



**NEW ENGLAND
COMMON ASSESSMENT PROGRAM**

**Released Items
Support Materials
2011**

**Grade 11
Mathematics**

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

G&M 10.5 Applies concepts of similarity by solving problems within mathematics or across disciplines or contexts.

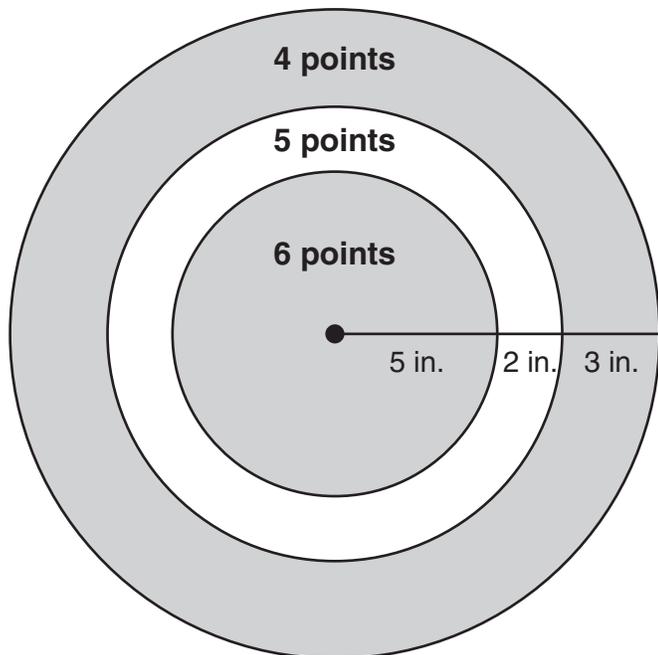


- 1 The ratio of the volumes of two cubes is 1:64. What is the ratio of the edge lengths of the two cubes?
- A. 1:4
 - B. 1:8
 - C. 1:16
 - D. 1:64

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

G&M 10.6 Solves problems involving perimeter, circumference, or area of two-dimensional figures (including composite figures) or surface area or volume of three-dimensional figures (including composite figures) within mathematics or across disciplines or contexts.

- 2 Look at this target.



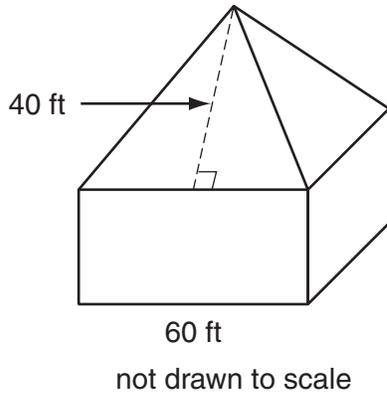
Which expression represents the area, in square inches, of the section of the target that is labeled "4 points"?

- A. $3^2\pi$
- B. $10^2\pi$
- C. $(7^2 - 3^2)\pi$
- D. $(10^2 - 7^2)\pi$

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

G&M 10.6 Solves problems involving perimeter, circumference, or area of two-dimensional figures (including composite figures) or surface area or volume of three-dimensional figures (including composite figures) within mathematics or across disciplines or contexts.

- 3 A diagram of a building is shown.



The building has a roof in the shape of a square pyramid. The slant height of the roof is 40 ft. What is the total surface area of the roof?

- A. 9600 ft²
- B. 8400 ft²
- C. 4800 ft²
- D. 2400 ft²

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

G&M 10.7 Uses units of measure appropriately and consistently when solving problems across content strands; makes conversions within or across systems and makes decisions concerning an appropriate degree of accuracy in problem situations involving measurement in other GEs.

4 One mile is equivalent to 320 rods. One square mile is equivalent to 640 acres. How many square rods are in 1 acre?

- A. 2
- B. 4
- C. 160
- D. 960

G&M 10.9 Solves problems on and off the coordinate plane involving distance, midpoint, perpendicular and parallel lines, or slope.

5 Quadrilateral $PQRS$ has vertices at these coordinates.

- $P(6, 5)$
- $Q(2, 4)$
- $R(4, 0)$
- $S(7, 1)$

Which statement is true?

- A. \overline{PQ} is parallel to \overline{RS} .
- B. \overline{PQ} is perpendicular to \overline{PS} .
- C. \overline{QR} is parallel to \overline{PS} .
- D. \overline{QR} is perpendicular to \overline{RS} .

**NECAP 2011 RELEASED ITEMS
GRADE 11 MATH**

F&A 10.1 Identifies, extends, and generalizes a variety of patterns (linear and nonlinear) represented by models, tables, sequences, or graphs in problem solving situations.

- 6 This table shows the perimeters, in inches, of rectangles with different widths.

Width (in.)	Perimeter (in.)
1	$6x + 4$
2	$6x + 6$
3	$6x + 8$
4	$6x + 10$
5	$6x + 12$

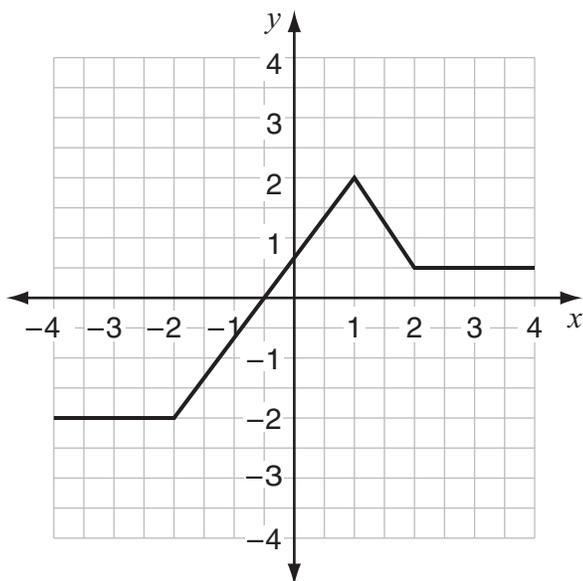
Based on the table, what is the width of a rectangle with a perimeter of $6x + 50$ inches?

- A. 24 inches
- B. 25 inches
- C. 40 inches
- D. 47 inches

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

F&A 10.2 Demonstrates conceptual understanding of linear and nonlinear functions and relations (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation).

7 Look at this graph of a function.



For which values of x does the function have a rate of change that is less than zero?

- A. between -4 and -2
- B. between -2 and 1
- C. between 1 and 2
- D. between 2 and 4

**NECAP 2011 RELEASED ITEMS
GRADE 11 MATH**

F&A 10.4 **Demonstrates conceptual understanding of equality** by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.

- 8 A theater group earned a total of \$5180 selling tickets to a musical.
- Tickets for balcony seats sold for \$5 each.
 - Tickets for orchestra seats sold for \$8 each.
 - The group sold four times as many tickets for balcony seats as for orchestra seats.

How many tickets for balcony seats were sold?

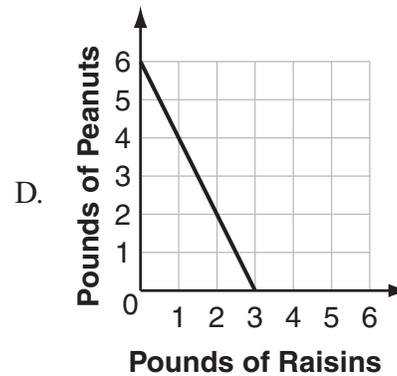
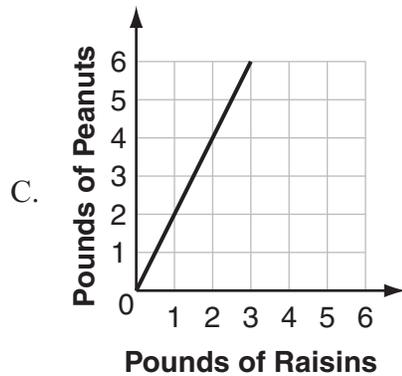
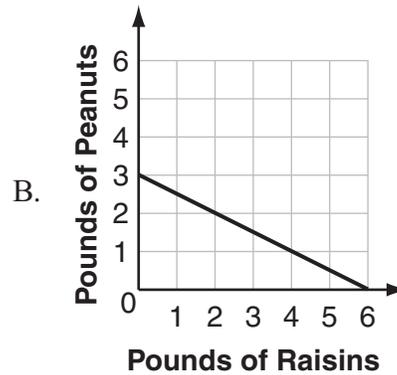
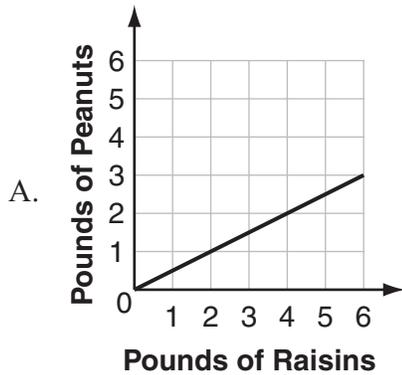
- A. 140
- B. 360
- C. 560
- D. 740

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

F&A 10.4 Demonstrates conceptual understanding of equality by solving problems involving algebraic reasoning about equality; by translating problem situations into equations; by solving linear equations (symbolically and graphically) and expressing the solution set symbolically or graphically, or provides the meaning of the graphical interpretations of solution(s) in problem-solving situations; or by solving problems involving systems of linear equations in a context (using equations or graphs) or using models or representations.



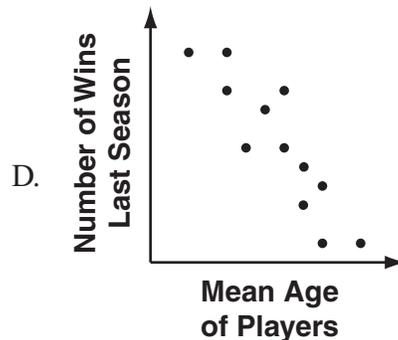
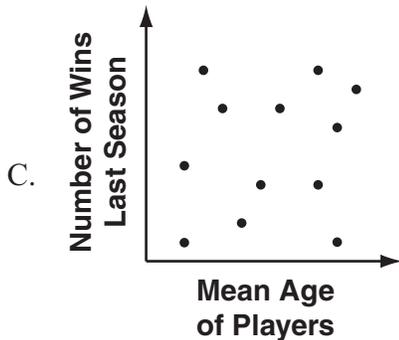
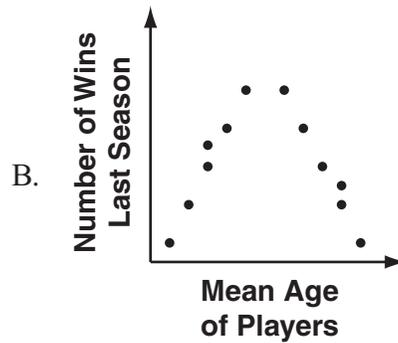
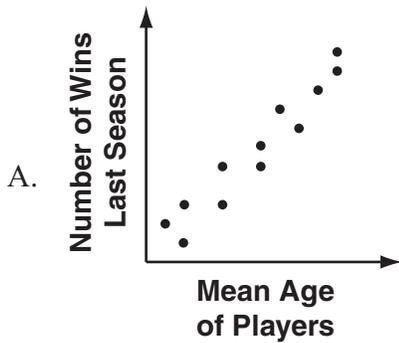
- 9 Trevor has \$6 to spend on raisins and peanuts. Raisins cost \$1 per pound, and peanuts cost \$2 per pound. Which graph shows the relationship between the number of pounds of raisins and the number of pounds of peanuts that Trevor can buy?



NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

DSP 10.2 Analyzes patterns, trends, or distributions in data in a variety of contexts by determining, using, or analyzing measures of central tendency (mean, median, or mode), dispersion (range or variation), outliers, quartile values, estimated line of best fit, regression line, or correlation (strong positive, strong negative, or no correlation) to solve problems; and solve problems involving conceptual understanding of the sample from which the statistics were developed.

- 10 Which graph shows a strong negative correlation between the mean age of the players on professional basketball teams and the number of wins last season?



* Item appeared differently in test booklet.

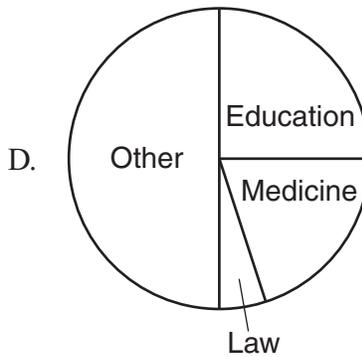
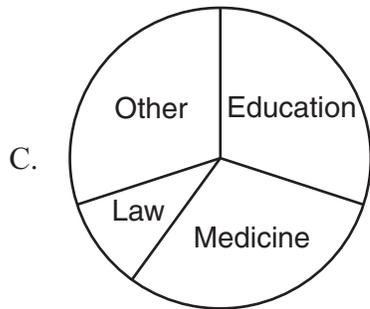
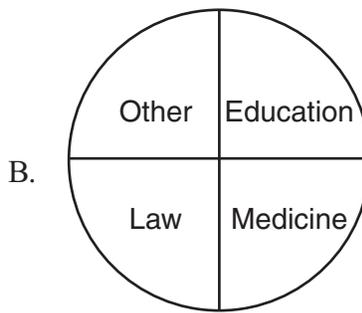
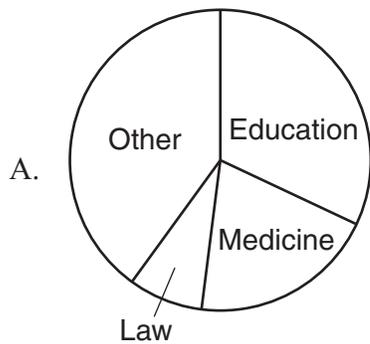
**NECAP 2011 RELEASED ITEMS
GRADE 11 MATH**

DSP 10.3 Identifies or describes representations or elements of representations that best display a given set of data or situation, consistent with the representations required in M(DSP)-10-1.

11 Joshua asked 50 college students, “What career field do you plan to enter when you graduate?” His data are shown in this table.

Career Field	Number of College Students
Education	16
Medicine	10
Law	4
Other	20

Which circle graph shows the data?



**NECAP 2011 RELEASED ITEMS
GRADE 11 MATH**

DSP 10.5 Solves problems involving experimental or theoretical probability.

- 12 Eliza spun the arrow on a spinner several times. For each spin, she recorded the color of the section in which the arrow stopped. Eliza's results are shown in this table.

Color	Number of Times
Red	21
Blue	15
Green	24

Eliza will spin the arrow on the spinner one more time. Based on the data in the table, what is the probability the arrow will stop in the red section?

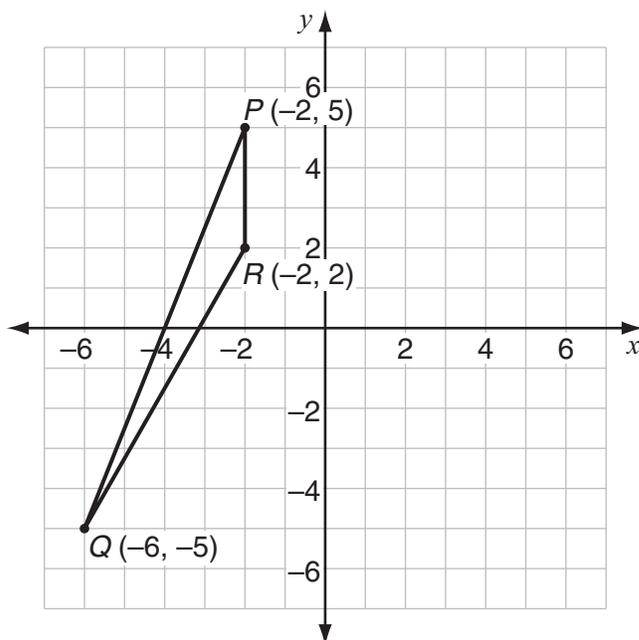
- A. $\frac{21}{100}$
- B. $\frac{1}{3}$
- C. $\frac{7}{20}$
- D. $\frac{7}{13}$

**NECAP 2011 RELEASED ITEMS
GRADE 11 MATH**

G&M 10.4 Applies the concepts of congruency by solving problems on or off a coordinate plane involving reflections, translations, or rotations; or solves problems using congruency involving problems within mathematics or across disciplines or contexts.



13 Look at triangle PQR on the grid below.



What are the coordinates of the image of point Q after triangle PQR is reflected over line PR ?

Scoring Guide:

Score	Description
1	for correct answer, $(2, -5)$ or equivalent
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1

 **13** $(2, -5)$

The student's answer is correct.

SCORE POINT 0
(EXAMPLE A)

 **13** $(-6, -5)$

The student's answer is incorrect.

SCORE POINT 0
(EXAMPLE B)

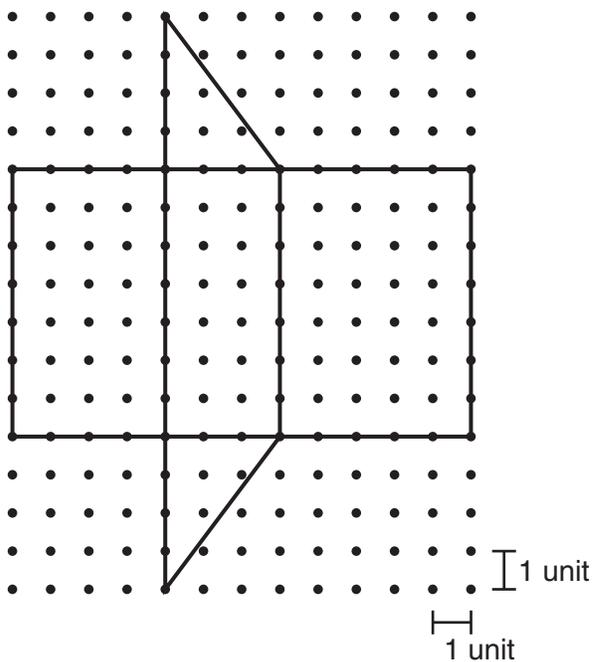
 **13** The coordinates would be $(6, 5)$.

The student's answer is incorrect.

**NECAP 2011 RELEASED ITEMS
GRADE 11 MATH**

G&M 10.6 Solves problems involving perimeter, circumference, or area of two-dimensional figures (including composite figures) or surface area or volume of three-dimensional figures (including composite figures) within mathematics or across disciplines or contexts.

- 14 This diagram shows the net of a triangular prism.



What is the volume, in cubic units, of the triangular prism that can be made from this net?

Scoring Guide:

Score	Description
1	for correct answer, 42 (cubic units)
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1
(EXAMPLE A)

14

$$\text{area of base} = \frac{1}{2}(3 \cdot 4) = 6 \text{ units}^2$$

$$\text{height} = 7 \text{ units}$$

$$\text{volume} = 6 \cdot 7 = 42 \text{ units}^3$$

The student's answer is correct. (Showing work is not required.)

SCORE POINT 1
(EXAMPLE B)

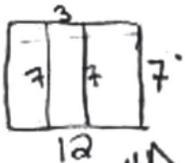
14

42 cubic units

The student's answer is correct.

SCORE POINT 0

14



$$\frac{3 \times 4}{2} = 6 \times 2 (\text{triangles})$$

$$7 \times 12 = 84 + 12 = 96 \text{ units}$$

The student's answer is incorrect.

**NECAP 2011 RELEASED ITEMS
GRADE 11 MATH**

F&A 10.2 Demonstrates conceptual understanding of linear and nonlinear functions and relations (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation).



- 15 This table shows a relationship between x and y .

x	5	10	15	20
y	$\frac{1}{10}$	$\frac{1}{20}$	$\frac{1}{30}$	$\frac{1}{40}$

Write an equation that shows the same relationship between x and y as in the table.

Scoring Guide:

Score	Description
1	for correct equation, $y = \frac{1}{2x}$ or equivalent
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1
(EXAMPLE A)

 15 $y = \frac{1}{2x}$

The student's answer is correct.

SCORE POINT 1
(EXAMPLE B)

 15 $\frac{1}{x} \cdot \frac{1}{2} = y$

The student's answer is correct.

SCORE POINT 0
(EXAMPLE A)

 15 $y = 1 \div 2x$

The student's answer is incorrect.

SCORE POINT 0
(EXAMPLE B)

 15 $\frac{1}{2(x)}$

The student's answer is incorrect.

**NECAP 2011 RELEASED ITEMS
GRADE 11 MATH**

F&A 10.3 Demonstrates conceptual understanding of algebraic expressions by solving problems involving algebraic expressions, by simplifying expressions (e.g., simplifying polynomial or rational expressions, or expressions involving integer exponents, square roots, or absolute values), by evaluating expressions, or by translating problem situations into algebraic expressions.

- 16 Sophia uses the equation below to estimate the percent, p , of games a baseball team is expected to win based on the number of runs scored, s , and the number of runs the team allows, a .

$$p = \frac{s^2}{s^2 + a^2} \times 100$$

Sophia's favorite baseball team scored 200 runs and allowed 150 runs. What percent of games is this team expected to win?

Scoring Guide:

Score	Description
1	for correct answer, 64(%)
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1
(EXAMPLE A)

16

64%

The student's answer is correct.

SCORE POINT 1
(EXAMPLE B)

16

64

The student's answer is correct.

SCORE POINT 0
(EXAMPLE A)

16

$$P = \frac{3^2}{5^2 + 3^2} \times 100, \quad P = \frac{200^2}{200^2 + 15^2} \times 100 = \frac{40000}{40000 + 225} \times 100$$

$$\frac{40000}{40000 + 225} = 226 \times 100 = \boxed{22600\%}$$

The student's answer is incorrect.

SCORE POINT 0
(EXAMPLE B)

16

$$P = \frac{200^2}{200^2 + 150^2} \times 100$$

$$\frac{40,000}{40,000 + 22,500} \times 100$$

$$\frac{40,000}{62,500} = 0.64$$

The student's answer is incorrect.

**NECAP 2011 RELEASED ITEMS
GRADE 11 MATH**

F&A 10.3 Demonstrates conceptual understanding of algebraic expressions by solving problems involving algebraic expressions, by simplifying expressions (e.g., simplifying polynomial or rational expressions, or expressions involving integer exponents, square roots, or absolute values), by evaluating expressions, or by translating problem situations into algebraic expressions.



- 17 The width of a rectangle is w feet. The length of the rectangle is 3 feet less than twice its width. Write an expression that represents the area, in square feet, of the rectangle in terms of w .

Scoring Guide:

Score	Description
1	for correct expression, $w(2w - 3)$ or equivalent
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1
(EXAMPLE A)



17

Length width
 $(2w - 3)(w)$

The student's answer is correct.

SCORE POINT 1
(EXAMPLE B)



17

area = length * width width = w
length = $2w - 3$

$$a = w(2w - 3) = 2w^2 - 3w$$

The student's answer is correct.

SCORE POINT 0
(EXAMPLE A)



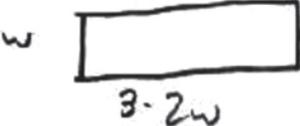
17

$$a = 2w \cdot (L - 3)^2$$

The student's answer is incorrect.

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 0
(EXAMPLE B)

 
$$\text{Area} = w(3-2w)$$
$$\text{Area} = 3w - 2w^2$$

17

The student's answer is incorrect.

SCORE POINT 0
(EXAMPLE C)


$$a = 2w - 3 \cdot w$$

17

The student's answer is incorrect.

**NECAP 2011 RELEASED ITEMS
GRADE 11 MATH**

DSP 10.5 Solves problems involving experimental or theoretical probability.

- 18 The quality control officer at a tire factory reported that 20 tires were defective out of a sample of 10,000 tires. What is the probability that a tire made at this factory is **not** defective?

Scoring Guide:

Score	Description
1	for correct answer, $\frac{9,980}{10,000}$ or equivalent
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1
(EXAMPLE A)

18 99.8% of the tires will not be defective.

The student's answer is correct.

SCORE POINT 1
(EXAMPLE B)

18 9,980 out of 10,000

The student's answer is correct.

SCORE POINT 1
(EXAMPLE C)

18 $\frac{20}{10,000} = \frac{1}{500}$ → means 1 out of 500 are defective which means 499 out of 500 are NOT defective

The student's answer is correct. (Showing work is not required.)

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 0
(EXAMPLE A)

18

Every $\frac{449}{500}$ will not be defective.
 $10,000 - 20 = 9980$ not defective
_{pieces defective}
 $\frac{9980}{10,000} = \frac{449}{500}$

The student's answer is incorrect.

SCORE POINT 0
(EXAMPLE B)

18

$\frac{20}{10,000} = \frac{1}{500} = 499$ not defective

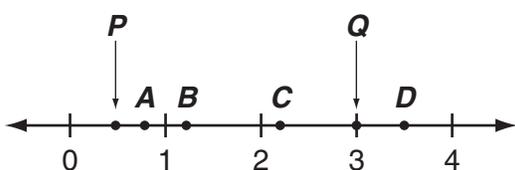
The student's answer is incorrect.

**NECAP 2011 RELEASED ITEMS
GRADE 11 MATH**

N&O 10.2 Demonstrates understanding of the relative magnitude of real numbers by solving problems involving ordering or comparing rational numbers, common irrational numbers (e.g., $\sqrt{2}$, π), rational bases with integer exponents, square roots, absolute values, integers, or numbers represented in scientific notation using number lines or equality and inequality symbols.



19 Look at this number line.



Which point is closest in value to $Q\sqrt{P}$? Show your work or explain how you know.

Scoring Guide:

Score	Description
2	for correct answer, C , with sufficient explanation or work shown to indicate correct strategy
1	for correct answer with insufficient or no explanation or work shown or for sufficient strategy with incorrect or no answer
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 2

 19

$QJP = 3\sqrt{5}$

$\sqrt{5} \approx 7$

$$\begin{array}{r} 300 \\ \times 7 \\ \hline 210 \end{array}$$

$$\begin{array}{r} 7 \\ \times 7 \\ \hline 49 \end{array}$$

C

The student's answer is correct, with sufficient work shown.

SCORE POINT 1

 19

C

The student's answer is correct, with no work shown.

SCORE POINT 0

 19

$3\sqrt{P}$

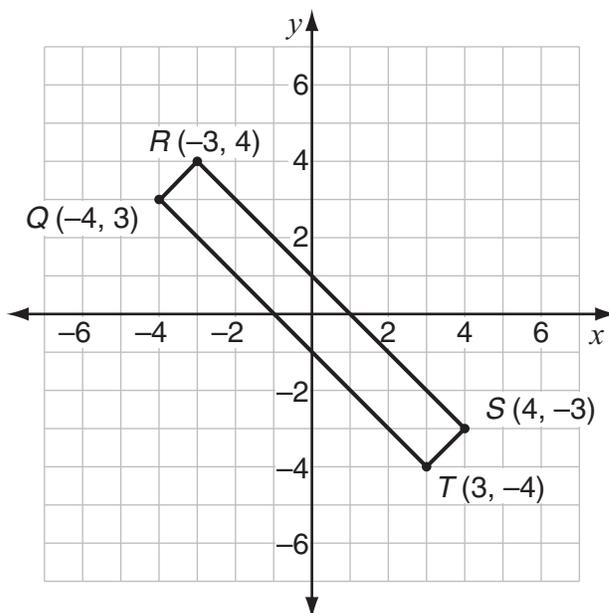
dis closest in value because no matter what, the number will be multiplied by 3 so it must be greater than 3

The student's answer is incorrect, with incorrect strategy.

**NECAP 2011 RELEASED ITEMS
GRADE 11 MATH**

G&M 10.9 Solves problems on and off the coordinate plane involving distance, midpoint, perpendicular and parallel lines, or slope.

- 20 Look at rectangle $QRST$.



What is the perimeter, in units, of rectangle $QRST$? Show your work or explain how you know.

Scoring Guide:

Score	Description
2	for correct answer, $16\sqrt{2}$ (units) or an approximation , with sufficient explanation or work shown to indicate correct strategy
1	for correct answer with insufficient or no explanation or work shown or for sufficient strategy with incorrect or no answer or correctly determines the two different side lengths: $\sqrt{2}$ and $7\sqrt{2}$ or approximations
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 2
(EXAMPLE A)

20

$$P = 2\sqrt{(-3+4)^2 + (4-3)^2} + 2\sqrt{(4+3)^2 + (-3-4)^2}$$

$$P \approx 22.627 \text{ units}$$

The student's answer is correct, with sufficient work shown.

SCORE POINT 2
(EXAMPLE B)

20

Perimeter of
QRST =
 $16\sqrt{2}$ units

Distance Formula:

$$l = \text{Side } \overline{RS} = \sqrt{(4+3)^2 + (-3-4)^2} = 7\sqrt{2}$$

$$w = \text{Side } \overline{RQ} = \sqrt{(-4+3)^2 + (3-4)^2} = \sqrt{2}$$

$$(2) \begin{array}{r} 7\sqrt{2} + (2)\sqrt{2} = 16\sqrt{2} \\ 14\sqrt{2} \quad 2\sqrt{2} \end{array}$$

The student's answer is correct, with sufficient work shown.

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1
(EXAMPLE A)

20 Using points S, T, and (3, -3) I made a right triangle and used Pythagorean Theorem to find length of $\overline{TS} = \sqrt{2}$ which I doubled because it is the same as \overline{QR} . Using points Q, T, and (-4, -4) I made a right triangle and used Pythagorean Theorem to find length of $\overline{QT} = \sqrt{98}$ which I doubled because it is the same as \overline{RS} . So $\sqrt{2} + \sqrt{98}$ is the perimeter of rectangle QRST.

The student has correctly determined the two different side lengths.

SCORE POINT 1
(EXAMPLE B)

20

$$D = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$TS = \begin{array}{r} (3-4)^2 + (-4+3)^2 \\ -1^2 + -1^2 \\ 1 + 1 \\ \sqrt{2} = 1.41 \end{array}$$

$$RS = \begin{array}{r} (-3-4)^2 + (4+3)^2 \\ -7^2 + 7^2 \\ 49 + 49 \\ \sqrt{98} = 9.90 \end{array}$$

$$1.41 \times 9.90 = \boxed{14.0}$$

The student has correctly determined the two different side lengths.

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 0

20

$$\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \text{distance}$$
$$\sqrt{(-3 - 4)^2 + (-4 - 3)^2}$$
$$\sqrt{(9 + 4)^2 + (16 + 9)^2}$$
$$169 + 169 = 338 = 18 \text{ units} + 2 \text{ units}$$

20 units

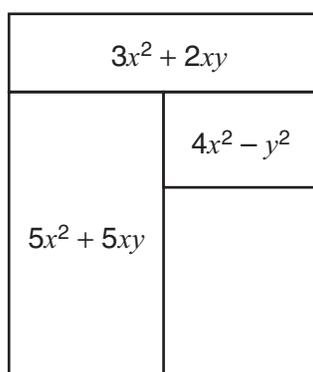
The student's answer is incorrect.

**NECAP 2011 RELEASED ITEMS
GRADE 11 MATH**

F&A 10.3 Demonstrates conceptual understanding of algebraic expressions by solving problems involving algebraic expressions, by simplifying expressions (e.g., simplifying polynomial or rational expressions, or expressions involving integer exponents, square roots, or absolute values), by evaluating expressions, or by translating problem situations into algebraic expressions.



- 21 The expression inside each of these rectangles represents the area, in square units, of the rectangle.



- Write an algebraic expression in simplified form to represent the sum of the areas of all the rectangles.
- What is the total area, in square units, of the rectangles when $x = 5$ and $y = 2$?

Scoring Guide:

Score	Description
2	for correct answer to part a, $12x^2 + 7xy - y^2$ or equivalent , and correct answer to part b, 366 (square units)
1	for correct answer to part a or for correct answer to part b or for correct answer to part b based on incorrect algebraic expression written in part a
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 2
(EXAMPLE A)



21

a) $12x^2 + 7xy - y^2$

$$(5x^2 + 5xy) + (3x^2 + 2xy) + (4x^2 - y^2)$$
$$12x^2 + 7xy - y^2$$

b) 366

$$12(5)^2 + 7(5)(2) - (2)^2 = 366$$
$$12(25) + 7(10) - 4$$
$$300 + 70 - 4$$
$$370 - 4$$

- a) The student's answer is correct. (Showing work is not required.)
b) The student's answer is correct. (Showing work is not required.)

SCORE POINT 2
(EXAMPLE B)



21

a) $12x^2 + 7xy - y^2$

b) 366 units²

- a) The student's answer is correct.
b) The student's answer is correct.

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1
(EXAMPLE A)



21

$$A) - 12x^2 + 7xy - y^2$$

$$B) - 12(5)^2 + 7(5)(2) - 2^2$$

$$3600 + 17 - 4$$

$$3600 + 13$$

$$\text{Area} = 3613^2$$

- a) The student's answer is correct.
b) The student's answer is incorrect. (Showing work is not required.)

SCORE POINT 1
(EXAMPLE B)



21

$$a) (3x^2 + 2xy) + (5x^2 + 5xy) + (4x^2 + y^2) = 12x^2 + 7xy + y^2$$

* • * • *

$12x^2 + 7xy + y^2$
sum of areas

$$\begin{array}{r} 12 \\ 25 \\ \hline 60 \\ 240 \\ \hline 300 \end{array}$$

$$b) 12(5)^2 + 7(5)(2) + (2)^2 = 12(25) + 7(10) + 4 = 300 + 70 + 4 = 374$$

The total area is 374 square units

- a) The student's answer is incorrect.
b) The student's answer is correct based on an incorrect answer in part a.

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 0
(EXAMPLE A)



21

a.) $12x^2 + 8x - y^2$
b.) 186

- a) The student's answer is incorrect.
b) The student's answer is incorrect.

SCORE POINT 0
(EXAMPLE B)



21

A.) $3x^2 + 2xy$
 $5x^2 + 5xy$
 $4x^2 - y^2$

$$12x^6 + 7xy - y^2$$

- a) The student's answer is incorrect.
b) The student's answer is incorrect.

B.) $5 \times 12 = 60^6 + 7xy - y^2$

**NECAP 2011 RELEASED ITEMS
GRADE 11 MATH**

N&O 10.4 Accurately solves problems involving rational numbers within mathematics, across content strands, disciplines or contexts (with emphasis on, but not limited to, proportions, percents, ratios, and rates).



- 22** Customer service surveys were sent to 200 cell phone users. Of those users, 80 completed the survey.
- a. What percent of the 200 cell phone users completed the survey?

Of the users who completed the survey, 75% rated their overall service as excellent.

- b. How many users rated their overall service as excellent?

Some of the cell phone users who completed the survey were sent a gift. Of these, 40%, representing 6 users, rated their service as excellent.

- c. How many cell phone users who completed the survey were sent a gift? Show your work or explain how you know.

Scoring Guide:

Score	Description
4	4 points
3	3 points
2	2 points
1	1 point
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

Part a: 1 point for correct answer, **40**(%)

Part b: 1 point for correct answer, **60**

Part c: 2 points for correct answer, **15**, with sufficient explanation or work shown to indicate correct strategy
OR
1 point for correct answer with insufficient or no explanation or work shown
or
for appropriate strategy with incorrect or no answer

Sample Response:

Part c: $6 = \text{total users sent gift} \times 40\%$
 $\text{total users sent gift} = 6 \div 40\% = 15$

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 4



22

a. 40%

b. 60

c. $40\% = 6$ so $20\% = 3$ $3 \times 5 = 15$

15 people were sent gifts because
40% of the people that got gifts was 6
people so that means that 3 is 20% and
 $20\% \times 5 = 100\%$ so $3 \times 5 = 15$ so 15
people got a gift

a) The student's answer is correct.

b) The student's answer is correct.

c) The student's answer is correct, with sufficient explanation given.

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 3



22

A 40% Completed the Survey

a) The student's answer is correct.

B 66 users

b) The student's answer is correct.

C 15 people received a

gift

c) The student's answer is correct, with no explanation or work shown.

13

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 2



sent to 200 cell phones, 80 completed

22 (a) $\frac{80 \div 2}{200 \div 2} = \frac{40}{100} = \boxed{40\%}$

a) The student's answer is correct.

(b) 75% of 80, $75\% = \frac{3}{4}$

$80 \div 4 = 20$
 $20 \times 3 = 60$

$\boxed{60 \text{ users rated it excellent}}$

b) The student's answer is correct.

(c) 16 users were sent a gift.

c) The student's answer is incorrect, with no explanation or work shown.

SCORE POINT 1
(EXAMPLE A)



22 A. 2.5% users completed it.

$80 \overline{) 200}$
 $\underline{160}$
 400

a) The student's answer is incorrect.

25	50	75	100
10	10	10	10
10	10	10	10

B. 60 people rated their overall service as excellent.

People rated excellent

b) The student's answer is correct.

C. $\begin{array}{r} 40 \text{ 6 user} \\ 40 \text{ 6 use} \\ \hline 80 \quad 12 \\ -5 \quad -1 \\ \hline 75 \quad 11 \end{array}$

C. 11 cellphone users got a gift.

c) The student's answer is incorrect, with insufficient strategy.

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1
(EXAMPLE B)



22

a. $\frac{80}{200} = \frac{8}{20} = \frac{4}{10} = \frac{2}{5} = 40\%$ completed the survey

b. $80 \times 0.75 = 60\%$ had an excellent overall service

c. $\frac{6}{60} = \frac{3}{30} = \frac{1}{10}$ 6 users were sent a gift.

- a) The student's answer is correct.
- b) The student's answer is incorrect.
- c) The student's answer is incorrect, with insufficient strategy.

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 0



22

Sent to 200 cell users

a) The student's answer is incorrect.

80 completed the Survey

a. $\frac{200}{80} = 25\%$ of people Completed the Survey

b. 174 said their overall service was excellent

$$\begin{array}{r} 200 \\ \div 75 \\ \hline 2,6 \end{array} \quad \begin{array}{r} 200 \\ - 26 \\ \hline 174 \end{array} \leftarrow$$

b) The student's answer is incorrect.

$$\begin{array}{r} 200 \\ - 40 \\ \hline 5 \end{array} \quad \begin{array}{r} 200 \\ - 5 \\ \hline 195 \end{array}$$

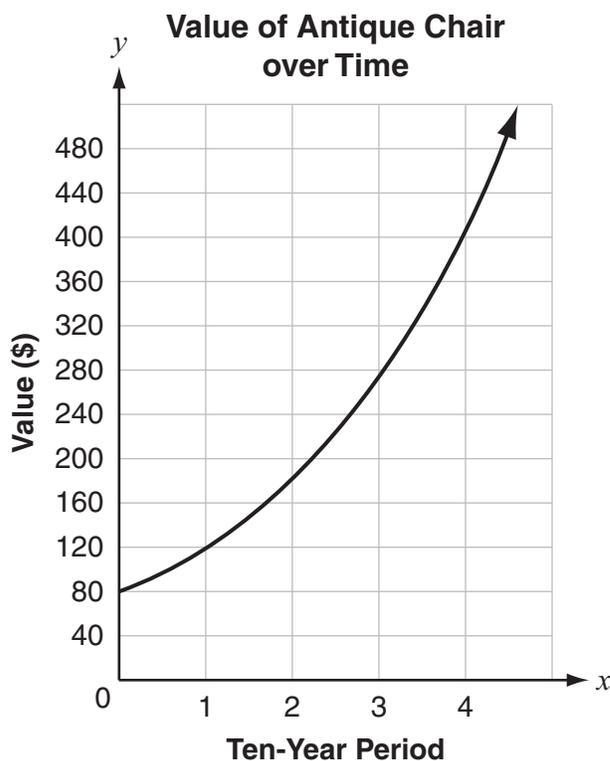
c) The student's response is incorrect.

195 people were sent gifts.

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

F&A 10.2 Demonstrates conceptual understanding of linear and nonlinear functions and relations (including characteristics of classes of functions) through an analysis of constant, variable, or average rates of change, intercepts, domain, range, maximum and minimum values, increasing and decreasing intervals and rates of change (e.g., the height is increasing at a decreasing rate); describes how change in the value of one variable relates to change in the value of a second variable; or works between and among different representations of functions and relations (e.g., graphs, tables, equations, function notation).

- 23 The value of an antique chair increases exponentially. This graph shows the chair's value over a set of four ten-year periods.



- By what amount did the value of the antique chair increase during the first ten-year period?
- By what percent did the value of the antique chair increase during each ten-year period? Show your work or explain how you know.
- During which ten-year period will the value of the antique chair reach \$1000? Show your work or explain how you know.

**NECAP 2011 RELEASED ITEMS
GRADE 11 MATH**

Scoring Guide:

Score	Description
4	5 points
3	4 points or correct answers to all parts
2	2 or 3 points
1	1 point
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

Part a: 1 point for correct answer, (\$)**40**

Part b: 2 points for correct answer, **50(%)**, with sufficient explanation or work shown to indicate correct strategy

OR

1 point for correct answer with insufficient or no explanation or work shown
or
for appropriate strategy with incorrect or no answer

Part c: 2 points for correct answer, **7th** ten-year period or correct answer based on an incorrect answer in part a and/or part b, with sufficient explanation or work shown to indicate correct strategy

OR

1 point for correct answer with insufficient or no explanation or work shown
or
for appropriate strategy with incorrect or no answer

Sample Response:

Part b: Change in first ten-year period is \$40 and $\frac{40}{80} = 0.5 = 50\%$
The percent the value increases is 50%.

Part c: The value increases 50% every ten years.

4th ten-year period = \$400, 5th ten-year period = \$600, 6th ten-year period = \$900, 7th ten-year period = \$1350. So, during the 7th ten-year period, the value first reaches \$1000.

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 4

23 a) \$40

b) $80 \rightarrow 120 = 40 = 50\%$
 $120 \rightarrow 180 = 60 = 50\%$
 $180 \rightarrow 270 = 90 = 50\%$
 $270 \rightarrow 405 = 135 = 50\%$ } 50% increase
each 10 year period

c) 5) $405 + 202.5 = 607.5$

6) $607.5 + 303.75 = 911.25$

7) $911.25 + 455.63 = 1366.88$

in period 7
the price will
reach \$1000

- a) The student's answer is correct.
b) The student's answer is correct, with sufficient work shown.
c) The student's answer is correct, with sufficient work shown.

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 3

23

(A) The value of the antique chair increased by \$40 during the first 10-year period.

(B) It increased by 1.5% every 10-year period.

$$80 \times 1.5 = 120 \quad 120 \times 1.5 = 180 \quad 180 \times 1.5 = 270$$

(C) During the 7th 10-year period, the value of the chair will reach \$1,000.

$$5 : 405 \times 1.5 = 607.5$$

$$6 : 607.5 \times 1.5 = 911.25$$

$$(7) : 911.25 \times 1.5 = 1,366.875$$

- a) The student's answer is correct.
- b) The student's answer is incorrect, with sufficient work shown to indicate correct strategy.
- c) The student's answer is correct, with sufficient work shown.

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 2

23

a) \$40

b) 20%

c) 7th

- a) The student's answer is correct.
- b) The student's answer is incorrect, with no work shown or explanation given.
- c) The student's answer is correct, with no work shown or explanation given.

SCORE POINT 1
(EXAMPLE A)

- 23 a.) The antique chair's value increased by \$40 in 70 years.
- b.) The chair's value increased by 3% each 10 year period.
(120 ÷ 40 = 3)
- c.) The 25th 10 year period will reach \$1000 because each 10 year period is increased by \$40.
(1000 ÷ 40 = 25)

- a) The student's answer is correct.
- b) The student's answer is incorrect, with insufficient strategy.
- c) The student's answer is incorrect, with insufficient strategy.

NECAP 2011 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1
(EXAMPLE B)

23

A. 120

- 80

\$40 → the cost increased by \$40 in the first 10 yr. period

B. Each ten yr. period the value changed by different percents
The 1st ten yr. period, the value went up almost 50%.

C. Between the 6 + 7 ten yr. period

- a) The student's answer is correct.
- b) The student's answer is incorrect, with insufficient strategy.
- c) The student's answer is incorrect, with insufficient strategy.

SCORE POINT 0

23

a. About +120 increase

b. 4% because each increase is done within 40 years. 40 as a percentage is 4.

C. During the 13th ten-year period the value will be up to \$1000.

- a) The student's answer is incorrect.
- b) The student's answer is incorrect, with insufficient strategy.
- c) The student's answer is incorrect, with insufficient strategy.

Grade 11 Mathematics Released Item Information – 2011

Released Item Number	1	2	3	4	5	6	7	8	9	10	11	12
No Tools Allowed	✓								✓			
Content Strand ¹	GM	GM	GM	GM	GM	FA	FA	FA	FA	DP	DP	DP
GSE Code	10-5	10-6	10-6	10-7	10-9	10-1	10-2	10-4	10-4	10-2	10-3	10-5
Depth of Knowledge Code	1	1	1	2	2	2	1	2	2	1	1	1
Item Type ²	MC											
Answer Key	A	D	C	C	B	A	C	D	B	D	A	C
Total Possible Points	1	1	1	1	1	1	1	1	1	1	1	1

Released Item Number	13	14	15	16	17	18	19	20	21	22	23
No Tools Allowed	✓		✓		✓		✓		✓	✓	
Content Strand ¹	GM	GM	FA	FA	FA	DP	NO	GM	FA	NO	FA
GSE Code	10-4	10-6	10-2	10-3	10-3	10-5	10-2	10-9	10-3	10-4	10-2
Depth of Knowledge Code	1	2	2	1	2	1	2	2	1	2	2
Item Type ²	SA	CR	CR								
Answer Key											
Total Possible Points	1	1	1	1	1	1	2	2	2	4	4

¹Content Strand: NO = Numbers & Operations, GM = Geometry & Measurement, FA = Functions & Algebra, DP = Data, Statistics, & Probability

²Item Type: MC = Multiple Choice, SA = Short Answer, CR = Constructed Response