

ALGEBRA 1

Workbook

Common Core Standards Edition

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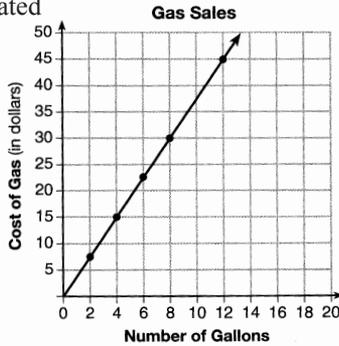
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January 2016
Part I

Answer all 24 questions in this part. Each correct answer will receive 2 credits. No partial credit will be allowed. For each statement or question, choose the word or expression that, of those given, best completes the statement or answers the question. Record your answers in the space provided. [48]

1. In the function $f(x) = (x - 2)^2 + 4$, the minimum value occurs when x is
 (1) -2 (2) 2 (3) -4 (4) 4 1 _____

2. The accompanying graph was created by an employee at a gas station.



Which statement can be justified by using the graph?

- (1) If 10 gallons of gas was purchased, \$35 was paid.
 (2) For every gallon of gas purchased, \$3.75 was paid.
 (3) For every 2 gallons of gas purchased, \$5.00 was paid.
 (4) If zero gallons of gas were purchased, zero miles were driven. 2 _____
3. For a recently released movie, the function $y = 119.67(0.61)^x$ models the revenue earned, y , in millions of dollars each week, x , for several weeks after its release.

Based on the equation, how much more money, in millions of dollars, was earned in revenue for week 3 than for week 5?

- (1) 37.27 (2) 27.16 (3) 17.06 (4) 10.11 3 _____

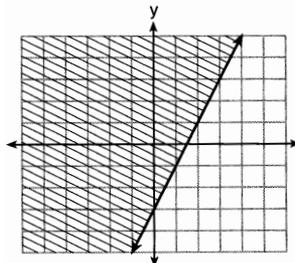
4. Given the following expressions:

I. $-\frac{5}{8} + \frac{3}{5}$ II. $\frac{1}{2} + \sqrt{2}$ III. $(\sqrt{5}) \cdot (\sqrt{5})$ IV. $3 \cdot (\sqrt{49})$

Which expression(s) result in an irrational number?

- (1) II, only (2) III, only (3) I, III, IV (4) II, III, IV 4 _____

5. Which inequality is represented by the accompanying graph?



- (1) $y \leq 2x - 3$ (3) $y \leq -3x + 2$
 (2) $y \geq 2x - 3$ (4) $y \geq -3x + 2$

5 _____

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6. Michael borrows money from his uncle, who is charging him simple interest using the formula $I = Prt$. To figure out what the interest rate, r , is, Michael rearranges the formula to find r . His new formula is r equals
- (1) $\frac{I-P}{t}$ (2) $\frac{P-I}{t}$ (3) $\frac{I}{Pt}$ (4) $\frac{Pt}{I}$ 6 _____
7. Which equation is equivalent to $y - 34 = x(x - 12)$?
- (1) $y = (x - 17)(x + 2)$ (3) $y = (x - 6)^2 + 2$
 (2) $y = (x - 17)(x - 2)$ (4) $y = (x - 6)^2 - 2$ 7 _____
8. The equation $A = 1300(1.02)^7$ is being used to calculate the amount of money in a savings account. What does 1.02 represent in this equation?
- (1) 0.02% decay (3) 2% decay
 (2) 0.02% growth (4) 2% growth 8 _____
9. The zeros of the function $f(x) = 2x^2 - 4x - 6$ are
- (1) 3 and -1 (2) 3 and 1 (3) -3 and 1 (4) -3 and -1 9 _____
10. When $(2x - 3)^2$ is subtracted from $5x^2$, the result is
- (1) $x^2 - 12x - 9$ (3) $x^2 + 12x - 9$
 (2) $x^2 - 12x + 9$ (4) $x^2 + 12x + 9$ 10 _____
11. Joe has a rectangular patio that measures 10 feet by 12 feet. He wants to increase the area by 50% and plans to increase each dimension by equal lengths, x . Which equation could be used to determine x ?
- (1) $(10 + x)(12 + x) = 120$ (3) $(15 + x)(18 + x) = 180$
 (2) $(10 + x)(12 + x) = 180$ (4) $(15)(18) = 120 + x^2$ 11 _____
12. When factored completely, $x^3 - 13x^2 - 30x$ is
- (1) $x(x + 3)(x - 10)$ (3) $x(x + 2)(x - 15)$
 (2) $x(x - 3)(x - 10)$ (4) $x(x - 2)(x + 15)$ 12 _____
13. The table below shows the cost of mailing a postcard in different years. During which time interval did the cost increase at the greatest average rate?
- | Year | 1898 | 1971 | 1985 | 2006 | 2012 |
|----------|------|------|------|------|------|
| Cost (¢) | 1 | 6 | 14 | 24 | 35 |
- (1) 1898-1971 (2) 1971-1985 (3) 1985-2006 (4) 2006-2012 13 _____
14. When solving the equation $x^2 - 8x - 7 = 0$ by completing the square, which equation is a step in the process?
- (1) $(x - 4)^2 = 9$ (3) $(x - 8)^2 = 9$
 (2) $(x - 4)^2 = 23$ (4) $(x - 8)^2 = 23$ 14 _____

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15. A construction company uses the function $f(p)$, where p is the number of people working on a project, to model the amount of money it spends to complete a project. A reasonable domain for this function would be
- (1) positive integers (3) both positive and negative integers
(2) positive real numbers (4) both positive and negative real numbers

15 _____

16. Which function is shown in the accompanying table?

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

x	$f(x)$
-2	$\frac{1}{9}$
-1	$\frac{1}{3}$
0	1
1	3
2	9
3	27

16 _____

17. Given the functions $h(x) = \frac{1}{2}x + 3$ and $j(x) = |x|$, which value of x makes $h(x) = j(x)$?

- (1) -2 (2) 2 (3) 3 (4) -6

17 _____

18. Which recursively defined function represents the sequence 3, 7, 15, 31, ... ?

- (1) $f(1) = 3, f(n+1) = 2^{f(n)} + 3$ (3) $f(1) = 3, f(n+1) = 2f(n) + 1$
(2) $f(1) = 3, f(n+1) = 2^{f(n)} - 1$ (4) $f(1) = 3, f(n+1) = 3f(n) - 2$

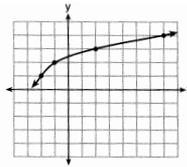
18 _____

19. The range of the function defined as $y = 5^x$ is

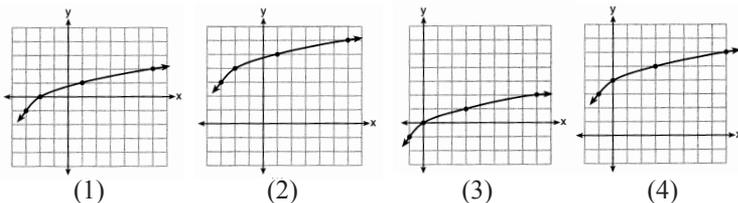
- (1) $y < 0$ (2) $y > 0$ (3) $y \leq 0$ (4) $y \geq 0$

19 _____

20. The graph of $y = f(x)$ is shown.



What is the graph of $y = f(x + 1) - 2$?



20 _____

21. Which pair of equations could not be used to solve the following equations for x and y ?

$$\begin{aligned} 4x + 2y &= 22 \\ -2x + 2y &= -8 \end{aligned}$$

- (1) $4x + 2y = 22$ (2) $4x + 2y = 22$ (3) $12x + 6y = 66$ (4) $8x + 4y = 44$
 $2x - 2y = 8$ $-4x + 4y = -16$ $6x - 6y = 24$ $-8x + 8y = -8$

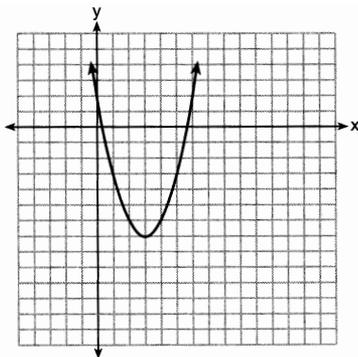
21 _____

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22. The accompanying graph representing a function is shown.

Which function has a minimum that is *less* than the one shown in the graph?



- (1) $y = x^2 - 6x + 7$
 (2) $y = |x + 3| - 6$
 (3) $y = x^2 - 2x - 10$
 (4) $y = |x - 8| + 2$

22 _____

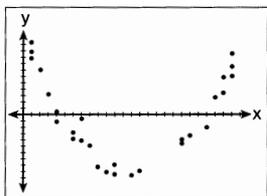
23. Grisham is considering the three situations below.

- I. For the first 28 days, a sunflower grows at a rate of 3.5 cm per day.
 II. The value of a car depreciates at a rate of 15% per year after it is purchased.
 III. The amount of bacteria in a culture triples every two days during an experiment.

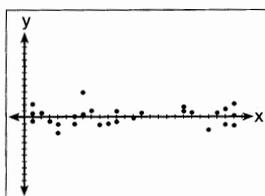
Which of the statements describes a situation with an equal difference over an equal interval?

- (1) I, only (2) II, only (3) I and III (4) II and III 23 _____

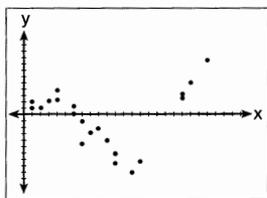
24. After performing analyses on a set of data, Jackie examined the scatter plot of the residual values for each analysis. Which scatter plot indicates the best linear fit for the data?



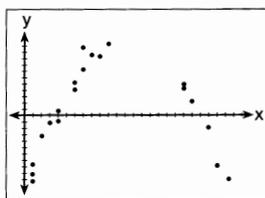
(1)



(3)



(2)



(4)

24 _____

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Part II

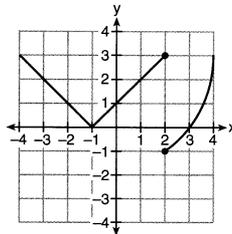
Answer all 8 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [16]

25. The function, $t(x)$, is shown in the accompanying table.

x	$t(x)$
-3	10
-1	7.5
1	5
3	2.5
5	0

Determine whether $t(x)$ is linear or exponential.
Explain your answer.

26. Marcel claims that the accompanying graph represents a function.



State whether Marcel is correct. Justify your answer.

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Part III

Answer all 4 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided for each question to determine your answer. Note that diagrams are not necessarily drawn to scale. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [16]

33. Let $h(t) = -16t^2 + 64t + 80$ represent the height of an object above the ground after t seconds. Determine the number of seconds it takes to achieve its maximum height. Justify your answer.

State the time interval, in seconds, during which the height of the object *decreases*. Explain your reasoning.

34. Fred's teacher gave the class the quadratic function $f(x) = 4x^2 + 16x + 9$.

a) State two different methods Fred could use to solve the equation $f(x) = 0$.

b) Using one of the methods stated in part a, solve $f(x) = 0$ for x , to the *nearest tenth*.

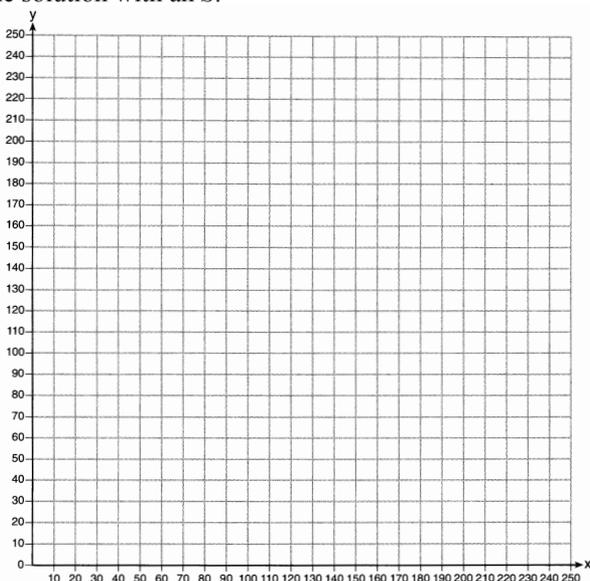
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Part IV

Answer the question in this part. A correct answer will receive 6 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. Utilize the information provided to determine your answer. Note that diagrams are not necessarily drawn to scale. A correct numerical answer with no work shown will receive only 1 credit. All answers should be written in pen, except for graphs and drawings, which should be done in pencil. [6]

37. The Reel Good Cinema is conducting a mathematical study. In its theater, there are 200 seats. Adult tickets cost \$12.50 and child tickets cost \$6.25. The cinema's goal is to sell at least \$1500 worth of tickets for the theater.

Write a system of linear inequalities that can be used to find the possible combinations of adult tickets, x , and child tickets, y , that would satisfy the cinema's goal.

Graph the solution to this system of inequalities on the set of axes below. Label the solution with an S .



Marta claims that selling 30 adult tickets and 80 child tickets will result in meeting the cinema's goal. Explain whether she is correct or incorrect, based on the graph drawn.