



Our Students. Their Moment.

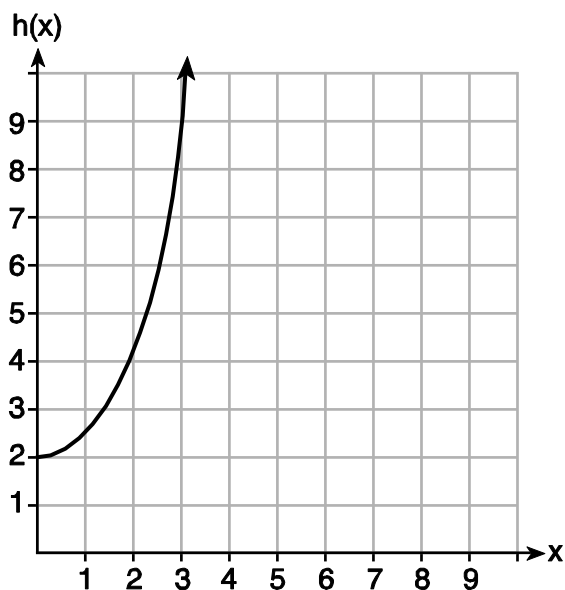
**Regents Exam in
Algebra I
(Common Core)**

**Sample Items
May 2013**

1. Given the functions $g(x)$, $f(x)$, and $h(x)$ shown below:

$$g(x) = x^2 - 2x$$

x	$f(x)$
0	1
1	2
2	5
3	7



The correct list of functions ordered from greatest to least by average rate of change over the interval $0 \leq x \leq 3$ is

- (1) $f(x)$, $g(x)$, $h(x)$
- (2) $h(x)$, $g(x)$, $f(x)$
- (3) $g(x)$, $f(x)$, $h(x)$
- (4) $h(x)$, $f(x)$, $g(x)$

Key: 4

Aligned to CCLS: F.IF.6

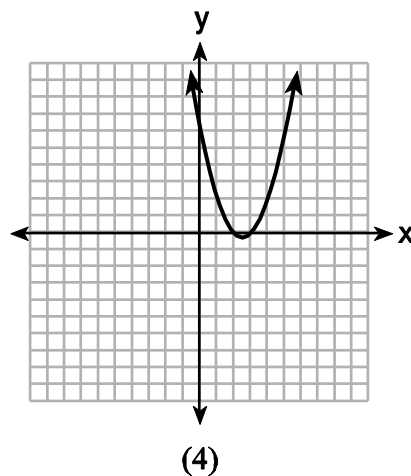
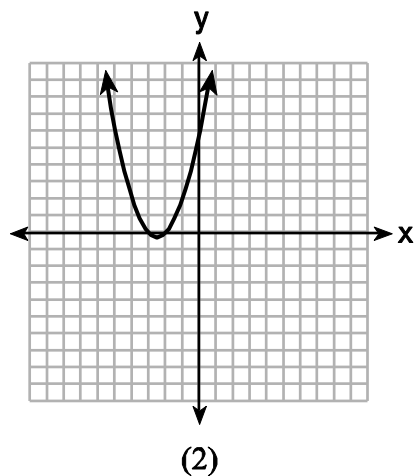
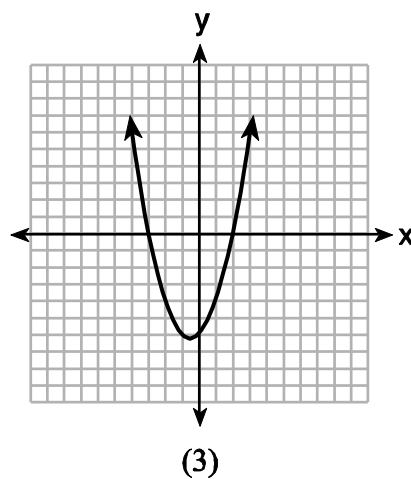
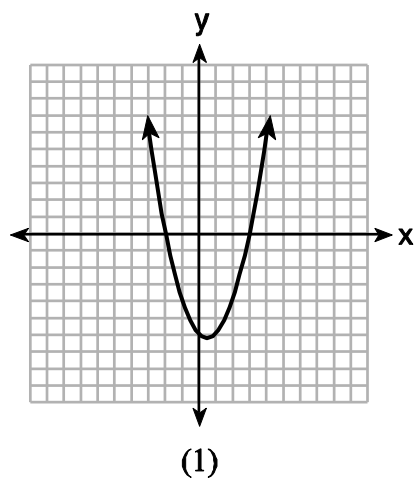
Mathematical Practices: 2

Commentary: This question aligns to F.IF.6 because it assesses a student's ability to calculate the average rate of change of a function presented symbolically, as a table, and graphically.

Rationale:

Option 4 is correct. Over the interval $0 \leq x \leq 3$, the average rate of change for $g(x) = \frac{3}{3} = 1$, $f(x) = \frac{6}{3} = 2$, and $h(x) = \frac{7}{3} = 2\frac{1}{3}$. Ordering these values from greatest to least results in the list of functions: $h(x)$, $f(x)$, $g(x)$.

2. The graphs below represent functions defined by polynomials. For which function are the zeros of the polynomials 2 and -3 ?



Key: 3

Aligned to CCLS: A.APR.3

Commentary: This question aligns to A.APR.3 because it requires a student to identify the graph of a polynomial with two given zeros.

Rationale: Option 3 is correct. The graph of the polynomial intersects the x -axis at points $(-3, 0)$ and $(2, 0)$. These are the only points on the graph where $y = 0$.

3. For which function defined by a polynomial are the zeros of the polynomial -4 and -6 ?

(1) $y = x^2 - 10x - 24$

(2) $y = x^2 + 10x + 24$

(3) $y = x^2 + 10x - 24$

(4) $y = x^2 - 10x + 24$

Key: 2

Aligned to CCLS: A.APR.3

Mathematical Practices: 2

Commentary: This question aligns to A.APR.3 because it requires a student to identify the equation of a polynomial with two given zeros.

Rationale: Option 2 is correct.

$$x = -4 \text{ and } x = -6$$

$$x + 4 = 0 \text{ and } x + 6 = 0$$

$$0 = (x + 4)(x + 6)$$

$$0 = x^2 + 4x + 6x + 24$$

$$0 = x^2 + 10x + 24$$

4. The length of the shortest side of a right triangle is 8 inches. The lengths of the other two sides are represented by consecutive odd integers. Which equation could be used to find the lengths of the other sides of the triangle?

- (1) $8^2 + (x + 1) = x^2$
- (2) $x^2 + 8^2 = (x + 1)^2$
- (3) $8^2 + (x + 2)^2 = x^2$
- (4) $x^2 + 8^2 = (x + 2)^2$

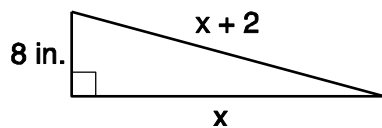
Key: 4

Aligned to CCLS: A.CED.1

Mathematical Practices: 1 and 2

Commentary: This item aligns to A.CED.1 because the student creates an equation in one variable that can be used to solve a problem.

Rationale: Option 4 is correct.



$$a^2 + b^2 = c^2$$
$$x^2 + 8^2 = (x + 2)^2$$

5. Donna wants to make trail mix made up of almonds, walnuts and raisins. She wants to mix one part almonds, two parts walnuts, and three parts raisins. Almonds cost \$12 per pound, walnuts cost \$9 per pound, and raisins cost \$5 per pound.

Donna has \$15 to spend on the trail mix. Determine how many pounds of trail mix she can make. [Only an algebraic solution can receive full credit.]

Key: 2 pounds of trail mix

Aligned to CCLS: A.CED.1

Mathematical Practices: 1 and 2

Commentary: This question aligns to A.CED.1 because the student creates equations in one variable and uses them to solve a problem.

Rationale: Let x = pounds of an ingredient. Then the number of pounds of trail mix is represented by the expression $x + 2x + 3x$. Therefore, the number of pounds of trail mix is $6x$. Then,

$$12x + 9(2x) + 5(3x) = 15$$

$$45x = 15$$

$$x = \frac{1}{3}$$

$$\text{So, } 6\left(\frac{1}{3}\right) = 2 \text{ pounds.}$$

Rubric:

[2] 2 and appropriate work is shown.

[1] Appropriate work is shown, but one computational error is made, but an appropriate number of pounds is stated.

or

[1] Appropriate work is shown, but one conceptual error is made, but an appropriate number of pounds is stated.

or

[1] 2, but no work is shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

6. A high school drama club is putting on their annual theater production. There is a maximum of 800 tickets for the show. The costs of the tickets are \$6 before the day of the show and \$9 on the day of the show. To meet the expenses of the show, the club must sell at least \$5,000 worth of tickets.

a) Write a system of inequalities that represent this situation.

b) The club sells 440 tickets before the day of the show. Is it possible to sell enough additional tickets on the day of the show to at least meet the expenses of the show? Justify your answer.

Key: a) $x + y \leq 800$
 $6x + 9y \geq 5000$

b) Yes with appropriate work shown to justify the answer.

Aligned to CCLS: A.CED.3

Commentary: This question aligns to A.CED.3 because a student writes a system of inequalities to determine a viable solution.

Mathematical Practices: 4 and 6

Rationale:

a) Let x = number of presale tickets
 y = number of day of show tickets

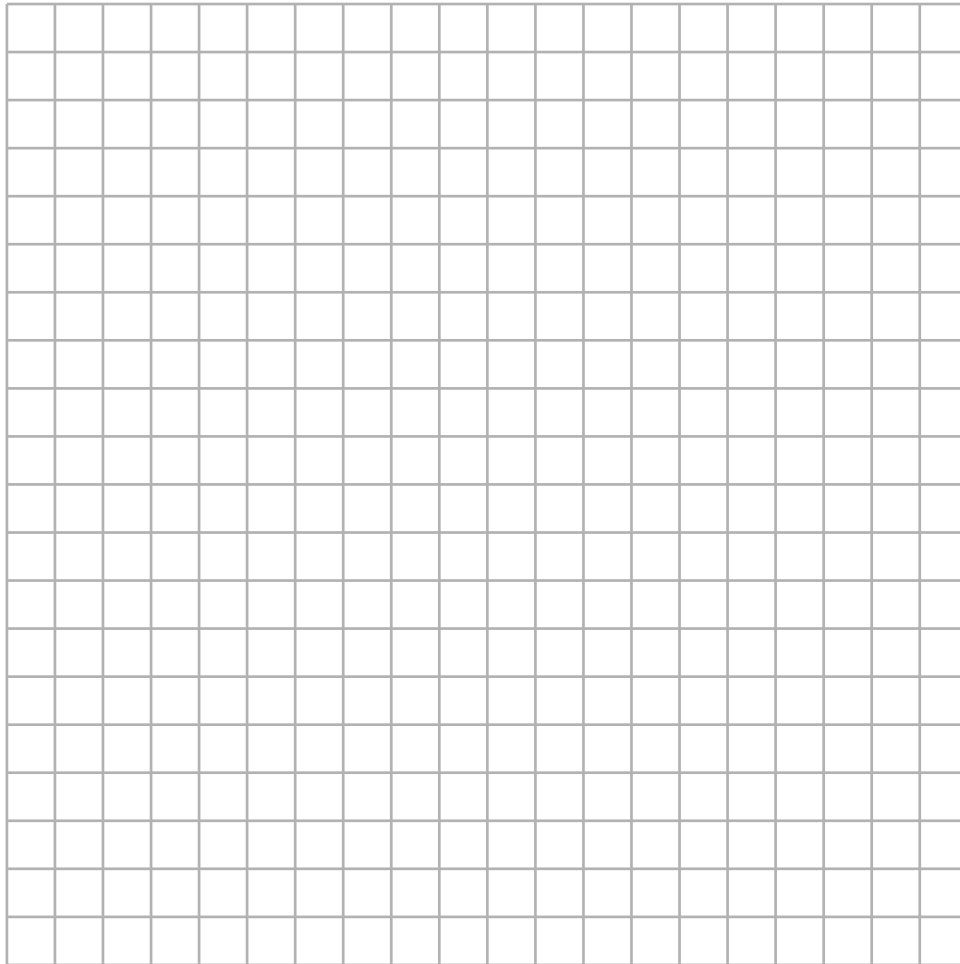
$$x + y \leq 800$$
$$6x + 9y \geq 5000$$

b) $6(440) + 9y \geq 5000$
 $2640 + 9y \geq 5000$
 $9y \geq 2360$
 $y \geq 262.\bar{2}$

263 tickets

440 advance purchase tickets added to 263 day of show tickets is 703 tickets, which is below the 800 ticket maximum. So yes, it is possible.

7. During a snowstorm, a meteorologist tracks the amount of accumulating snow. For the first three hours of the storm, the snow fell at a constant rate of one inch per hour. The storm then stopped for two hours and then started again at a constant rate of one-half inch per hour for the next four hours.
- a) On the grid below, draw and label a graph that models the accumulation of snow over time using the data the meteorologist collected.



- b) If the snowstorm started at 6 p.m., how much snow had accumulated by midnight?

Key: a) See graph in rationale below.

b) $3\frac{1}{2}$

Aligned to CCLS: F.IF.4

8. Next weekend Marnie wants to attend either carnival *A* or carnival *B*. Carnival *A* charges \$6 for admission and an additional \$1.50 per ride. Carnival *B* charges \$2.50 for admission and an additional \$2 per ride.

a) In function notation, write $A(x)$ to represent the total cost of attending carnival *A* and going on x rides. In function notation, write $B(x)$ to represent the total cost of attending carnival *B* and going on x rides.

b) Determine the number of rides Marnie can go on such that the total cost of attending each carnival is the same. [Use of the set of axes below is optional.]

c) Marnie wants to go on five rides. Determine which carnival would have the lower total cost. Justify your answer.

