

Office of Catholic Schools

Algebra I

Section 1 – Calculator Allowed

Teacher Key

45 Minutes

OCS Algebra 1
Teacher Key

Teacher Key			
Item	Unit	Benchmark	Correct Answer
1.	Equations and Inequalities	Evaluate algebraic expressions by substituting rational numbers for unknown quantities	A
2.	Equations and Inequalities	Solve equations with special solutions - all real numbers, no solution, etc.	C
3.	Equations and Inequalities	Solve linear inequalities when the method involves reversing the inequality sign	B
4.	Equations and Inequalities	Rearrange a multivariate equation to isolate a variable or term	C
5.	Equations and Inequalities	Solve inequalities with special solutions - all real numbers, no solution, etc.	A
6.	Equations and Inequalities	Solve compound inequalities	B
7.	Equations and Inequalities	Solve one and two-step absolute value equations and inequalities	B
8.	Linear Concepts	Determine the slope of a line from an equation, two points, a graph, or a table	D
9.	Linear Concepts	Interpret the meaning of slope given a graph	C
10.	Linear Concepts	Interpret and apply linear concepts written using two variables other than x and y	C
11.	Linear Concepts	Create and use linear relationships to solve a problem	D
12.	Linear Concepts	Determine the equation of a line from two points, a graph, or a table	D
13.	Linear Concepts	Derive alternate forms of linear equations from the others	A
14.	Linear Concepts	Recognize parallel, perpendicular, and coincidental lines	A
15.	Linear Concepts	Recognize parallel, perpendicular, and coincidental lines	B
16.	Linear Concepts	Solve linear inequalities in two variables	B
17.	Linear Concepts	Solve systems of two linear equations	C
18.	Linear Concepts	Solve systems of two linear equations	D
19.	Linear Concepts	Find solutions and graph systems of first-degree inequalities reversing the inequality signs	D
20.	Linear Concepts	Create a system of linear equations to solve a problem	C
21.	Linear Concepts	Create a system of linear equations to solve a problem	A
22.	Quadratic Functions	Given the graph of a quadratic function, be able to identify the vertex, orientation, and axis of symmetry	C
23.	Quadratic Functions	Given a quadratic function, identify the vertex, orientation, and axis of symmetry	B
24.	Quadratic Functions	Solve a quadratic equation when given a graph	A
25.	Quadratic Functions	Solve a quadratic equation using factoring	C
26.	Quadratic Functions	Solve a quadratic equation using the quadratic formula (given)	B
27.	Quadratic Functions	Given a quadratic equation in a real world scenario, interpret the solution	B

MATH TEST – MULTIPLE CHOICE

27 Questions

DIRECTIONS: Solve each problem, choose the correct answer, and then fill in the corresponding oval on your answer document.

You are allowed to use a calculator for this section of the test. You may use a calculator for any problems you choose, but some of the problems may best be done without using a calculator.

1. What is the value of $a^3 - 2b^2 + c$ when $a = 2$, $b = -3$ and $c = 5$?

- A. -5
B. 2
C. 23
D. 31

A.	$(2)^3 - 2(-3)^2 + 5$ Correct
B.	Used all values equal 2
C.	$(2 \times 3) - (2 \times (-3) \times 2) + 5$
D.	Used $b^2 = -9$

2. $3x + \frac{1}{3}x + 9 = \frac{1}{3}(10x + 9)$

Which of the following describes the solution to the equation above?

- A. $x = 0$
B. $x = 9$
C. The equation has no solutions.
D. There are an infinite number of solutions.

A.	Since x is equal on both sides of the equation, subtracted and found $x = 0$
B.	Did no work
C.	$\frac{10}{3}x + 9 = \frac{10}{3}x + 3$ Correct
D.	Incorrectly read reduced equation

3. Solve the inequality $2x - 7 \geq 9x + 28$.

- A. $x \geq -5$
B. $x \leq -5$
C. $x \geq -1$
D. $x \leq 1$

A.	Did not reverse inequality sign
B.	Correct
C.	$11x \geq -11$
D.	$-11x \geq -11$

4.

$$A = \frac{B}{C-2B}$$

Solve the equation for B in terms of A and C ?

- A. $B = \frac{AC}{3}$
- B. $B = \frac{A}{C-2A}$
- C. $B = \frac{AC}{1+2A}$
- D. $B = \frac{A}{2C+A}$

A.	$AC - 2B = B$, did not distribute A
B.	Switched A and B
C.	Correct
D.	Coefficients on C and A reversed

5.

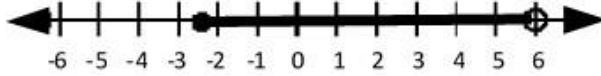
$$4x - 5 \leq y(8x - 10)$$

In the inequality above, y is a constant. For what value of y does the equation have an infinite number of solutions?

- A. $\frac{1}{2}$
- B. 2
- C. 4
- D. 5

A.	$4x - 5 \leq \frac{1}{2}(8x - 10)$; $4x - 5 \leq 4x - 5$ Correct
B.	Reciprocal of correct answer
C.	Coefficient on first term
D.	Second term

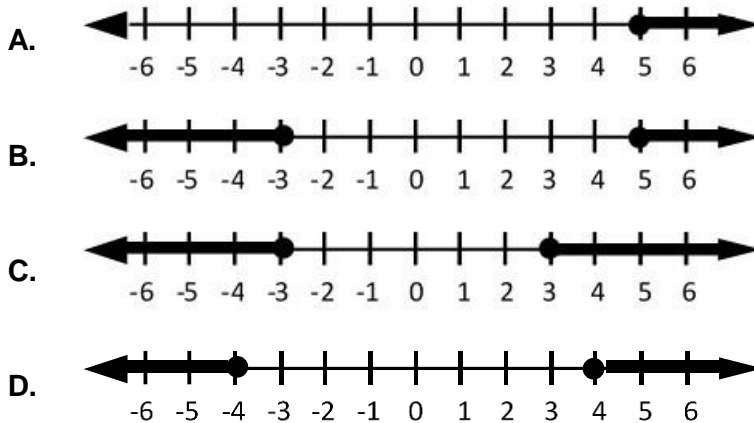
6. Which of the following logical statements describes the set of values of x graphed on the real number line shown below?



A.	First parenthesis should be a bracket
B.	Correct
C.	Bracket and parenthesis are reversed
D.	Second bracket should be a parenthesis

- A. $(-2\frac{1}{2}, 6)$
 B. $[-2\frac{1}{2}, 6)$
 C. $(-2\frac{1}{2}, 6]$
 D. $[-2\frac{1}{2}, 6]$

7. What is the solution set of $|3m - 3| \geq 12$?



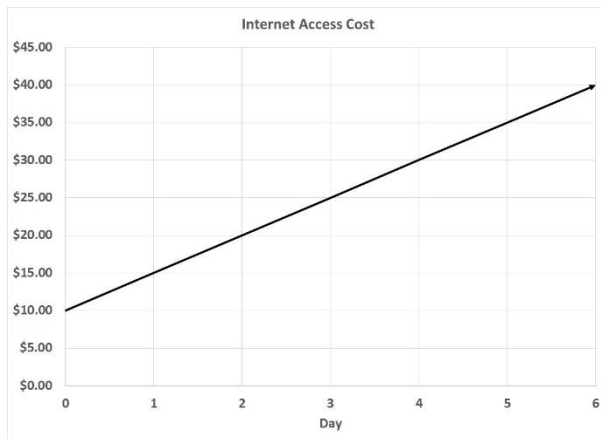
A.	Missing 2 nd term
B.	Correct
C.	2 nd term incorrect
D.	Did not evaluate -3 in expression

8. What is the slope of the line in the xy -plane that passes through points $(-\frac{3}{2}, -5)$ and $(3, \frac{5}{2})$?

- A. $-\frac{3}{5}$
- B. $-\frac{5}{3}$
- C. $\frac{3}{5}$
- D. $\frac{5}{3}$

A.	$\frac{-\frac{3}{2}+3}{-5+\frac{5}{2}}$
B.	$\frac{-5+\frac{5}{2}}{-\frac{3}{2}+3}$
C.	$\frac{\frac{3}{2}-3}{-5-\frac{5}{2}}$
D.	$\frac{-5-\frac{5}{2}}{\frac{3}{2}-3}$ Correct

9. The cost function shown in the graph below shows the cost for internet access per day. It has two components: a fixed cost, plus a constant cost per day. Based on the graph, what is the fixed cost for internet access?



- A. \$0.00
- B. \$5.00
- C. \$10.00
- D. \$15.00

A.	Starting point of y -axis
B.	Cost per day
C.	Correct
D.	Cost after 1 day

10.

$$C = 20 + 12.50m$$

Julia is going to subscribe to Netflix. She uses the above equation to estimate the cost, C , she owes when she subscribes for m months. Based on the equation, what is the total cost that she spends for the first six months of her subscription?

- A. 32.50
- B. 75.00
- C. 95.00
- D. 132.50

A.	Cost of 1 month
B.	Does not add 20
C.	Correct
D.	$(20 \times 6) + 12.50$

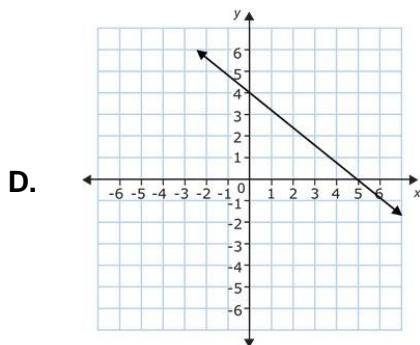
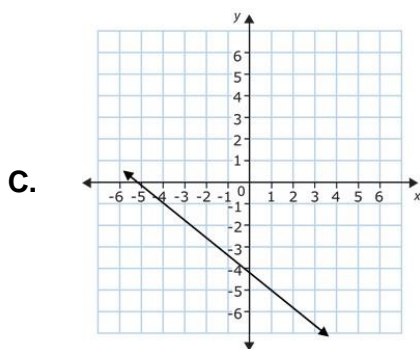
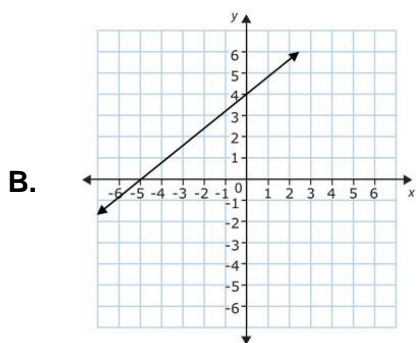
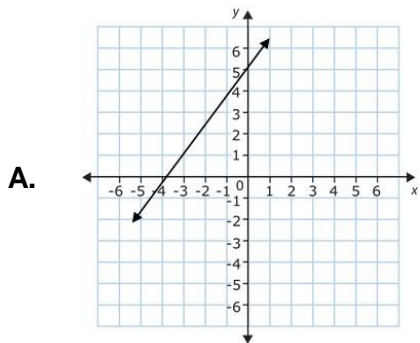
11. Leo rode his bike to the park. The trip to the park took m minutes. Returning home he was tired and the trip took 10 minutes longer than the ride to the park. Which of the following is an expression for the total number of minutes he spent riding his bike?

- A. $m - 10$
- B. $2m$
- C. $2m - 10$
- D. $2m + 10$

A.	Time to ride home, subtracted instead of added
B.	Did not include extra time on ride home
C.	Subtracted extra time instead of added
D.	Leo took m to the park, $m + 10$ back from the park for a total of $2m + 10$ Correct

12. Which of the following is the graph of the line in the xy coordinate plane with the equation $y = -\frac{4}{5}x + 4$?

A.	Incorrect slope and y -intercept
B.	Incorrect sign on slope
C.	Incorrect y -intercept
D.	Correct



13. What is the point-slope equation of the line in the xy -plane that passes through the origin and point $(6, 12)$?

- A. $y - 12 = 2(x - 6)$
 B. $y - 12 = (x - 6)$
 C. $y = \frac{1}{2}x$
 D. $y = x + 6$

A.	Correct
B.	Slope is missing
C.	Slope is reciprocal
D.	Would not pass through the origin

- 14.

$$\begin{aligned} ax - y &= 8 \\ 5x - 10y &= 80 \end{aligned}$$

What value of a will result in a system of parallel lines?

- A. $\frac{1}{2}$
 B. 1
 C. 2
 D. 5

A.	$\frac{5}{10}$ Correct
B.	Coefficient of y in first equation
C.	Reciprocal
D.	Coefficient of x in second equation

15. What is the slope of any line parallel to the line $y = 1$ in the standard (x, y) coordinate plane?

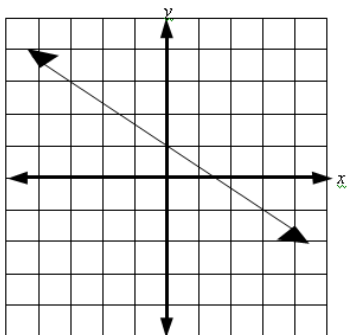
- A. -1
 B. 0
 C. 1
 D. Undefined

A.	$y = -x$
B.	Correct
C.	$y = x$
D.	Horizontal line

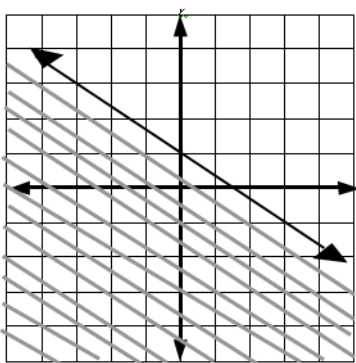
16. Which of the following is the graph of the inequality $4x + 6y \leq 6$?

A.	Only graph of line, missing shading
B.	Correct
C.	Incorrect slope and shading
D.	Incorrect slope and shading

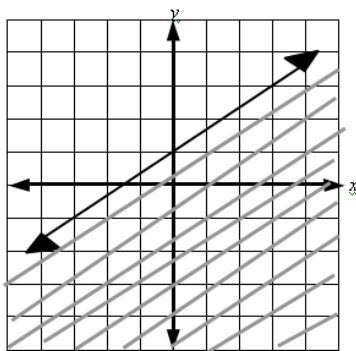
A.



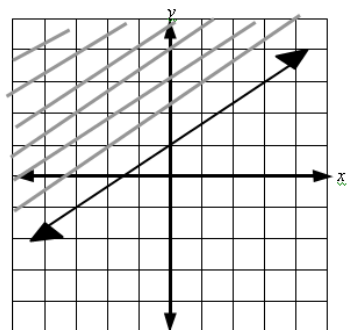
B.



C.



D.



17. What is the value of x in the solution to the following system of equations?

$$x + 3y + 12 = 37$$

$$2x + y = 15$$

- A. 1
B. 3
C. 4
D. 7

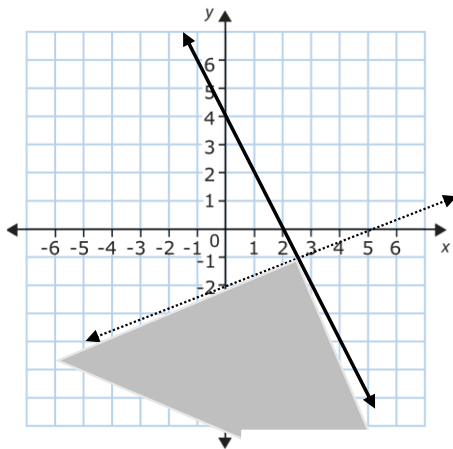
A.	Within range of the answer
B.	Value of $y - x$
C.	Correct
D.	Value of y

18. A dog fostering program sponsors a total of 45 dogs who are either 15 pounds or 50 pounds. The sum of the dogs' weight is 1,305 pounds. Which system of equations could be used to find the number of 50 pound dogs sponsored by the dog fostering program?

- A. $x + y = 45$
 $50x + 50y = 1,305$
- B. $x + y = 45$
 $50x - 15y = 1,305$
- C. $x + y = 50$
 $15x + 45y = 1,305$
- D. $x + y = 45$
 $15x + 50y = 1,305$

A.	Coefficients in second equation are incorrect
B.	Operation in second equation is incorrect
C.	Switched 50 and 45
D.	Correct

19. The shaded portion of the graph in the standard (x, y) coordinate plane below represents the solution set of which of the following systems of inequalities?



A.	Both inequality signs are incorrect
B.	First inequality sign is incorrect
C.	Second inequality sign is incorrect
D.	Correct

A. $y \geq -2x + 4$
 $y > \frac{2}{5}x - 2$

B. $y \geq -2x + 4$
 $y < \frac{2}{5}x - 2$

C. $y \leq -2x + 4$
 $y > \frac{2}{5}x - 2$

D. $y \leq -2x + 4$
 $y < \frac{2}{5}x - 2$

20. A line in the xy -plane has the points in the table.

x	-3	0	2	5
y	-11	-5	-1	5

Line a has the equation $y = \frac{2}{3}x + 7$.

What is the intersection of the two lines?

- A. (-3, -11)
- B. (6, 1)
- C. (9, 13)
- D. The two lines do not intersect.

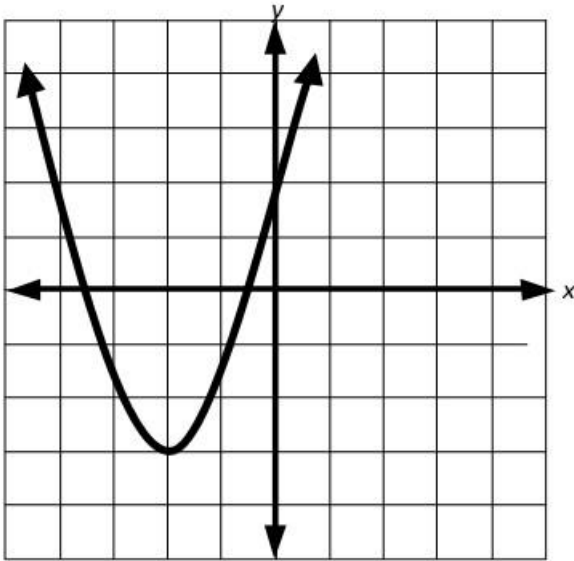
A.	First point in table
B.	Used $y = x - 5$ for first equation
C.	$y = 2x - 5$ $y = \frac{2}{3}x + 7$ Correct
D.	Answer within range

21. Which equation should be paired with $2x - 3y = 4$ to form a system that has no solutions?

- A. $4x - 6y = 5$
- B. $-6x - 9y = -12$
- C. $3x - 2y = -4$
- D. $x = 4$

A.	Slope of both lines are $\frac{2}{3}$ with different y -intercepts Correct
B.	Slopes have different signs
C.	Slopes are reciprocal
D.	Will have 1 solution $(4, \frac{8}{3})$

22. What is the axis of symmetry of the following function?



- A. $x = 0$
 B. $y = 0$
 C. $x = -2$
 D. $y = -3$

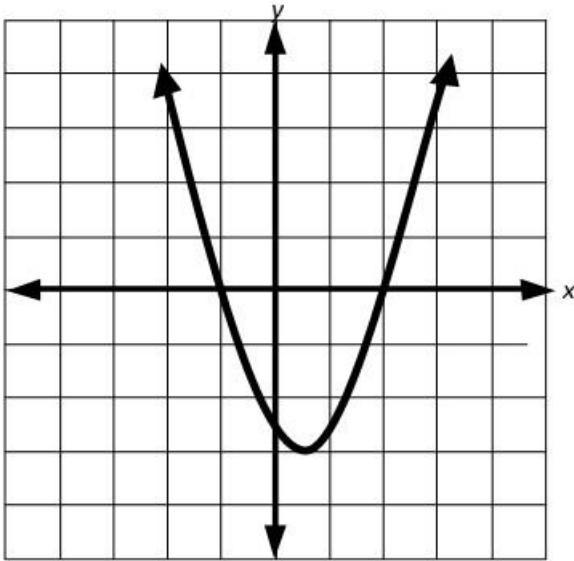
A.	Used x -coordinate of origin
B.	Used y -coordinate of origin
C.	Correct
D.	Used y -coordinate of vertex

23. The function g is defined by $g(x) = (x + 8)(x - 3)$. The graph of g in the xy -plane is a parabola. Which of the following intervals contains the x -coordinate of the vertex of the graph of g ?

- A. $-8 < x < -3$
 B. $-3 < x < 8$
 C. $3 < x < 8$
 D. $4 < x < 6$

A.	Too low
B.	$(-8 + 3) \div 2 = -2.5$ Correct
C.	Too high
D.	Too high

24. What are the roots of the function in the graph below?



- A. $x = -1, x = 2$
 B. $x = -1, x = 0, x = 2$
 C. $x = -1, x = 0$
 D. $x = 0, x = 2$

A.	Correct
B.	$x = 0$ is not a root
C.	$x = 0$ is not a root, missing $x = 2$
D.	$x = 0$ is not a root, missing $x = -1$

25. What is the sum of the solutions of the equation

$$2x^2 - x - 21 = 0 ?$$

- A. $-\frac{13}{2}$
 B. $-\frac{1}{2}$
 C. $\frac{1}{2}$
 D. $\frac{13}{2}$

A.	Wrong sign on $\frac{7}{2}$
B.	Wrong sign on both values
C.	$(x + 3)(2x - 7)$ Correct
D.	Wrong sign on 3

26. What are the solutions to $5x^2 - 30x + 35 = 0$?

- A. $x = -3 \pm \sqrt{2}$
- B. $x = 3 \pm \sqrt{2}$
- C. $x = 6 \pm \frac{\sqrt{34}}{2}$
- D. $x = 6 \pm \sqrt{7}$

A.	Used b instead of $-b$
B.	$5(x^2 - 6x + 7)$ Correct
C.	Did not divide first term by $2a$, did not square b and added $4ac$
D.	Did not divide first term by $2a$, dropped b^2

27. The width of a rectangle is 3 inches shorter than the length. If the area is 54 square inches, what is the width, in inches?

- A. 3
- B. 6
- C. 9
- D. 18

A.	Amount less than height
B.	$W = L - 3$; $W(W + 3) = 54$; $W^2 + 3W - 54$; $(W - 6)(W + 9)$; $W = -9, 6$ Correct
C.	Dropped negative OR gave height
D.	$54 \div 3$

MATH TEST – SHORT RESPONSE

2 Questions

DIRECTIONS: Solve each problem. Clearly show all steps, including appropriate formulas, substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer but with no work shown will receive only partial credit.

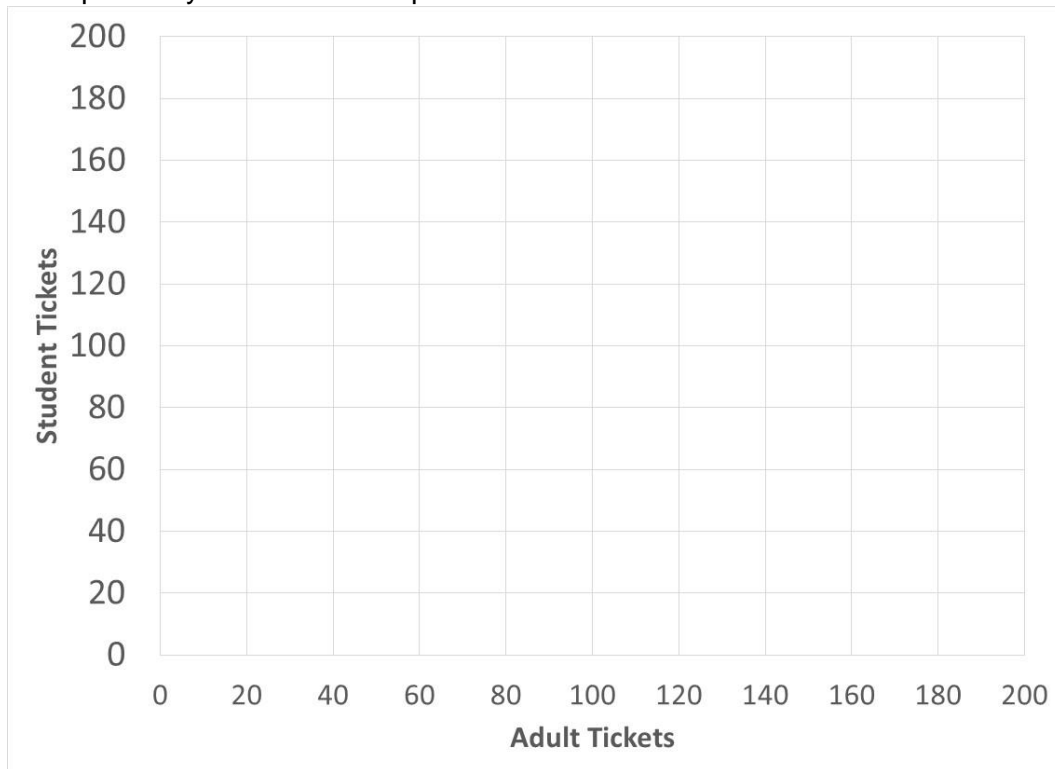
You are allowed to use a calculator for this section of the test. You may use a calculator for any problems you choose, but some of the problems may best be done without using a calculator.

1. Linear Concepts, Create and use linear relationships to solve a problem
Linear Concepts, Create a system of linear equations to solve a problem
Linear Concepts, Solve systems of two linear equations

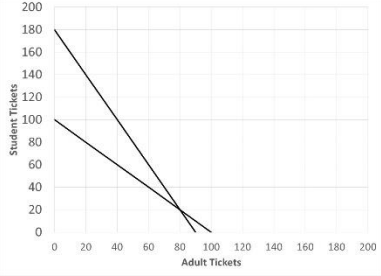
PROMPT:

Tickets for a school play cost \$4 for adults and \$2 for students. At the end of the play, the school sold a total of 100 tickets and collected \$360.

- Write a system of linear equations using x to represent the number of adult tickets and y to represent the number of student tickets.
- Graph the system of linear equations from above.



- Solve the system algebraically for x and y . Show all work.
- How much money was made from adult tickets? How much money was made from student tickets?

<u>Prompt</u>	<u>Response</u>	<u>Points</u>
a. Write a system of linear equations using x to represent the number of adult tickets and y to represent the number of student tickets.	$x + y = 100$ OR $y = -x + 100$ $4x + 2y = 360$ OR $2x + y = 180$ OR $y = -2x + 180$	1: correct equation for number of tickets 1: correct equation for money collected
b. Graph the system of linear equations from above.		1: graph matches equation from part (a) 1: graph matches equation from part (b)
c. Solve the system algebraically for x and y . Show all work.	$x = 80$ $y = 20$	1: for x value 1: for y value
d. How much money was made from adult tickets? How much money was made from student tickets?	Adult tickets = \$320 Student tickets = \$40	1: correct adult 1: correct student

2. Quadratic Functions, Given a quadratic function, identify the vertex, orientation, and axis of symmetry
 Quadratic Functions, Solve a quadratic equation using factoring
 Quadratic Functions, Given a quadratic equation in a real world scenario, interpret the solution

PROMPT:

A rocket is launched into the air with an upward velocity of 128 ft/sec. Its height h , in feet, after t seconds is given by the function $h(t) = -16t^2 + 128t$.

- Find the vertex of the given function as an ordered pair. Show all work.
 (Note: vertex formula for a parabola $x = -\frac{b}{2a}$)
- What is the maximum height of the rocket in feet?
- How many seconds does the rocket stay in the air? Show all work.

<u>Prompt</u>	<u>Response</u>	<u>Points</u>
a. Find the vertex of the given function as an ordered pair. Show all work. (Note: vertex formula for a parabola $x = -\frac{b}{2a}$)	$x = -\frac{b}{2a} = -\frac{128}{2(-16)} = 4$ $h(4) = 256$ (4, 256)	1: finding the x-coordinate 1: finding the y-coordinate 1: work shown
b. What is the maximum height of the rocket in feet?	256 feet OR y-coordinate from (a)	1: correct value of interpretation from vertex
c. How many seconds does the rocket stay in the air? Show all work.	$-16t^2 + 128t = 0$ $-16t(t - 8) = 0$ $t = 8$ 8 seconds	1: correct value 1: work shown