ALGEBRA 1
Workbook
Common Core Standards Edition

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ALGEBRA 1
June 2018
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]

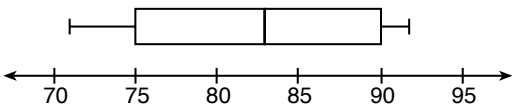
1. The solution to $4p + 2 < 2(p + 5)$ is
(1) $p > -6$ (2) $p < -6$ (3) $p > 4$ (4) $p < 4$ 1 _____

2. If $k(x) = 2x^2 - 3\sqrt{x}$, then $k(9)$ is
(1) 315 (2) 307 (3) 159 (4) 153 2 _____

3. The expression $3(x^2 + 2x - 3) - 4(4x^2 - 7x + 5)$ is equivalent to
(1) $-13x - 22x + 11$ (3) $19x^2 - 22x + 11$
(2) $-13x^2 + 34x - 29$ (4) $19x^2 + 34x - 29$ 3 _____

4. The zeros of the function $p(x) = x^2 - 2x - 24$ are
(1) –8 and 3 (2) –6 and 4 (3) –4 and 6 (4) –3 and 8 4 _____

5. The box plot summarizes the data for the average monthly high temperatures in degrees Fahrenheit for Orlando, Florida. The third quartile is



(1) 92 (2) 90 (3) 83 (4) 71 5 _____

6. Joy wants to buy strawberries and raspberries to bring to a party. Strawberries cost \$1.60 per pound and raspberries cost \$1.75 per pound. If she only has \$10 to spend on berries, which inequality represents the situation where she buys x pounds of strawberries and y pounds of raspberries?
(1) $1.60x + 1.75y \le 10$ (3) $1.75x + 1.60y \le 10$
(2) $1.60x + 1.75y \ge 10$ (4) $1.75x + 1.60y \ge 10$ 6 _____

7. On the main floor of the Kodak Hall at the Eastman Theater, the number of seats per row increases at a constant rate. Steven counts 31 seats in row 3 and 37 seats in row 6. How many seats are there in row 20?
(1) 65 (2) 67 (3) 69 (4) 71 7 _____

8. Which ordered pair below is *not* a solution to $f(x) = x^2 - 3x + 4$?
(1) (0, 4) (2) (1.5, 1.75) (3) (5, 14) (4) (–1, 6) 8 _____

9. Students were asked to name their favorite sport from a list of basketball, soccer, or tennis. The results are shown in the table below.

	Basketball	Soccer	Tennis
Girls	42	58	20
Boys	84	41	5

What percentage of the students chose soccer as their favorite sport?
(1) 39.6% (2) 41.4% (3) 50.4% (4) 58.6% 9 _____

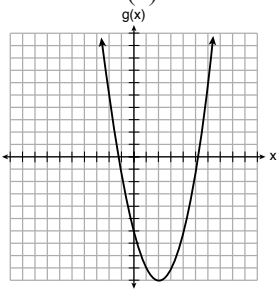
10. The trinomial $x^2 - 14x + 49$ can be expressed as
(1) $(x - 7)^2$ (2) $(x + 7)^2$ (3) $(x - 7)(x + 7)$ (4) $(x - 7)(x + 2)$ 10 ____

11. A function is defined as $\{(0, 1), (2, 3), (5, 8), (7, 2)\}$. Isaac is asked to create one more ordered pair for the function. Which ordered pair can he add to the set to keep it a function?
(1) (0, 2) (2) (5, 3) (3) (7, 0) (4) (1, 3) 11 ____

12. The quadratic equation $x^2 - 6x = 12$ is rewritten in the form $(x + p)^2 = q$, where q is a constant. What is the value of p?
(1) –12 (2) –9 (3) –3 (4) 9 12 ____

13. Which of the quadratic functions below has the *smallest* minimum value?

$h(x) = x^2 + 2x - 6$
(1)



(2)

$k(x) = (x + 5)(x + 2)$
(3)

x	f(x)
–1	–2
0	–5
1	–6
2	–5
3	–2

(4) 13 ____

14. Which situation is *not* a linear function?
(1) A gym charges a membership fee of \$10.00 down and \$10.00 per month.
(2) A cab company charges \$2.50 initially and \$3.00 per mile.
(3) A restaurant employee earns \$12.50 per hour.
(4) A \$12,000 car depreciates 15% per year. 14 ____

15. The Utica Boilermaker is a 15-kilometer road race. Sara is signed up to run this race and has done the following training runs:

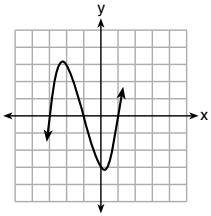
I. 10 miles II. 44,880 feet III. 15,560 yards

Which run(s) are at least 15 kilometers?
(1) I, only (2) II, only (3) I and III (4) II and III 15 ____

16. If $f(x) = x^2 + 2$, which interval describes the range of this function?
(1) $(-\infty, \infty)$ (2) $[0, \infty)$ (3) $[2, \infty)$ (4) $(-\infty, 2]$ 16 ____

17. The amount Mike gets paid weekly can be represented by the expression $2.50a + 290$, where a is the number of cell phone accessories he sells that week. What is the constant term in this expression and what does it represent?
(1) $2.50a$, the amount he is guaranteed to be paid each week
(2) $2.50a$, the amount he earns when he sells a accessories
(3) 290, the amount he is guaranteed to be paid each week
(4) 290, the amount he earns when he sells a accessories 17 ____

18. A cubic function is graphed on the set of accompanying axes. Which function could represent this graph?



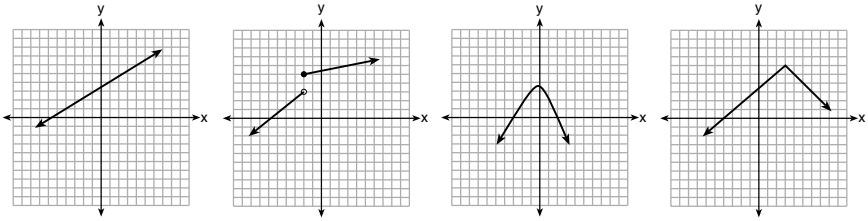
(1) $f(x) = (x - 3)(x - 1)(x + 1)$
(2) $g(x) = (x + 3)(x + 1)(x - 1)$
(3) $h(x) = (x - 3)(x - 1)(x + 3)$
(4) $k(x) = (x + 3)(x + 1)(x - 3)$ 18 ____

19. Mrs. Allard asked her students to identify which of the polynomials below are in standard form and explain why.

I. $15x^4 - 6x + 3x^2 - 1$ II. $12x^3 + 8x + 4$ III. $2x^5 + 8x^2 + 10x$

Which student's response is correct?
(1) Tyler said I and II because the coefficients are decreasing.
(2) Susan said only II because all the numbers are decreasing.
(3) Fred said II and III because the exponents are decreasing.
(4) Alyssa said II and III because they each have three terms. 19 ____

20. Which graph does *not* represent a function that is always increasing over the entire interval $-2 < x < 2$?



(1) (2) (3) (4)

20 ____

21. At an ice cream shop, the profit, $P(c)$, is modeled by the function $P(c) = 0.87c$, where c represents the number of ice cream cones sold. An appropriate domain for this function is
(1) an integer ≤ 0 (3) a rational number ≤ 0
(2) an integer ≥ 0 (4) a rational number ≥ 0 21 ____

22. How many real-number solutions does $4x^2 + 2x + 5 = 0$ have?
(1) one (2) two (3) zero (4) infinitely many 22 ____

23. Students were asked to write a formula for the length of a rectangle by using the formula for its perimeter, $p = 2\ell + 2w$. Three of their responses are shown.

I. $\ell = \frac{1}{2}p - w$ II. $\ell = \frac{1}{2}(p - 2w)$ III. $\ell = \frac{p - 2w}{2}$

Which responses are correct?
(1) I and II, only (3) I and III, only
(2) II and III, only (4) I, II, and III 23 ____

24. If $a_n = n(a_{n-1})$ and $a_1 = 1$, what is the value of a_5?
(1) 5 (2) 20 (3) 120 (4) 720 24 ____

ALGEBRA 1
January 2020
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. If $f(x) = 2(3^x) + 1$, what is the value of $f(2)$?
(1) 13 (2) 19 (3) 37 (4) 54 1 _____

2. A high school sponsored a badminton tournament. After each round, one-half of the players were eliminated. If there were 64 players at the start of the tournament, which equation models the number of players left after 3 rounds?
(1) $y = 64(1 - .5)^3$ (3) $y = 64(1 - .3)^{0.5}$
(2) $y = 64(1 + .5)^3$ (4) $y = 64(1 + .3)^{0.5}$ 2 _____

3. Given $7x + 2 \geq 58$, which number is *not* in the solution set?
(1) 6 (2) 8 (3) 10 (4) 12 3 _____

4. Which table could represent a function?

x	f(x)
1	4
2	2
3	4
2	6

(1)

x	g(x)
1	2
2	4
3	6
4	2

(2)

x	h(x)
2	6
0	4
1	6
2	2

(3)

x	k(x)
2	2
3	2
4	6
3	6

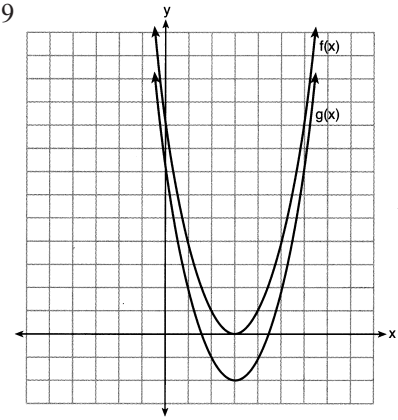
(4) 4 _____

5. Which value of x makes $\frac{x-3}{4} + \frac{2}{3} = \frac{17}{12}$ true?
(1) 8 (2) 6 (3) 0 (4) 4 5 _____

6. Which expression is equivalent to $18x^2 - 50$?
(1) $2(3x + 5)^2$ (3) $2(3x - 5)(3x + 5)$
(2) $2(3x - 5)^2$ (4) $2(3x - 25)(3x + 25)$ 6 _____

7. The functions $f(x) = x^2 - 6x + 9$ and $g(x) = f(x) + k$ are graphed.

Which value of k would result in the graph of $g(x)$?
(1) 0
(2) 2
(3) –3
(4) –2



7 _____

8. The shaded boxes in the figures below represent a sequence.

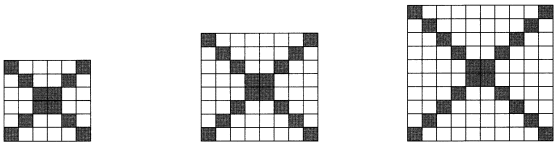


Figure 1 Figure 2 Figure 3

If figure 1 represents the first term and this pattern continues, how many shaded blocks will be in figure 35?
(1) 55 (2) 148 (3) 420 (4) 805 8 _____

9. The zeros of the function $f(x) = x^3 - 9x^2$ are
(1) 9, only (2) 0 and 9 (3) 0 and 3, only (4) –3, 0, and 3 9 _____

10. A middle school conducted a survey of students to determine if they spent more of their time playing games or watching videos on their tablets. The results are shown in the table.

	Playing Games	Watching Videos	Total
Boys	138	46	184
Girls	54	142	196
Total	192	188	380

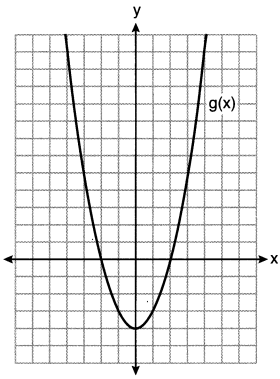
Of the students who spent more time playing games on their tablets, approximately what percent were boys?
(1) 41 (2) 56 (3) 72 (4) 75 10 ____

11. Which statement best describes the solutions of a two-variable equation?
(1) The ordered pairs must lie on the graphed equation.
(2) The ordered pairs must lie near the graphed equation.
(3) The ordered pairs must have $x = 0$ for one coordinate.
(4) The ordered pairs must have $y = 0$ for one coordinate. 11 ____

12. The expression $x^2 - 10x + 24$ is equivalent to
(1) $(x + 12)(x - 2)$ (3) $(x + 6)(x + 4)$
(2) $(x - 12)(x + 2)$ (4) $(x - 6)(x - 4)$ 12 ____

13. Which statement is true about the functions $f(x)$ and $g(x)$, given below?

$$f(x) = -x^2 - 4x - 4$$



(1) The minimum value of $g(x)$ is greater than the maximum value of $f(x)$.
(2) $f(x)$ and $g(x)$ have the same y-intercept.
(3) $f(x)$ and $g(x)$ have the same roots.
(4) $f(x) = g(x)$ when $x = -4$.

13 ____

14. The equation $V(t) = 12{,}000(0.75)^t$ represents the value of a motorcycle t years after it was purchased. Which statement is true?
(1) The motorcycle cost \$9000 when purchased.
(2) The motorcycle cost \$12,000 when purchased.
(3) The motorcycle's value is decreasing at a rate of 75% each year.
(4) The motorcycle's value is decreasing at a rate of 0.25% each year. 14 ____

15. The solutions to $(x + 4)^2 - 2 = 7$ are
(1) $-4 \pm \sqrt{5}$ (2) $4 \pm \sqrt{5}$ (3) -1 and -7 (4) 1 and 7 15 ____

16. Which expression is *not* equivalent to $-4x^3 + x^2 - 6x + 8$?
(1) $x^2(-4x + 1) - 2(3x - 4)$ (3) $-4x^3 + (x - 2)(x - 4)$
(2) $x(-4x^2 - x + 6) + 8$ (4) $-4(x^3 - 2) + x(x - 6)$ 16 ____

17. Which situation could be modeled as a linear equation?
(1) The value of a car decreases by 10% every year.
(2) The number of fish in a lake doubles every 5 years.
(3) Two liters of water evaporate from a pool every day.
(4) The amount of caffeine in a person's body decreases by $\frac{1}{3}$ every 2 hours.
17 ____

18. The range of the function $f(x) = |x + 3| - 5$ is
(1) $[-5, \infty)$ (2) $(-5, \infty)$ (3) $[3, \infty)$ (4) $(3, \infty)$ 18 ____

19. A laboratory technician used the function $t(m) = 2(3)^{2m+1}$ to model her research. Consider the following expressions:

I. $6(3)^{2m}$ II. $6(6)^{2m}$ III. $6(9)^m$

The function $t(m)$ is equivalent to
(1) I, only (2) II, only (3) I and III (4) II and III 19 ____

20. Which system of equations has the same solutions as the accompanying system?

$$\begin{aligned} 3x - y &= 7 \\ 2x + 3y &= 12 \end{aligned}$$

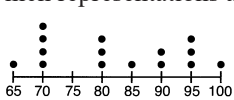
(1) $\begin{aligned} 6x - 2y &= 14 \\ -6x + 9y &= 36 \end{aligned}$ (2) $\begin{aligned} 18x - 6y &= 42 \\ 4x + 6y &= 24 \end{aligned}$ (3) $\begin{aligned} -9x - 3y &= -21 \\ 2x + 3y &= 12 \end{aligned}$ (4) $\begin{aligned} 3x - y &= 7 \\ x + y &= 2 \end{aligned}$ 20 ____

21. A population of paramecia, P, can be modeled using the exponential function $P(t) = 3(2)^t$, where t is the number of days since the population was first observed. Which domain is most appropriate to use to determine the population over the course of the first two weeks?
(1) $t \geq 0$ (2) $t \leq 2$ (3) $0 \leq t \leq 2$ (4) $0 \leq t \leq 14$ 21 ____

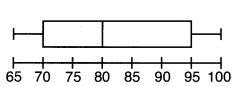
22. Given the following data set:

65, 70, 70, 70, 70, 80, 80, 80, 85, 90, 90, 95, 95, 95, 100

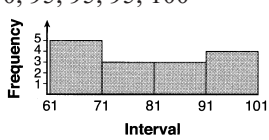
Which representations are correct for this data set?



I



II



III

(1) I and II, only (2) I and III, only (3) II and III, only (4) I, II, and III 22 ____

23. A recursively defined sequence is shown to the right.

$$a_1 = 5$$
$$a_{n+1} = 2a_n - 7$$

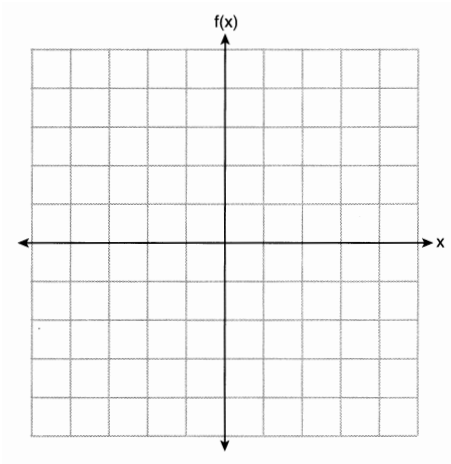
The value of a_4 is
(1) –9 (2) –1 (3) 8 (4) 15 23 ____

24. Which polynomial has a leading coefficient of 4 and a degree of 3?
(1) $3x^4 - 2x^2 + 4x - 7$
(2) $4 + x - 4x^2 + 5x^3$
(3) $4x^4 - 3x^3 + 2x^2$
(4) $2x + x^2 + 4x^3$ 24 ____

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. Graph $f(x) = -\sqrt{x} + 1$ on the accompanying set of axes.



26. Maria orders T-shirts for her volleyball camp. Adult-sized T-shirts cost \$6.25 each and youth-sized T-shirts cost \$4.50 each. Maria has \$550 to purchase both adult-sized and youth-sized T-shirts. If she purchases 45 youth-sized T-shirts, determine algebraically the maximum number of adult-sized T-shirts she can purchase.

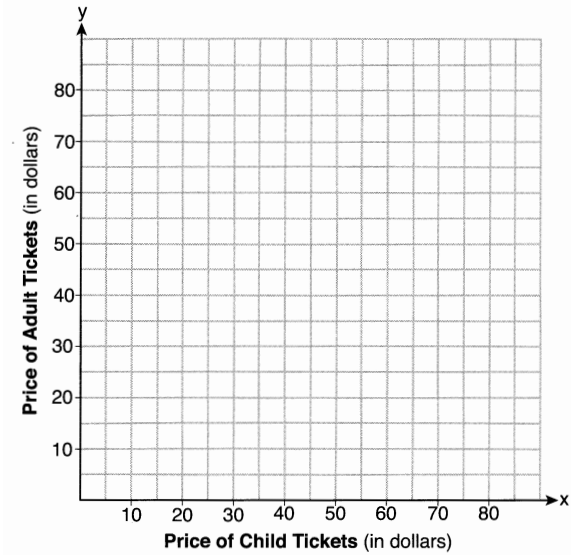
Part IV

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. Two families went to Rollercoaster World. The Brown family paid $170 for 3 children and 2 adults. The Peckham family paid $360 for 4 children and 6 adults.

If x is the price of a child's ticket in dollars and y is the price of an adult's ticket in dollars, write a system of equations that models this situation.

Graph your system of equations on the set of axes.



State the coordinates of the point of intersection.

Explain what each coordinate of the point of intersection means in the context of the problem.

THE STATE EDUCATION DEPARTMENT / THE UNIVERSITY OF THE STATE OF NEW YORK / ALBANY, NY 12234

Common Core High School Math Reference Sheet
(Algebra I, Geometry, Algebra II)

CONVERSIONS

1 inch = 2.54 centimeters
1 meter = 39.37 inches
1 mile = 5280 feet
1 mile = 1760 yards
1 mile = 1.609 kilometers

1 kilometer = 0.62 mile
1 pound = 16 ounces
1 pound = 0.454 kilograms
1 kilogram = 2.2 pounds
1 ton = 2000 pounds

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
1 gallon = 3.785 liters
1 liter = 0.264 gallon
1 liter = 1000 cubic centimeters

FORMULAS

Triangle	$A = \frac{1}{2}bh$	Pythagorean Theorem	$a^2 + b^2 = c^2$
Parallelogram	$A = bh$	Quadratic Formula	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
Circle	$A = \pi r^2$	Arithmetic Sequence	$a_n = a_1 + (n-1)d$
Circle	$C = \pi d$ or $C = 2\pi r$	Geometric Sequence	$a_n = a_1 r^{n-1}$
General Prisms	$V = Bh$	Geometric Series	$S_n = \frac{a_1 - a_1 r^n}{1 - r}$ where $r \neq 1$
Cylinder	$V = \pi r^2 h$	Radians	$1 \text{ radian} = \frac{180}{\pi} \text{ degrees}$
Sphere	$V = \frac{4}{3}\pi r^3$	Degrees	$1 \text{ degree} = \frac{\pi}{180} \text{ radians}$
Cone	$V = \frac{1}{3}\pi r^2 h$	Exponential Growth/Decay	$A = A_0 e^{k(t - t_0)} + B_0$
Pyramid	$V = \frac{1}{3}Bh$		