



**NEW ENGLAND
COMMON ASSESSMENT PROGRAM**

**Released Items
Support Materials
2013**

**Grade 11
Mathematics**

NECAP 2013 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.



- 1 The values of x , y , and z are shown.

$$x = -3 + 0.8$$

$$y = -3 - \frac{5}{8}$$

$$z = -3 + 0.45$$

Which inequality is true?

- A. $x > z$
- B. $y > x$
- C. $y > z$
- D. $z > x$

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).

- 2 Allen's water bill contains the following information:

- He used 1600 cubic feet of water.
- The total cost for the water he used is \$34.80.

Which price is closest to the **cost per gallon** of water that Allen used?

[1 cubic foot of water = 7.48 gallons of water]

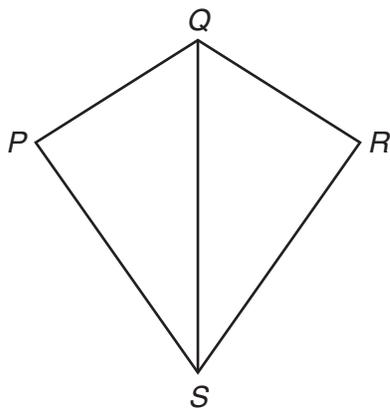
- A. \$0.0029
- B. \$0.0218
- C. \$0.1627
- D. \$0.2908

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

G&M 10.2 Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems involving angles, lines, polygons, circles, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem).



- 3 Quadrilateral $PQRS$ is shown below.



The following statements about quadrilateral $PQRS$ are true:

- Line segment QS bisects angle PSR .
- Line segment PS is congruent to line segment RS ($PS \cong RS$).

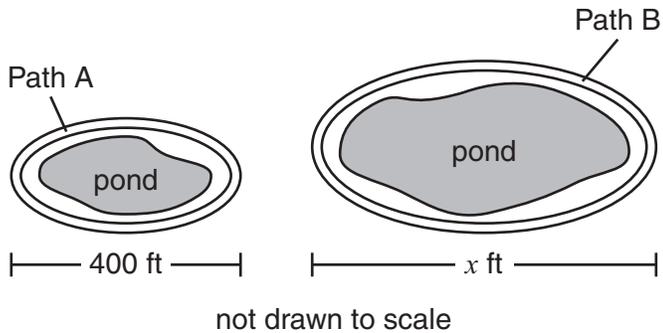
Which mathematical theorem can be used to prove that triangle PQS is congruent to triangle RQS ($\triangle PQS \cong \triangle RQS$)?

- A. SSS theorem
- B. SAS theorem
- C. AAS theorem
- D. ASA theorem

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

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

- 4 A parks department built paths around the two ponds shown in this diagram. The paths are geometrically similar.



- Path A is 400 feet from one end to the opposite end.
- The perimeter of Path A is $\frac{1}{4}$ mile.
- The perimeter of Path B is $\frac{5}{8}$ mile.

What is the value of x ?

- A. 600 feet
- B. 640 feet
- C. 1000 feet
- D. 1600 feet

NECAP 2013 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.

5 Square $WXYZ$ is plotted on a coordinate grid.

- Vertex X is located at $(6, 8)$.
- The midpoint of the diagonals of $WXYZ$ is located at $(3, 5)$.

Which coordinate pair represents the location of another vertex of square $WXYZ$?

- A. $(0, 2)$
- B. $(3, 2)$
- C. $(6, 1)$
- D. $(8, 0)$

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 list shows the first four terms of a geometric sequence.

$$4, 2, 1, \frac{1}{2}, \dots$$

Which function can be used to determine the n th term of this sequence?

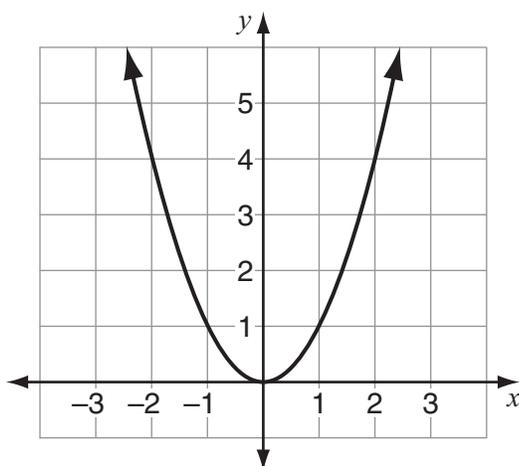
- A. $f(n) = 4 - 2^n$
- B. $f(n) = 4 - 2^{n-1}$
- C. $f(n) = 4\left(\frac{1}{2}\right)^n$
- D. $f(n) = 4\left(\frac{1}{2}\right)^{n-1}$

NECAP 2013 RELEASED ITEMS
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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.



What is the domain of the function?

- A. all real numbers
- B. all real numbers greater than or equal to 0
- C. all real numbers between 0 and 4
- D. all real numbers between -2 and 2

NECAP 2013 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.



- 8 Look at this expression.

$$|-49 + 5x^3|$$

What is the value of the expression
when $x = -2$?

- A. 9
- B. 19
- C. 79
- D. 89

NECAP 2013 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.



9 Which expression is equivalent to

$$\frac{x^2 - 16}{x^2 - 9x + 20} \text{ for } x \neq 4?$$

A. $\frac{x+4}{x+5}$

B. $\frac{x+4}{x-5}$

C. $\frac{x-4}{x+5}$

D. $\frac{x-4}{x-5}$

**NECAP 2013 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.

- 10 Shelley spends \$10 on hamburger meat every week.
- Let x represent the price, in dollars, for 1 pound of hamburger meat.
 - Let y represent the number of pounds of hamburger meat Shelley buys.

Which equation shows the relationship between x and y ?

- A. $y = 10x$
- B. $y = 10 - x$
- C. $y = \frac{x}{10}$
- D. $y = \frac{10}{x}$

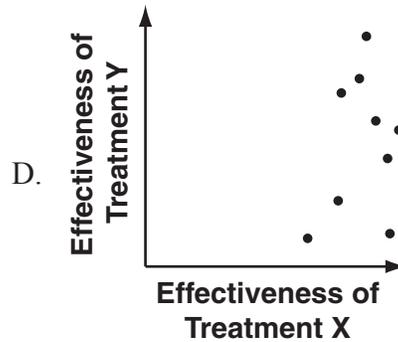
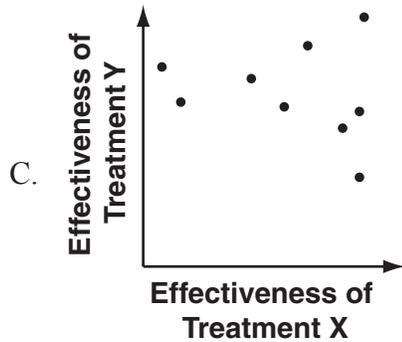
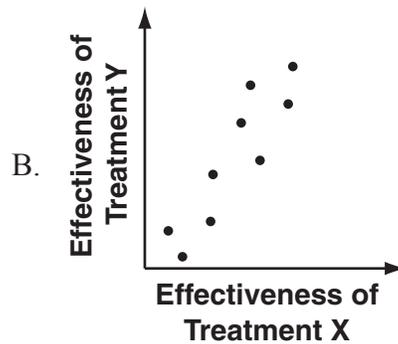
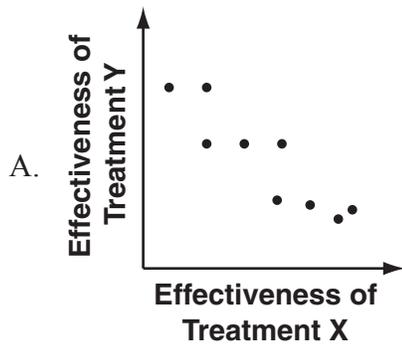
NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

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 involving understanding of the sample from which the statistics were developed.



- 11 While studying medical treatments, scientists noticed a relationship between two of the treatments when applied together. As Treatment X became more effective, Treatment Y became less effective.

Which scatter plot best demonstrates this relationship?



NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

DSP 10.5 Solves problems involving experimental or theoretical probability.



- 12 Each student at a math fair will be given a gift bag. Each bag contains one gift.
- $\frac{1}{5}$ of the bags contain a calculator.
 - $\frac{2}{5}$ of the bags contain a protractor.
 - $\frac{2}{5}$ of the bags contain a pencil case.

What is the probability that a randomly chosen gift bag contains a calculator **or** a protractor?

- A. 0.2
- B. 0.4
- C. 0.6
- D. 0.8

**NECAP 2013 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).



- 13** A store donated \$45,000 to a local college. This amount was 1% of the store's profit, in dollars. What was the store's profit, in dollars?

Scoring Guide:

Score	Description
1	for correct answer, (\$)4,500,000
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1
(EXAMPLE A)



13

4.5 million dollars

The student's response is correct.

SCORE POINT 1
(EXAMPLE B)



13

\$ 4,500,000

The student's response is correct.

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 0



13

4 45000
100

40000000
43000000

3000000

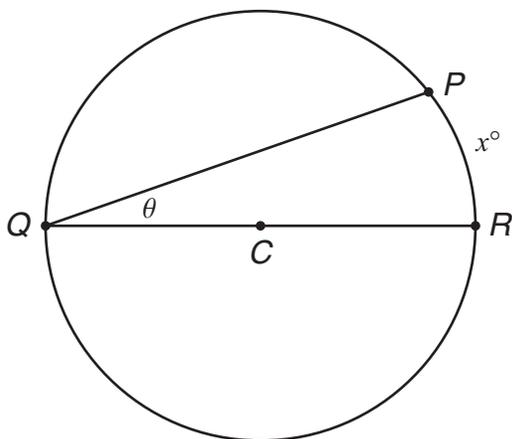
\$4,5000,000

The student's response is incorrect.

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

G&M 10.2 Makes and defends conjectures, constructs geometric arguments, uses geometric properties, or uses theorems to solve problems involving angles, lines, polygons, circles, or right triangle ratios (sine, cosine, tangent) within mathematics or across disciplines or contexts (e.g., Pythagorean Theorem, Triangle Inequality Theorem).

14 Look at circle C .



The measure of minor arc PR is x degrees. Write an expression that represents the measure, in degrees, of angle θ .

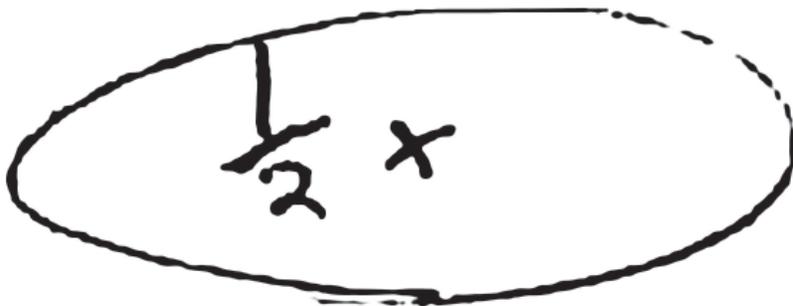
Scoring Guide:

Score	Description
1	for correct answer, $\frac{x}{2}$ 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 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1

14



The student's response is correct.

SCORE POINT 0
(EXAMPLE A)

14

$$RR = x$$

$$\text{angle } \theta = \frac{PR}{2}$$

The student's response is incorrect.

SCORE POINT 0
(EXAMPLE B)

14

$$\frac{1}{2}\theta = x^\circ$$

The student's response is incorrect.

**NECAP 2013 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.

- 15 Jeremy won the long-jump event at a track meet with a jump of 24 feet. What distance, in **meters**, did Jeremy jump? Round your answer to the nearest 0.1 meter.

[1 foot = 12 inches; 1 inch = 2.54 centimeters; 1 meter = 100 centimeters]

Scoring Guide:

Score	Description
1	for correct answer, 7.3 (meters)
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1
(EXAMPLE A)

15 $24 \text{ feet} \left(\frac{12 \text{ in}}{1 \text{ ft}} \right) \left(\frac{2.54 \text{ cm}}{1 \text{ in}} \right) \left(\frac{1 \text{ m}}{100 \text{ cm}} \right) = \boxed{7.3 \text{ m}}$ Jeremy jumped 7.3 meters.

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

SCORE POINT 1
(EXAMPLE B)

15 7.3 meters

The student's response is correct.

SCORE POINT 0
(EXAMPLE A)

15 7.31 Meters.

The student's response is incorrect.

SCORE POINT 0
(EXAMPLE B)

15 $24 \text{ ft} = 288 \text{ in}$
 $288 \text{ in} = 931.52 \text{ cm}$
 $931 = 7.3 \text{ cm}$ 7.3 cm

The student's response is incorrect. The student labeled the answer with incorrect units.

**NECAP 2013 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** Andrew uses this expression to compute his total earnings, in dollars, each week, where h represents the number of hours he worked and s represents the amount, in dollars, of his sales.

$$8h + 0.03s$$

Last week, Andrew worked 35 hours and his sales were \$5100. What were Andrew's total earnings, in dollars, last week?

Scoring Guide:

Score	Description
1	for correct answer, (\$) 433
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1
(EXAMPLE A)



16

433

The student's response is correct.

SCORE POINT 1
(EXAMPLE B)



16

$$\begin{array}{r} 435 \\ \times 8 \\ \hline 280 \end{array}$$

$$8h + 0.03s$$
$$\begin{array}{r} 280 \\ 153 \\ \hline 433 \end{array}$$

$$h = 35 \quad s = 5100$$
$$8(35) + 0.03(5100)$$
$$280 + 153$$

$$\begin{array}{r} 5100 \\ \times .03 \\ \hline 153.00 \end{array}$$

433 dollars

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

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 0



16

$8h + 0.03s$ $h = \# \text{ of hours}$ $s = \$ \text{ sale}$

$\begin{array}{r} 4 \\ 35 \\ \times 280 \\ \hline \end{array}$

$8(35) + 0.03(5100) =$
 $280 + 153000 = 153,280$

The student's response is incorrect.

NECAP 2013 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.



17 Look at this equation.

$$3(x + 6) - 5(x - 2) = 10$$

What value of x makes the equation true?

Scoring Guide:

Score	Description
1	for correct answer, 9
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1
(EXAMPLE A)



17

$$x = 9$$

The student's response is correct.

SCORE POINT 1
(EXAMPLE B)



17

$$\begin{array}{l} 3(x+6) - 5(x-2) = 10 \\ 3x + 18 - 5x + 10 = 10 \end{array} \quad \begin{array}{l} -2x + 28 = 10 \\ \underline{-28 \quad -28} \\ -2x = -18 \\ \underline{-2 \quad -2} \end{array} \quad x = \boxed{9}$$

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

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 0



17

$$3(x+6) - 5(x-2) = 10$$

$$3x + 18 - 5x - 10 = 10$$

$$-2x - 8 = 10$$

$$-2x - 8 = 10 \quad 10 = 10$$

The value of x that could make
the equation true is -9 .

The student's response is incorrect.

**NECAP 2013 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 involving understanding of the sample from which the statistics were developed.



18 This list shows the ages of 12 actors in a video.

17, 16, 20, 20, 14, 19, 16, 74, 15, 17, 18, 16

How many years older than the median age is the actor represented by the outlier of the data?

Scoring Guide:

Score	Description
1	for correct answer, 57 (years)
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1
(EXAMPLE A)



18

57

The student's response is correct.

SCORE POINT 1
(EXAMPLE B)



18

outlier: 74

~~14, 15, 16, 16, 16~~, 17, 17, 18, 19, 20, 20, 24

median = 17

$74 - 17 =$

57 years

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

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 0
(EXAMPLE A)



18

14 15 16 16 16 17 17 18 19 20 20 74

$$74 - 17 =$$

53 years

The student's response is incorrect.

SCORE POINT 0
(EXAMPLE B)



18

17 16 20 20 14 19 16 74 15 17 18 16

Y
median

55 yrs Older to 19

58 yrs Older to 16

The student's response is incorrect.

**NECAP 2013 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** This list shows the amounts, in dollars, three companies earned from sales last year.
- company X: 1.5×10^9
 - company Y: 6.4×10^8
 - company Z: 5.98×10^8
- a. Write an inequality statement that orders the amounts earned from sales from least to greatest.

Company P earned \$716 million from sales last year.

- b. Compare the amount company P earned from sales with the amounts companies X, Y, and Z earned from sales.

Scoring Guide:

Score	Description
2	for correct inequality in part a, $5.98 \times 10^8 < 6.4 \times 10^8 < 1.5 \times 10^9$ or equivalent and correct comparison in part b
1	for correct inequality in part a OR for correct comparison in part b
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 2



19

a. $5.98 \times 10^8 < 6.4 \times 10^8 < 1.5 \times 10^9$

Part a: The student's response is correct.

b. Company P earned more than companies y and z but earned less than company X.

Part b: The student's response is correct.

SCORE POINT 1



19

a.) $5.98 \times 10^8 < 6.4 \times 10^8 < 1.5 \times 10^9$

Part a: The student's response is correct.

b.) $7.16 \times 10^6 < 5.48 \times 10^7 < 6.4 \times 10^8 < 1.5 \times 10^9$
Company P Company Z Company Y Company X

Part b: The student's response is incorrect.

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 0



19

a.) 5.98×10^8
 6.4×10^8
 1.5×10^9

Part a: The student's response is incorrect. (The student did not write answer as an inequality statement.)

b.) more than company Y and company Z.

Part b: The student's response is incorrect.

**NECAP 2013 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.



- 20** On Friday, Earl drove his truck 232 miles.
- His truck gets 16 miles per gallon in the city.
 - His truck gets 20 miles per gallon on the highway.

On Friday, the truck used a total of 12 gallons of gas. The truck used c gallons of gas in the city and h gallons of gas on the highway. How many gallons of gas did Earl's truck use Friday when traveling on the highway? Show your work or explain how you know.

Scoring Guide:

Score	Description
2	for correct answer, 10 (gallons), with sufficient explanation or work shown to indicate correct strategy
1	for correct answer with insufficient or no explanation or work shown OR for appropriate 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

SCORE POINT 2



20

$$c + h = 12$$

$$16c + 20h = 232$$

$$c = 12 - h$$

$$16(12 - h) + 20h = 232$$

$$192 - 16h + 20h = 232$$

$$4h = 40$$

$$h = 10 \text{ gallons}$$

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

SCORE POINT 1



20

$$20h + 16c = 232$$

$$20h + 16(-h + 12) = 232$$

$$20h - 16h + 192 = 232$$

$$\begin{array}{r} 232 \\ -192 \\ \hline 34 \end{array}$$

$$\underline{4h = 34}$$

4

$h = 8.5$ gallons on the highway

$$h + c = 12$$

$$c = -h + 12$$

$$\begin{array}{r} 16 \\ 12 \\ \hline 38 \\ 16 \\ \hline 198 \end{array}$$

The student's response is incorrect, with sufficient work shown to indicate correct strategy.

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 0



20

$$-20h + 12 = c$$
$$\begin{array}{r} -12 \\ -12 \end{array}$$

$$\frac{20h}{20} = \frac{-12c}{-20}$$

$$h = 4$$

The student's response is incorrect.

**NECAP 2013 RELEASED ITEMS
GRADE 11 MATH**

DSP 10.4 Uses **counting techniques to solve problems** in context involving combinations or permutations using a variety of strategies (e.g., organized lists, tables, tree diagrams, models, Fundamental Counting Principle, or others).

- 21 An identification code uses the digits 1, 2, and 3.
- How many 3-digit identification codes are possible if each digit can be used only once?
 - How many 3-digit identification codes are possible if each digit can be used more than once?

Scoring Guide:

Score	Description
2	for correct answer to part a, 6 , and correct answer to part b, 27
1	for correct answer to part a OR for correct answer to part b
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 2
(EXAMPLE A)

21

A. $\underline{3} \cdot \underline{2} \cdot \underline{1} = 6$ possible codes

Part a: The student's response is correct.

B. $\underline{3} \cdot \underline{3} \cdot \underline{3} = 27$ possible codes

Part b: The student's response is correct.

SCORE POINT 2
(EXAMPLE B)

21

A-6

Part a: The student's response is correct.

B. 27

Part b: The student's response is correct.

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1
(EXAMPLE A)

21

$$^a \underline{123 \quad 132 \quad 213 \quad 231 \quad 321 \quad 312}$$

111	112	113	121	122	123	131	132	133	211	212	213	221	222	223	231	232	233
A-6																	
B-26									311 312 313 321 322 323 331 332 333								

Part a: The student's response is correct.

Part b: The student's response is incorrect.

SCORE POINT 1
(EXAMPLE B)

21

$$3 \cdot 3 = 9$$

A) 9

Part a: The student's response is incorrect.

B) $3 \cdot 3 \cdot 3 = 27$

Part b: The student's response is correct.

SCORE POINT 0

21

$$a) 3 \times 3 = 9 \text{ codes}$$

Part a: The student's response is incorrect.

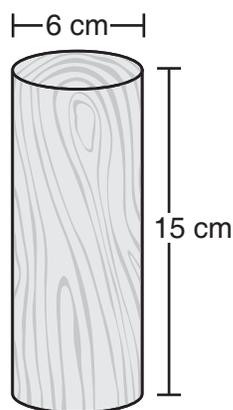
$$b) 9 \times 9 \times 9 = 729 \text{ codes}$$

Part b: The student's response is incorrect.

NECAP 2013 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.

- 22 Rachel is using this solid piece of wood to make a toy. The piece of wood is in the shape of a cylinder.



- What is the area, in square centimeters, of the base of the cylinder? Write your answer in terms of π .
- What is the volume, in cubic centimeters, of the cylinder? Write your answer in terms of π .

Rachel will drill a hole straight through the center of the base. The diameter of the hole she drills will be equal to one-half the diameter of the original cylinder.

- What fraction of the original volume will **remain** after Rachel drills the hole? 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

**NECAP 2013 RELEASED ITEMS
GRADE 11 MATH**

Training Notes:

Part a: 1 point for correct area, 9π (square centimeters)

Part b: 1 point for correct volume, 135π (cubic centimeters)

Part c: 2 points for correct answer, $\frac{3}{4}$, or **equivalent**, 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

Do not penalize twice for incorrect units.

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 4
(EXAMPLE A)

22

a. $9\pi \text{ cm}^2$

Part a: The student's response is correct.

b. $V = 9\pi$

Part b: The student's response is correct.

$V = 135\pi \text{ cm}^3$



$$\begin{aligned} & \times 1.5^2 = 2.25 \text{ cm}^2 \\ & \times \frac{15}{33.75\pi \text{ cm}^3} \end{aligned}$$

$$\frac{1}{4} = \frac{33.75\pi}{135\pi}$$

$\frac{3}{4}$ OF
the original
VOLUME will
remain

Part c: The student's response is correct,
with sufficient work shown.

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 4
(EXAMPLE B)

22

$$a.) B = 9\pi$$

Part a: The student's response is correct.

$$b.) V = 135\pi$$

Part b: The student's response is correct.

$$c.) \left(\frac{3}{2}\right)^2 \pi = (2.25\pi) 15 = 33.75\pi$$

$$135\pi - 33.75\pi = 101.25\pi$$

$$\frac{\cancel{101.25\pi}}{\cancel{135\pi}} = \left(\frac{3}{4}\right)^{\text{left}}$$

Part c: The student's response is correct,
with sufficient work shown.

22

$$\begin{aligned} a.) \quad A &= \pi r^2 \\ A &= \pi 3^2 \\ A &= 9\pi \text{ cm} \end{aligned}$$

Part a: The student's response is correct.
(Penalized for incorrect units.)

$$\begin{aligned} b.) \quad V &= b \cdot h \\ V &= 9\pi \cdot 15 \text{ cm} \\ V &= 135\pi \text{ cm}^3 \end{aligned}$$

Part b: The student's response is correct.

$$\begin{aligned} c.) \quad \text{hole} &= & V &= b \cdot h \\ A &= \pi 1.5^2 & V &= 2.25\pi \cdot 15 \\ A &= \pi 2.25 \text{ cm} & V &= 33.75\pi \text{ cm}^3 \end{aligned}$$

Part c: The student's response is correct,
with sufficient work shown.

$$\frac{33.75\pi \text{ cm}^3}{135\pi \text{ cm}^3} = \frac{1}{4} = \text{hole}$$

$\frac{3}{4}$ of the original volume will remain
after Rachel drills a hole.

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 2

22

$$\begin{aligned} (a) \quad A &= \pi r^2 \\ &= (3^2)\pi \\ &= 9\pi \text{ cm}^2 \end{aligned}$$

Part a: The student's response is correct.
(Showing work is not required.)

$$\begin{aligned} (b) \quad V &= Bh \\ V &= 9\pi(15) \\ V &= 135\pi \text{ cm}^3 \end{aligned}$$

Part b: The student's response is correct.
(Showing work is not required.)

(c)  $V_{\text{new hole}} =$

$$\begin{aligned} A &= 1.5^2 \pi \\ A &= 2.25\pi \text{ cm}^2 \\ V &= 2.25\pi(15) \\ &= 33.75\pi \text{ cm}^3 \end{aligned}$$
$$135\pi \text{ cm}^3 - 33.75\pi \text{ cm}^3 = \boxed{101.25\pi \text{ cm}^3}$$

Part c: The student's response is incorrect,
with incomplete strategy.

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1

22

a.) 225π

Part a: The student's response is incorrect.

b.) 135π

Part b: The student's response is correct.

c.) $\frac{1}{4}$

Part c: The student's response is incorrect,
with no explanation or work shown.

33.75

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 0

22

$$\begin{aligned} \text{a). } A &= 6\pi \cdot 15 \\ A &= 90\pi \text{ cm} \end{aligned}$$

Part a: The student's response is incorrect.

$$\text{b). } V = 90\pi \text{ cm}$$

Part b: The student's response is incorrect.

$$\begin{aligned} \text{c). } A &= 3\pi \cdot 15 \\ A &= 45\pi \end{aligned}$$

Part c: The student's response is incorrect.

$$90\pi - 45\pi = 45\pi \text{ remaining}$$

$\frac{1}{2}$ will remain after the hole is drilled.

**NECAP 2013 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 Glen made this table to represent a linear function.

x	$y = f(x)$
0	-2
1	0
2	2
3	4

- a. What is the y -intercept of Glen's function?

Stacy wrote this equation to represent a different linear function.

$$g(x) = 3x + 12$$

- b. What is the x -intercept of Stacy's function? Show your work or explain how you know.

Glen and Stacy will each graph their linear functions on the same coordinate plane.

- c. Who will graph the steeper line, Glen or Stacy? Show your work or explain how you know.

**NECAP 2013 RELEASED ITEMS
GRADE 11 MATH**

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, **-2**

Part b: 2 points for correct answer, **-4**, 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: 1 point for correct answer, **Stacy**, with sufficient explanation or work shown to indicate correct strategy

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 4



23

a) $y = +2$

Part a: The student's response is correct.

b) $0 = 3x + 12$

$x = -4$

Part b: The student's response is correct, with sufficient work shown.

c) m of Glens graph: 2

m of Stacy's graph: 3

Part c: The student's response is correct, with sufficient explanation given.

$3 > 2$ Stacy's graph will have a steeper line because it has a steeper slope.

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 3
(EXAMPLE A)



23

a. -2

Part a: The student's response is correct.

b. $0 = 3x + 12$

$$12 = 3x$$

$$4 = x$$

Part b: The student's strategy is appropriate, with incorrect answer.

c. stacy slope = 3

gen slope = 2

~~stacy steeper~~

Part c: The student's response is correct, with sufficient explanation given.

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 3
(EXAMPLE B)



23

a. $(0, -2) = y\text{-intercept}$

Part a: The student's response is correct.

b. $g(x) = 3x + 12$, $-12 = 3x + 12$

Part b: The student's response is correct, with sufficient work shown.

$$\begin{array}{r} -12 = 3x + 12 \\ \hline -12 - 12 = 3x + 12 - 12 \\ -24 = 3x \\ \hline -8 = x \end{array}$$

$x\text{-intercept} = (-8, 0)$

c.) $\frac{-2}{1} = \text{Glen}$

$\frac{12}{-4} = -3 = \text{stacy}$

stacy because her slope is a larger number and has a higher "rise" hence the steepness

Part c: The student's explanation is incorrect.

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 2



23

$$a.) m = \frac{42-4}{x_2-x_1} \quad m = \frac{-2-0}{0-1} \quad m = 2/1 \quad m = 2$$

$$y = mx + b$$
$$-2 = (2)0 + b$$
$$\boxed{-2 = b}$$

Part a: The student's response is correct.

$$b.) y = 3(0) + 12$$
$$\boxed{g(x) = 12}$$

Part b: The student's response is incorrect, with insufficient work shown.

c.) Stacy's because her slope is 3
and Ellen's slope is 2.

Part c: The student's response is correct, with sufficient explanation given.

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 1
(EXAMPLE A)



23

a.) the y-intercept of Glen's function is $(1, 0)$

Part a: The student's response is incorrect.

b. $x=0$ $f(0) = 12 \rightarrow 12$

The x-intercept of Stacy's function is $(0, 12)$

Part b: The student's response is incorrect, with insufficient work shown.

c. Glen's slope = 2 Stacy's slope = 3

Stacy will have the "steeper" graph because her slope is greater than Glen's

Part c: The student's response is correct, with sufficient explanation given.



23

A. the y intercept is -2

Part a: The student's response is correct.

B. the x intercept is $3x$ because the 3 has an x after it which means it's in the x intercept.

Part b: The student's response is incorrect, with insufficient explanation given.

C. Stacy will graph the steeper line because Stacy has more larger numbers than Glen.

Part c: The student's explanation is incorrect.

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 0
(EXAMPLE A)



23

x	$y = f(x)$
0	-2
1	0
2	2
3	4

A.) 2

Part a: The student's response is incorrect.

$$g(x) = 3x + 12$$

x	$y = g(x)$
0	12
1	15
-1	9

B.) 0

Part b: The student's response is incorrect, with insufficient work shown.

C) Stacy's will be steeper because her's would be a vertical line on a coordinate plane.

Part c: The student's explanation is incorrect.

NECAP 2013 RELEASED ITEMS
GRADE 11 MATH

SCORE POINT 0
(EXAMPLE B)



23

a) $-2, 0, 2, 4$

Part a: The student's response is incorrect.

b) $x = 4$

Part b: The student's response is incorrect, with no work shown or explanation given.

c) Stacy's because her y intercept is greater.

Part c: The student's explanation is incorrect.

Grade 11 Mathematics Released Item Information – 2013

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