

Item Keys, Alignments, Commentary, and Rationales

Item #1

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: $h(x)$, $f(x)$, $g(x)$.

Item #2

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 $y = 0$.

Item #3

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.

$$\begin{aligned}x &= -4 \text{ and } x = -6 \\x + 4 &= 0 \text{ and } x + 6 = 0 \\0 &= (x + 4)(x + 6) \\0 &= x^2 + 4x + 6x + 24 \\0 &= x^2 + 10x + 24\end{aligned}$$

Item #4

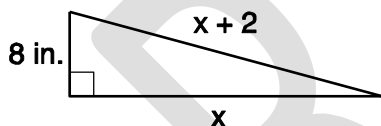
Key: 4

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.



$$\begin{aligned}a^2 + b^2 &= c^2 \\x^2 + 8^2 &= (x + 2)^2\end{aligned}$$

Item #5

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,

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

$$45 = 15$$

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

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

Item #6

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.

Rubrics:

- (a) [2] $x + y \leq 800$ and $6x + 9y \geq 5000$.
- [1] $x + y \leq 800$ or $6x + 9y \geq 5000$.
- [1] $x + y = 800$ and $6x + 9y = 500$. *or*
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- (b) [2] Yes, and appropriate work is shown.
- [1] Appropriate work is shown, but “yes” is not stated.
- [1] Appropriate work is shown, but one computational error is made, but an appropriate determination is made. *or*
- [1] Appropriate work is shown, but one conceptual error is made, but an appropriate determination is made.
- [0] Yes, but no work is shown. *or*
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.

Item #7

Key: a) See graph in rationale below.

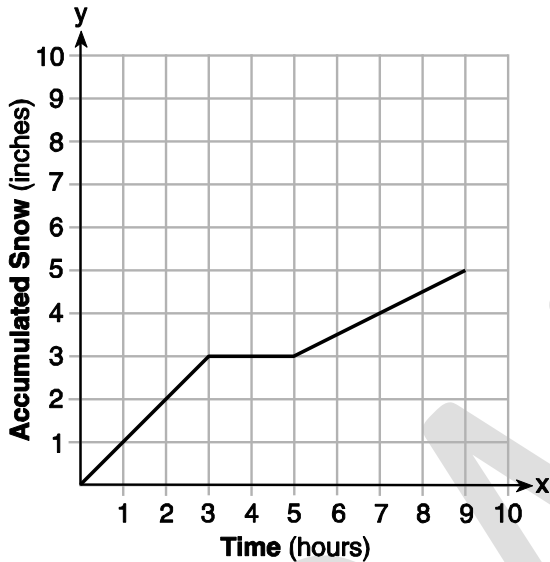
b) $3\frac{1}{2}$

Aligned to CCLS: F.IF.4

Commentary: This question aligns to F.IF.4 because the students sketch a graph based on a verbal description of the snowstorm.

Mathematical practices: 4

Rationale:



Rubric:

- [4] A correct graph is drawn, the axes are labeled correctly, and $3\frac{1}{2}$ is stated.
- [3] Appropriate work is shown, but one graphing or labeling error is made, but an appropriate amount of snow is stated.
- or*
- [3] A correct graph is drawn, the axes are labeled correctly, but the amount of snow is missing or is incorrect.
- [2] Appropriate work is shown, but two or more graphing or labeling errors are made, but an appropriate amount of snow is stated.
- or*
- [2] Appropriate work is shown, but one conceptual error is made, but an appropriate amount of snow is stated.
- or*
- [2] Appropriate work is shown, but one graphing or labeling error is made, and the amount of snow is missing or is incorrect.
- [1] Appropriate work is shown, but two or more graphing or labeling errors are made, and the amount of snow is missing or incorrect.
- or*

[1] Appropriate work is shown, but one conceptual error and one graphing or labeling error are made, but an appropriate amount of snow is stated.

or

[1] Appropriate work is shown, but one conceptual error is made, and the amount of snow is missing or is incorrect.

or

[1] $3\frac{1}{2}$, 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.

Item #8

Key: a) $A(x) = 1.50x + 6$
 $B(x) = 2x + 2.50$

b) 7 rides

c) Carnival *B* with appropriate justification.

Aligned to CCLS: A.REI.11

Mathematical Practices: 2, 3, and 4

Commentary: This question aligns to A.REI.11 because the answer to the problem requires the student to solve $A(x) = B(x)$, either algebraically or graphically.

Rationale:

a) $A(x) = 1.50x + 6$
 $B(x) = 2x + 2.50$

b) $A(x) = B(x)$
 $1.50x + 6 = 2x + 2.5$
 $x = 7$

c) Carnival *A* cost = $1.50x + 6$
 $= 1.50(5) + 6$
 $= \$13.50$

Carnival *B* cost = $2x + 2.50$
 $= 2(5) + 2.50$
 $= \$12.50$

Carnival *B* because it costs \$12.50 and carnival *A* costs \$13.50.

Rubrics:

- (a) [2] $A(x) = 1.50x + 6$ and $B(x) = 2x + 2.50$
- [1] Either $A(x) = 1.50x + 6$ or $B(x) = 2x + 2.50$ is written.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- (b) [2] 7 and appropriate work is shown.
- [1] Appropriate work is shown, but one computational or graphing error is made, but an appropriate number of rides is stated.
- or*
- [1] Appropriate work is shown, but one conceptual error is made, but an appropriate number of rides is stated.
- or*
- [1] 7, 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.
- (c) [2] Carnival *B* and an appropriate justification is given, such as showing that carnival *B* costs \$12.50 and carnival *A* costs \$13.50.
- [1] Carnival *B*, but the justification is incomplete or incorrect.
- [0] Carnival *B*, but no explanation is given.