INACTIVE SECTION."**
- **When you have completed the calculator inactive questions, read and follow the directions at the end of this section of the test.**

1. What is the correct graph of the function $y = 2x + 5$?

A



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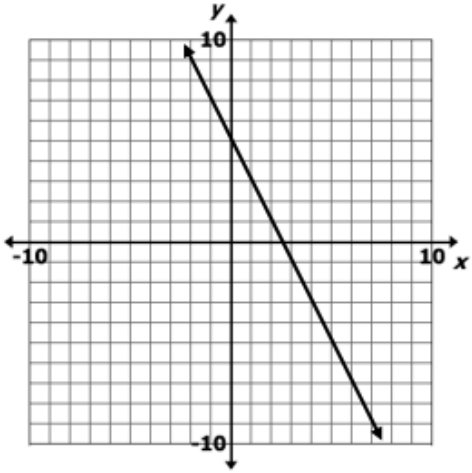

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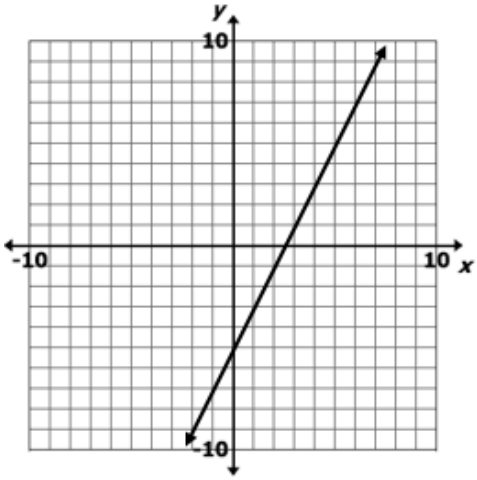

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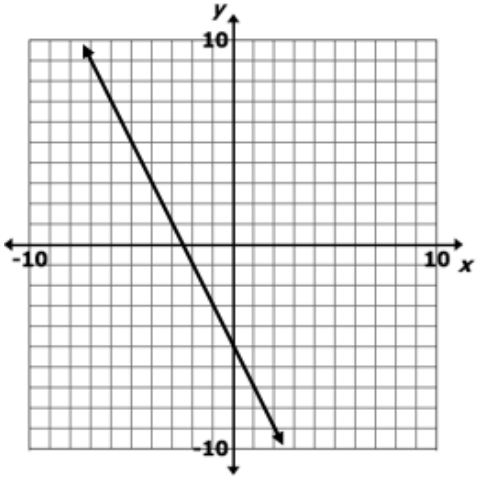


2. A nursery sells small, potted cacti for $4 each and usually sells 20 cacti per week. For every one-dollar increase in price per cactus, the nursery sells three less cacti per week. The functions shown represent the price increase and the number of cacti sold, respectively.

$$f(x) = 4 + x$$
$$g(x) = 20 - 3x$$

What is $f(x) \times g(x)$, the expression representing the revenue earned from selling cacti for one week?

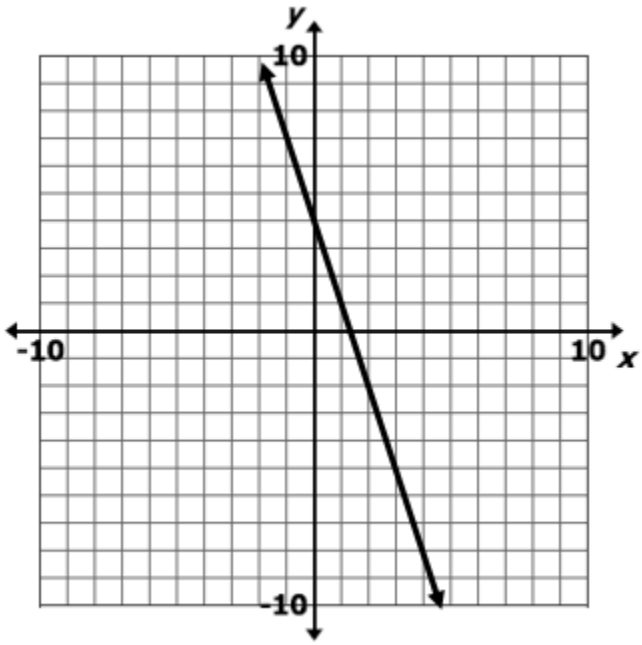
A $-2x + 24$

B $4x - 16$

C $-3x^2 + 8x + 80$

D $3x^2 + 32x + 80$

3. The graph shows the solution of a linear equation.



What is the linear equation?

A $y = -4x + 4$

B $y = -3x + 4$

C $y = 3x + 2$

D $y = 5x + 3$

4. What is a correct simplification of the expression?

$$\left(\frac{m}{n^2}\right)^{-2}$$

A $\frac{n^4}{m^2}$

B $\frac{1}{m^2}$

C $\frac{m^2}{1}$

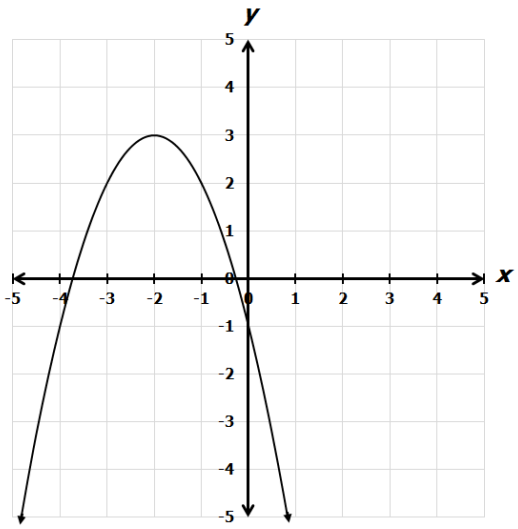
D $\frac{m^2}{n^4}$

5. Consider the quadratic equation.

$$y = -x^2 + 4x - 1$$

Which graph represents the solution of this equation?

A



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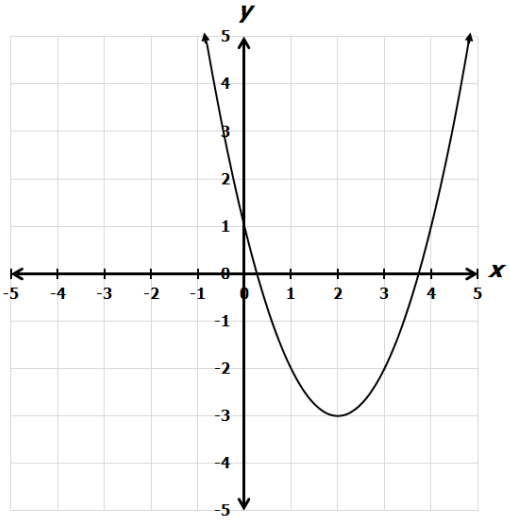

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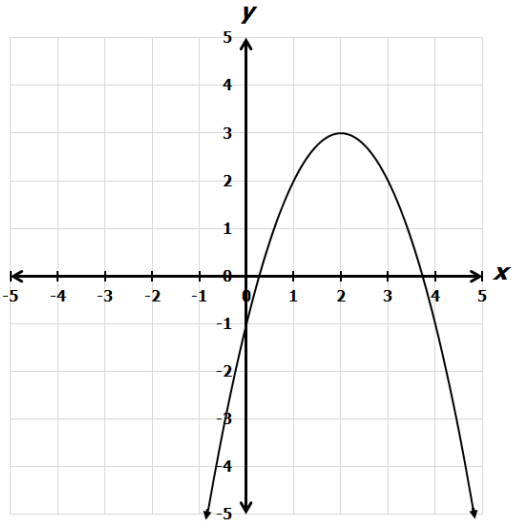

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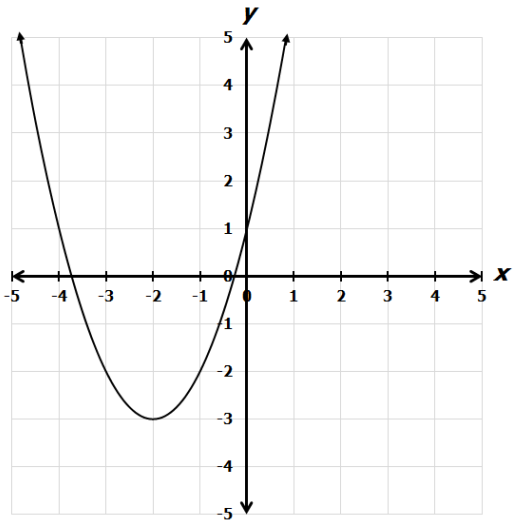


DIRECTIONS FOR THE GRIDDED RESPONSE SECTION OF THE TEST:

- **Questions 1 through 5 require you to write your answers in the boxes provided on the back of your answer document.**
- **Write only the number or symbol in each box, and fill in the circle in each column that matches what you have printed.**
- **Fill in only 1 circle in each column.**

1. Consider the function.

$$f(x) = -8(2)^x$$

What is the value of $f(-1)$?

2. In order to solve the equation $2x + 7 = -x + 1$, a student graphs two functions, $f(x)$ and $g(x)$.

$$f(x) = 2x + 7$$
$$g(x) = -x + 1$$

What is the solution to the equation $f(x) = g(x)$?

Go to the next page

3. A charity is selling brooms to raise funds.

- **Each box has 10 brooms.**
- **Each broom is sold for $15.**

If the charity earns $50 profit for each box of brooms, how much does each box of brooms cost the charity, in dollars?

4. The sum of three consecutive integers is 177. What is the *largest* of the integers?

5. A geometric sequence is defined by the given properties.

$$a_1 = 5$$
$$a_n = 3a_{n-1}$$

What is the value of term a_4 in the geometric sequence?

END OF CALCULATOR INACTIVE SECTION

DIRECTIONS:

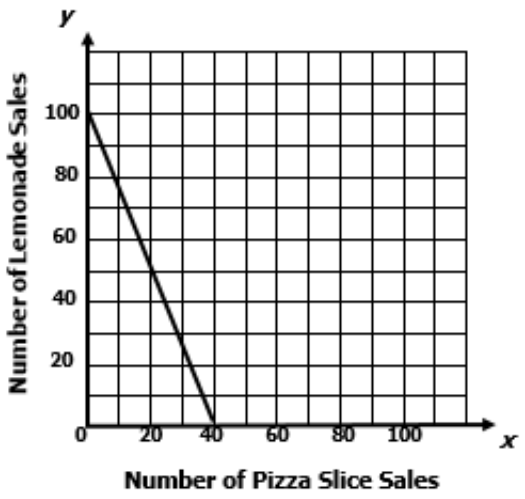
- **Look back over your answers for the calculator inactive questions. You will *not* be able to go back and work on these questions once you are given a calculator.**
- **Raise your hand to let your teacher know you are ready to begin the calculator active questions.**
- **Do not begin work on the calculator active test questions until your teacher has given you a calculator.**
- **Turn your answer document over to the multiple choice side.**
- **When your teacher has given you a calculator, GO TO THE NEXT PAGE, and BEGIN the calculator active questions.**
- **Stop when you see the words "STOP. END OF MATH TEST."**

6. A concession stand sells pizza slices and lemonade.

- **Each pizza slice costs $2.50.**
- **Each lemonade costs $1.00.**
- **The total sales for one day is $100.**

Which graph represents the relationship between the number of pizza slice sales, *x*, and the number of lemonade sales, *y*, for that day?

A



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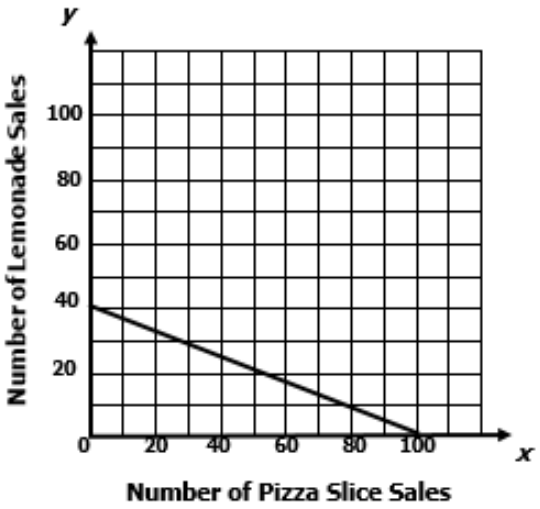

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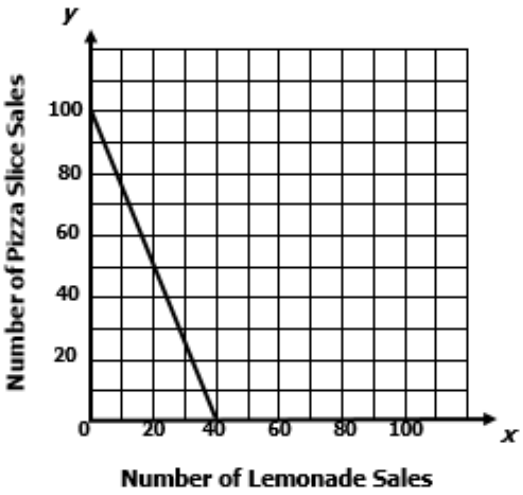

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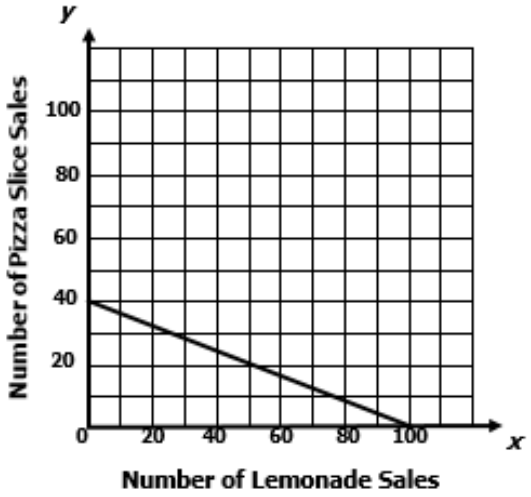


7. The total cost of building a brick pathway outside of a school involves the cost of bricks and the cost of labor. The length of the pathway is p meters, and the width of the pathway is 2 meters.

If the expression $30(2p) + 250$ gives the total cost of the brick pathway, what does the 30 represent?

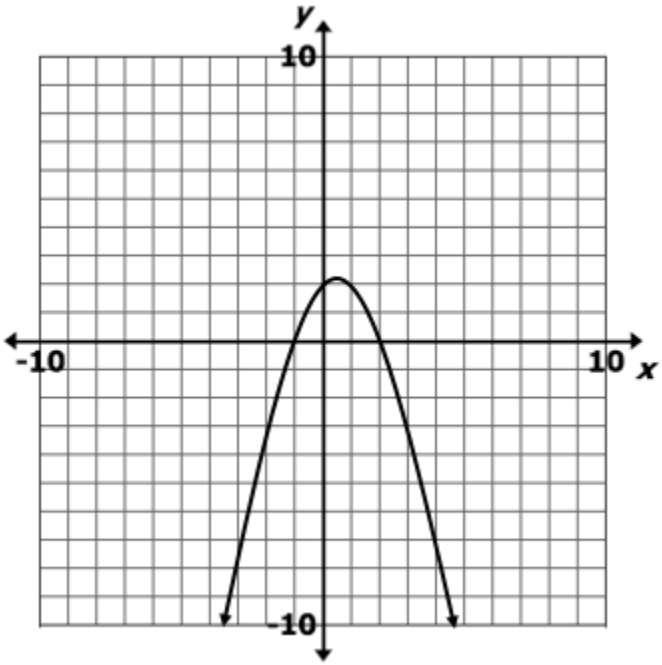
A the area of the brick pathway in square meters

B the cost of labor per hour

C the cost of the bricks per square meter

D the total cost of the labor

8. Consider the graph of a quadratic function on the coordinate plane.



Which characteristics *best* describe the function?

A intercepts at (-1, 0), (0, 2), and (2, 0); maximum between $x = 0$ and $x = 1$

B intercepts at (-1, 0), (0, 2), and (2, 0); maximum between $x = 2$ and $x = 3$

C intercepts at (0, -1), (0, 2), and (2, 0); maximum between $x = 0$ and $x = 1$

D intercepts at (0, -1), (0, 2), and (2, 0); maximum between $x = 2$ and $x = 3$

9. The perimeter of a square is represented by the function $P = 4s$. Is the function linear, and why?

A The function is linear because it does not have a constant rate of change.

B The function is linear because it has a constant rate of change.

C The function is nonlinear because it does not have a constant rate of change.

D The function is nonlinear because it has a constant rate of change.

10. Albert and Paula purchase a new car for $18,000. The value of the car is expected to decrease with time, as shown by the graph.

What is the domain of the graph?

A all negative real numbers

B all real numbers

C all real numbers between 0 and 18,000

D all real numbers greater than or equal to 0

11. A florist buys x dozen roses and y dozen carnations for a wedding. The roses cost $16 per dozen, and the carnations cost $9 per dozen.

If the florist pays a total of $218, which equation represents the situation?

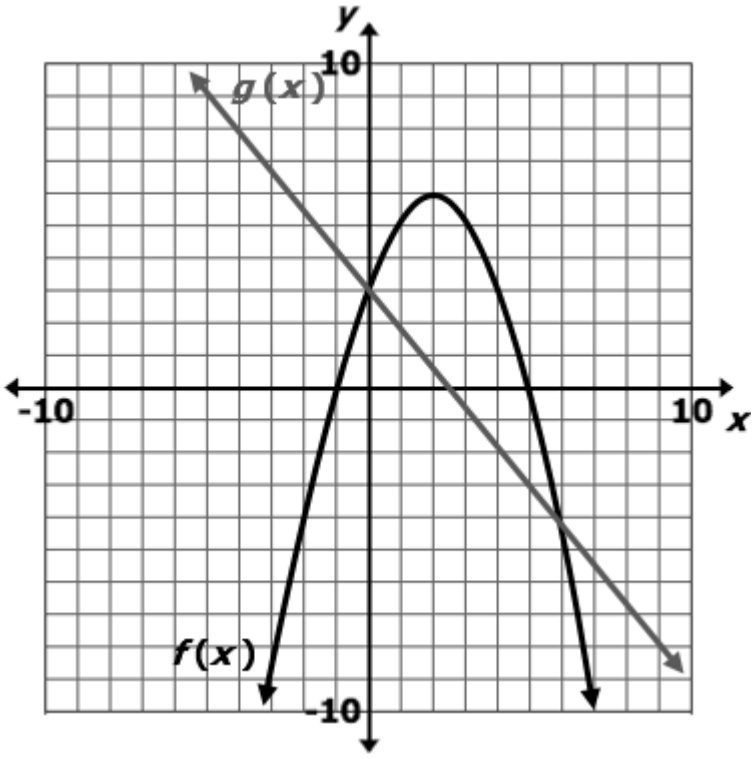
A $16x + 9y = 218$

B $16x - 9y = 218$

C $9x + 16y = 218$

D $9x - 16y = 218$

12. Consider the graph of the equations $y = f(x)$ and $y = g(x)$.



What are the *approximate* solutions of the equation $f(x) = g(x)$?

A -4 and 3

B -1 and 5

C 0 and 3

D 0 and 6

13. Which situation can be modeled with an exponential function?

A A computer downloads 100 kilobytes of data per minute.

B A tree grows 8 inches per year.

C The number of visits to a website doubles every 24 hours.

D The population of bacteria grows by 50 bacteria.

14. The expression $100(2)^x$ represents the growth of a bacteria population after x days. What does the 2 represent in the expression?

A the amount of time necessary to double the population

B the final size of the population after x days

C the initial size of the population when $x = 0$

D the rate at which the population is growing every day

15. The table represents the relationship between n, the position of the term in a sequence, and v, the value of the term.

position (n)	1	2	3	4	5
value (v)	-7	-4	-1	2	5

Which rule defines the sequence demonstrated in the table?

A $v = 2n - 9$

B $v = 3n - 10$

C $v = 4n - 12$

D $v = 6n - 19$

16. The population of a town t years after the year 2007 can be modeled by the function $p(t) = 3{,}000(0.95)^t$. Which statement is true?

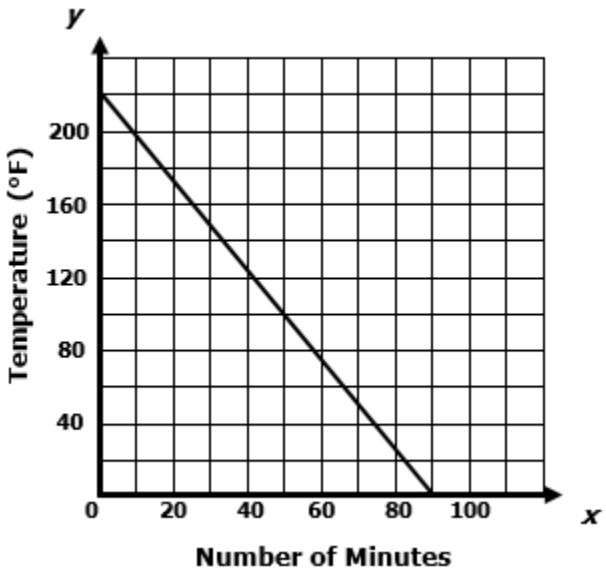
A The decay rate of the population of the town is 5%.

B The decay rate of the population of the town is 95%.

C The growth rate of the population of the town is 5%.

D The growth rate of the population of the town is 95%.

17. A chef puts a pie in a freezer set at 0°F. The temperature of the pie, *y*, after *x* minutes in the freezer is displayed in the graph.



Which statement is true?

A The pie was initially 240°F.

B The pie took 95 minutes to reach 0°F.

C The pie increased in temperature at a rate of $2.\overline{4}$ degrees per minute.

D The pie decreased in temperature at a rate of $2.\overline{4}$ degrees per minute.

18. Kate works as a computer salesperson. She earns a monthly salary of $1,200 plus $20 for every computer, *c*, sold. It costs Kate $4 per day to drive to work.

Which expression represents the amount of money Kate makes after deducting her travel costs if, over the course of 12 months, she goes to work 300 days?

A $1{,}200c + 20 - 300(4)$

B $12(1{,}200 + 20c) - 300(4)$

C $12(1{,}200) + 20c - 300(4)$

D $12[1{,}200 + 20c - 300(4)]$

19. Which equation represents the relationship between x and y shown in the table?

x	0	1	2	3	4
y	-3	-2	1	6	13

A $y = x + 1$

B $y = x^2 - 3$

C $y = 2x^2 - 3$

D $y = x^2 + 1$

20. Fernando throws a baseball in the air. The function $h(t) = -16t^2 + 24t + 6$ models the height of the baseball, h, at a given time, t, in seconds, after he throws it.

Which is the *most* reasonable domain for the function $h(t)$?

A all real numbers

B all integers

C all real numbers greater than or equal to 0 and less than or equal to approximately 1.7

D all integers greater than or equal to 0 and less than or equal to approximately 2

21. Consider the two functions.

$$y = 1.5x$$
$$y = 1.5^x$$

For which value is $1.5x < 1.5^x$?

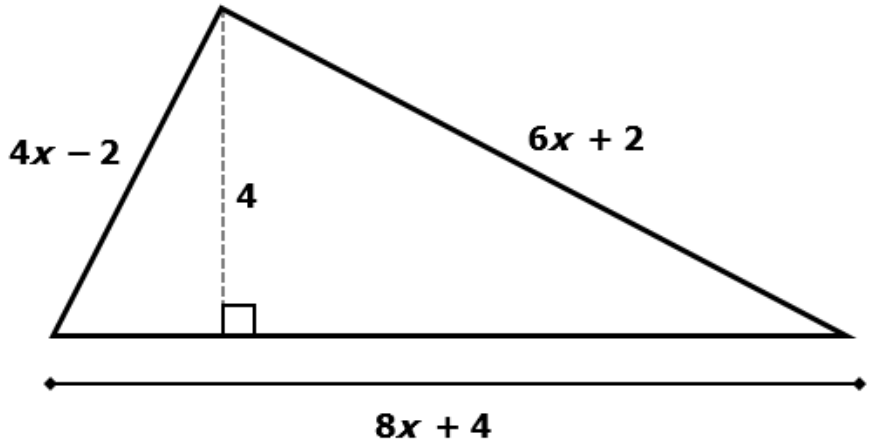
A 0

B 1

C 2

D 3

22. The area of a triangle is represented by the formula $A = \frac{1}{2}bh$.



Which expression represents the area of the triangle?

A $12x + 4$

B $16x + 8$

C $18x + 8$

D $32x + 16$

23. In order to solve the equation $3x + 4 = -2x - 7$, a student graphs $f(x) = 3x + 4$ and $g(x) = -2x - 7$. Which *best* describes the next step in finding the solution(s) to the equation?

A The student should find the x-intercepts of the two lines. The solutions to the equation are always the x-values of the coordinates of the x-intercepts.

B The student should find the y-intercepts of the two lines. The solutions to the equation are always the y-values of the coordinates of the y-intercepts.

C The student should find the intersection of the two lines. The solution to the equation is always the x-value of the coordinates of the intersection.

D The student should find the intersection of the two lines. The solution to the equation is always the y-value of the coordinates of the intersection.

24. The table shows the costs of taxi rides based on the lengths of the rides, in miles.

Length of Taxi Ride (miles)	Cost
1.2	$9.00
2.0	$12.00
4.7	$21.45
6.8	$28.80

Approximately **what is the cost of a 5.5-mile taxi ride?**

A $19.25

B $22.45

C $24.25

D $27.45

25. A crane lifts construction materials from a palette to the top of a building at a constant rate. If the equation $y = 4x + 3$ models the height of the materials, y, in feet, after x seconds of lifting, which statement is true?

A The crane lifts the materials at a rate of 3 feet per second, and the initial height of the materials is 0 feet.

B The crane lifts the materials at a rate of 3 feet per second, and the initial height of the materials is 4 feet.

C The crane lifts the materials at a rate of 4 feet per second, and the initial height of the materials is 0 feet.

D The crane lifts the materials at a rate of 4 feet per second, and the initial height of the materials is 3 feet.

26. A student is trying to decide between two part-time jobs. Each job has a base pay and an hourly rate. The table represents the rate each job pays.

Job 1	Job 2
The base pay is \$30, and the job pays \$150 total for an 8-hour day.	$y = 17x + 25$

Which job pays more per hour, and what is the rate?

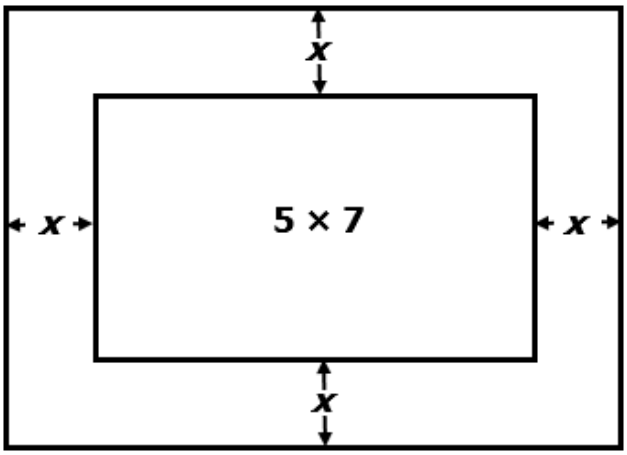
A Job 1 pays more per hour, and the rate is \$15 per hour.

B Job 1 pays more per hour, and the rate is \$30 per hour.

C Job 2 pays more per hour, and the rate is \$17 per hour.

D Job 2 pays more per hour, and the rate is \$25 per hour.

27. The picture frame holds a 5 × 7 photograph. The border around the edges of the photograph has the same width, x, on each side of the frame.



If the area of the picture frame is $A = (5 + 2x)(7 + 2x)$, what does $2x$ represent?

A The $2x$ represents the change in only the length of the photograph based on the length of the border.

B The $2x$ represents the change in only the length of the picture frame based on the length of the border.

C The $2x$ represents the change in each dimension of the photograph, length and width, based on the width of the border.

D The $2x$ represents the change in each dimension of the picture frame, length and width, based on the width of the border.

28. The table shows the values of three functions for four different values of x.

x	$f(x)$	$g(x)$	$h(x)$
1	4	2	1
2	8	4	4
3	12	8	9
4	16	16	16

For $x \geq 10$, which inequality is true about the functions?

A $f(x) > g(x) > h(x)$

B $f(x) > h(x) > g(x)$

C $f(x) < g(x) < h(x)$

D $f(x) < h(x) < g(x)$

29. An employee has a savings account with $2,000, where the interest is compounded annually at a rate of 5%. The employee also deposits $500 into a retirement account at the beginning of each year.

Which function represents the amount in both of the employee's accounts after x years?

A $f(x) = 2{,}500 + 0.05x$

B $f(x) = 2{,}000(1.05)^x + 500x$

C $f(x) = 500x + 2{,}000(0.05)^x$

D $f(x) = 2{,}000(1.05x) + 500$

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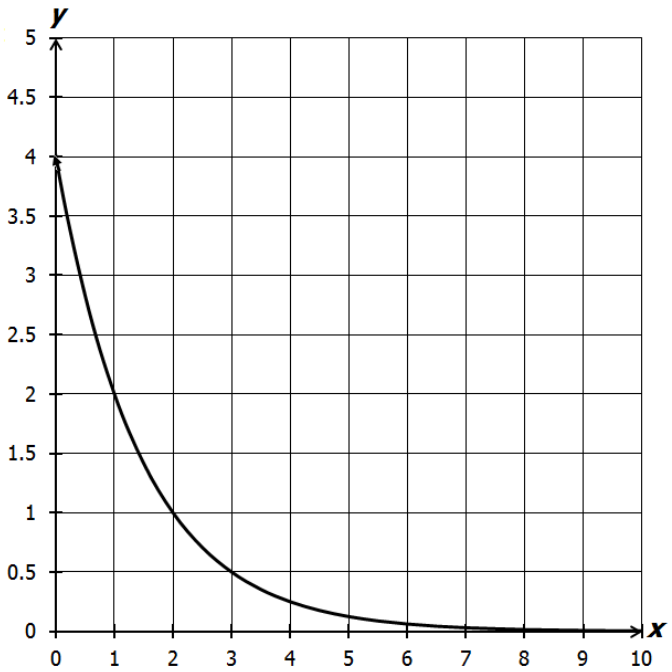
30. An exponential function, $f(x)$, is graphed on the coordinate plane.



The function $g(x)$ is defined by the equation.

$$g(x) = 0.5(4^x)$$

Which function has the greater value for $x = 2$, and how much greater is the value of the function?

A $f(x)$; 1

B $f(x)$; 8

C $g(x)$; 7

D $g(x)$; 8