



**NEW ENGLAND
COMMON ASSESSMENT PROGRAM**

**Released Items
Support Materials
2013**

**Grade 8
Mathematics**

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

N&O 7.1 Demonstrates conceptual understanding of rational numbers with respect to percents as a means of comparing the same or different parts of the whole when the wholes vary in magnitude (e.g., 8 girls in a classroom of 16 students compared to 8 girls in a classroom of 20 students, or 20% of 400 compared to 50% of 100); and percents as a way of expressing multiples of a number (e.g., 200% of 50) using models, explanations, or other representations.



- 1 A puppy weighs 8 pounds. Its weight when full-grown is expected to be 600% of its current weight. How much is the puppy expected to weigh when it is full-grown?
- A. 14 pounds
 - B. 48 pounds
 - C. 56 pounds
 - D. 75 pounds

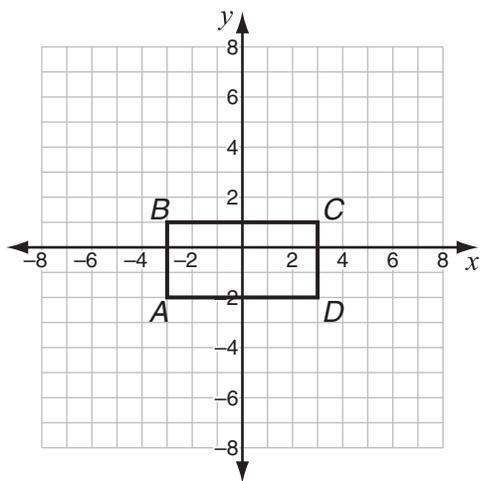
N&O 7.4 Accurately solves problems involving proportional reasoning; percents involving discounts, tax, or tips; and rates. (IMPORTANT: Applies the conventions of order of operations including parentheses, brackets, or exponents.)

- 2 The ratio of child to teen to adult tickets sold at a water park on Saturday was 4:1:2. A total of 294 tickets were sold. How many child tickets were sold?
- A. 42
 - B. 84
 - C. 168
 - D. 221

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

G&M 7.4 Applies the concepts of congruency by solving problems on a coordinate plane involving reflections, translations, or rotations.

3 Look at this diagram.



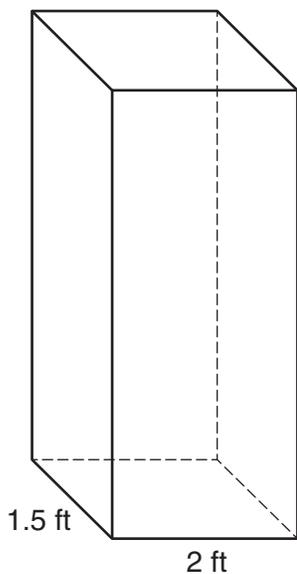
Rectangle $ABCD$ is rotated 90° clockwise about point D . What are the coordinates of the image of point A ?

- A. $(-3, -4)$
- B. $(-3, 4)$
- C. $(-3, -8)$
- D. $(3, 4)$

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

G&M 7.6 Demonstrates conceptual understanding of the area of circles or the area or perimeter of composite figures (quadrilaterals, triangles, or parts of circles), and the surface area of rectangular prisms, or volume of rectangular prisms, triangular prisms, or cylinders using models, formulas, or by solving related problems. Expresses all measures using appropriate units.

- 4 This rectangular prism has a volume of 12 cubic feet.



not drawn to scale

What is the surface area of the rectangular prism?

- A. 12 square feet
- B. 17 square feet
- C. 28 square feet
- D. 34 square feet

**NECAP 2013 RELEASED ITEMS
GRADE 8 MATH**

F&A 7.1 Identifies and extends to specific cases a variety of patterns (linear and nonlinear) represented in models, tables, sequences, graphs, or in problem situations; **and generalizes** linear relationship using words and symbols; generalizes a linear relationship to find a specific case; or writes an expression or equation using words or symbols to express the **generalization** of a nonlinear relationship.

- 5 This table shows the total cost of CDs for members of a CD club.

Number of CDs Bought	Total Cost (dollars)
1	2
2	9
3	16
4	23
⋮	⋮

According to the table, what would be the total cost, in dollars, of 8 CDs?

- A. 30
- B. 46
- C. 51
- D. 58

**NECAP 2013 RELEASED ITEMS
GRADE 8 MATH**

F&A 7.1 Identifies and extends to specific cases a variety of patterns (linear and nonlinear) represented in models, tables, sequences, graphs, or in problem situations; **and generalizes** linear relationship using words and symbols; generalizes a linear relationship to find a specific case; or writes an expression or equation using words or symbols to express the **generalization** of a nonlinear relationship.

- 6 This table shows the total cost for different numbers of sweatshirts.

Number of Sweatshirts	Total Cost
1	\$17.50
2	\$25.00
3	\$32.50
4	\$40.00
5	\$47.50
6	\$55.00

Based on information in this table, how is the cost of 12 sweatshirts determined?

- A. Multiply \$17.50 by 12.
- B. Multiply \$55.00 by 2.
- C. Multiply \$7.50 by 12 and subtract \$10.00.
- D. Multiply \$7.50 by 12 and add \$10.00.

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

F&A 7.3 Demonstrates conceptual understanding of algebraic expressions by using letters to represent unknown quantities to write algebraic expressions (including those with whole number exponents or more than one variable); or by evaluating algebraic expressions (including those with whole number exponents or more than one variable); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y = 5x^3 - 2$).



- 7 What is the value of y when $y = 2x^3 - 10$ and $x = -5$?
- A. -1010
 - B. -990
 - C. -260
 - D. -40

F&A 7.3 Demonstrates conceptual understanding of algebraic expressions by using letters to represent unknown quantities to write algebraic expressions (including those with whole number exponents or more than one variable); or by evaluating algebraic expressions (including those with whole number exponents or more than one variable); or by evaluating an expression within an equation (e.g., determine the value of y when $x = 4$ given $y = 5x^3 - 2$).



- 8 This formula can be used to determine d , the distance in meters an object falls in t seconds.

$$d = \frac{1}{2}(9.8)t^2$$

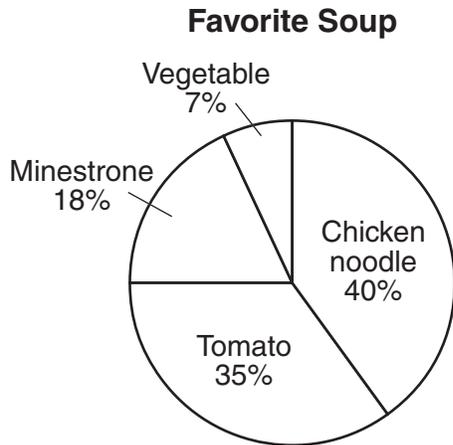
What distance will an object fall in 10 seconds?

- A. 245 meters
- B. 490 meters
- C. 2401 meters
- D. 4802 meters

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

DSP 7.1 **Interprets a given representation** (circle graphs, scatter plots that represent discrete linear relationships, or histograms) to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems. (IMPORTANT: *Analyzes data consistent with concepts and skills in DSP 7.2.*)

- 9 This circle graph shows the results of a survey about favorite soups.



A total of 300 people were surveyed. How many more people chose chicken noodle soup than chose tomato soup?

- A. 5
- B. 15
- C. 40
- D. 75

**NECAP 2013 RELEASED ITEMS
GRADE 8 MATH**

DSP 7.5 For a probability event in which the sample space may or may not contain equally likely outcomes, determines the experimental or theoretical probability of an event in a problem-solving situation.

- 10 This table shows the types of movies that some students prefer.

Movie Preferences

	Action	Comedy	Drama	Thriller
Boys	6	5	1	5
Girls	5	7	3	3

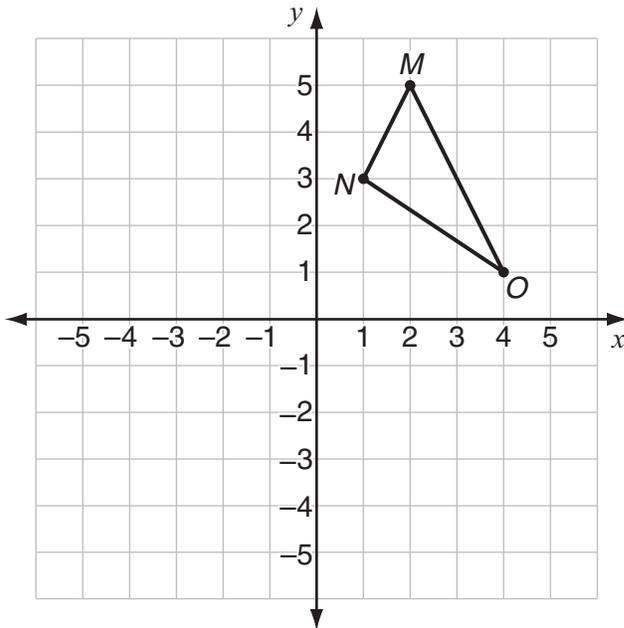
Given that a student prefers comedy, what is the probability that the student is a boy?

- A. $\frac{1}{7}$
- B. $\frac{5}{17}$
- C. $\frac{5}{12}$
- D. $\frac{5}{7}$

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

G&M 7.4 Applies the concepts of congruency by solving problems on a coordinate plane involving reflections, translations, or rotations.

- 11 Look at triangle MNO on this coordinate grid.



Triangle MNO is reflected across the y -axis to form triangle $M'N'O'$. Then triangle $M'N'O'$ is reflected across the x -axis to form triangle $M''N''O''$. After the two reflections, what are the coordinates for vertex M'' ?

Scoring Guide:

Score	Description
1	for correct answer, $(-2, -5)$
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 8 MATH

SCORE POINT 1
(EXAMPLE A)

11

$(-2, -5)$

The student's response is correct.

SCORE POINT 1
(EXAMPLE B)

11

$M(2,5) N(1,3) O(4,1) \quad M'(-2,5) N(-1,3) O(-4,1)$
 $M''(-2,-5) N''(-1,-3) O''(-4,-1) \quad M'' \text{ is } (-2,-5) \leftarrow \text{answer}$

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

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 0
(EXAMPLE A)

11

$$M' = (-2, 5)$$

The student's response is incorrect.

SCORE POINT 0
(EXAMPLE B)

11

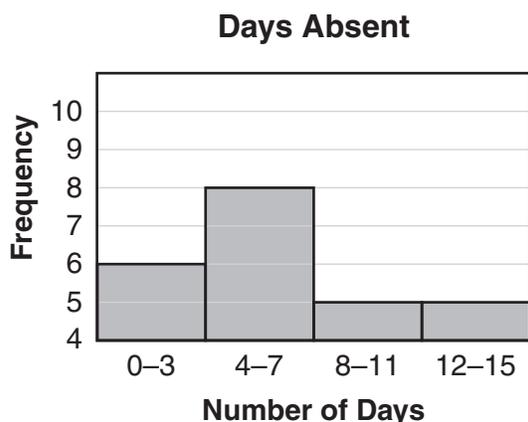
$$(-2, 5) \quad (-1, -3) \quad (-4, -1)$$

The student's response is incorrect.
(The student does not label the vertices.)

**NECAP 2013 RELEASED ITEMS
GRADE 8 MATH**

DSP 7.3 Identifies or describes representations or elements of representations that best display a given set of data or situation, consistent with the representations required in DSP 7.1.

- 12 A teacher recorded the number of days each student in a class was absent during a school year. A student in the class made this histogram to display the teacher's data.



Kevin said that the number of students absent 4 to 7 days is twice the number of students absent 0 to 3 days because the bar is twice as tall. Jill said Kevin was incorrect because 8 students were absent 4 to 7 days and 6 students were absent 0 to 3 days.

Explain why Kevin was misled by the histogram.

Scoring Guide:

Score	Description
1	for a correct explanation that the graph is misleading because the vertical scale does not start at 0, 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 8 MATH

SCORE POINT 1
(EXAMPLE A)

12

Kevin was misled by the histogram because the frequency, or y axis, starts at 4 instead of 0.

The student's explanation is sufficient.

SCORE POINT 1
(EXAMPLE B)

12

Kevin was misled by the histogram because the frequency starts at 4. If the histogram started at 0, then it would show that it is not half.

The student's explanation is sufficient.

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 0
(EXAMPLE A)

12

Because 2 bars were colored in for the 0-3 days absent, and 4 were filled in for the 4-7, which is twice the amount.

The student's explanation is incorrect.

SCORE POINT 0
(EXAMPLE B)

12

He was mistaken because, of the way the frequency was set up.

The student's explanation is insufficient.

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

N&O 7.2 Demonstrates understanding of the relative magnitude of numbers by ordering, comparing, or identifying equivalent rational numbers across number formats, numbers with whole number cases and whole number exponents (e.g., 3^3 , 4^3), integers, absolute values, or numbers represented in scientific notation using number lines or equality and inequality symbols.



13 Look at this number line.



- a. What point on the number line shows the location of $\frac{4}{5}$?
- b. What point on the number line shows the location of $\frac{5}{8}$?

Scoring Guide:

Score	Description
2	for correct answer in part a, U , and in part b, T
1	for correct answer in part a OR for correct answer 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 8 MATH

SCORE POINT 2
(EXAMPLE A)



13

a. U

Part a: The student's response is correct.

B. T

Part b: The student's response is correct.

SCORE POINT 2
(EXAMPLE B)



13

a. Point U represents $\frac{4}{5}$

b. Point T represents $\frac{5}{8}$

Part a: The student's response is correct.

Part b: The student's response is correct.

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 1



13

a. Point R

Part a: The student's response is incorrect.

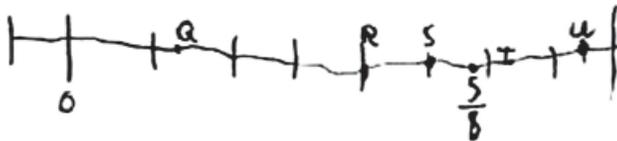
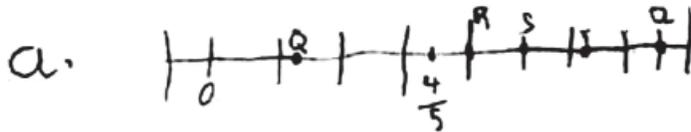
B. Point T

Part b: The student's response is correct.

SCORE POINT 0



13



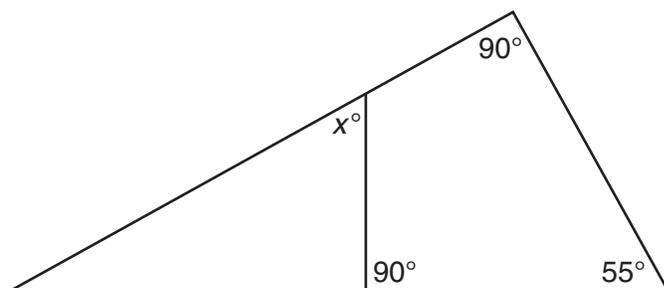
Part a: The student's response is incorrect.

Part b: The student's response is incorrect.

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

G&M 7.5 Applies concepts of similarity by solving problems involving scaling up or down and their impact on angle measures, linear dimensions and areas of polygons, and circles when the linear dimensions are multiplied by a constant factor. Describes effects using models or explanations.

- 14 Look at this diagram.



What is the value of x ? Show your work or explain how you know.

Scoring Guide:

Score	Description
2	for correct answer, $55(^{\circ})$, 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

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 2
(EXAMPLE A)

14

$90 + 90 = 180$
 $180 - 125 = 55$
 $180 - 90 = 90$

$x = 55^\circ$

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

SCORE POINT 2
(EXAMPLE B)

14

All angles of a triangle add up to 180° . First, subtract 90° and 55° from 180° , to get 35° , the measure of the 3rd angle. 90° and the angle to its left, make a straight line (180°). $180^\circ - 90^\circ = 90^\circ$. Add 35° and 90° . This equals 125° . Subtract 125° from 180° . This equals 55° .

$x = 55^\circ$

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

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 1
(EXAMPLE A)

14

The value of x is 55°

The student's response is correct,
with no explanation or work shown.

SCORE POINT 1
(EXAMPLE B)

14

$x = 55^\circ$
The value of x is 55° because
the angle of x is congruent to the angle
of 55° degrees.

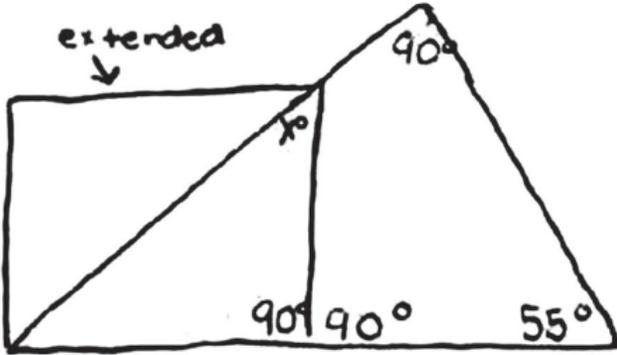


The student's response is correct,
with insufficient explanation given.

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 0

14



$x = 45^\circ$ because when the triangle is extended it forms a rectangle with 90° sides. x is half of one or 45° .

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

**NECAP 2013 RELEASED ITEMS
GRADE 8 MATH**

F&A 7.4 Demonstrates conceptual understanding of equality by showing equivalence between two expressions (expressions consistent with the parameters of the left- and right-hand sides of the equations being solved at this grade level) using models or different representations of the expressions, solving multi-step linear equations of the form $ax \pm b = c$ with $a \neq 0$, $ax \pm b = cx \pm d$ with $a, c \neq 0$, and $(x/a) \pm b = c$ with $a \neq 0$, where a, b, c and d are whole numbers; or by translating a problem-solving situation into an equation consistent with the parameters of the type of equations being solved for this grade level.

- 15 Diana makes bracelets to sell at a craft fair. She sells the bracelets for \$5.00 each.
- a. Write an expression to represent Diana's total sales, in dollars, for selling b bracelets.

It costs Diana \$1.00 for materials to make each bracelet. She rents a space at the craft fair for the whole season for \$75.

- b. Write an equation that can be used to calculate the amount of profit, p , Diana earns at the end of the season for selling b bracelets. Be sure to use both p and b in your equation.
[profit = total sales – total expenses]

Diana has a goal to make a profit of \$325 for the whole season.

- c. Use your equation from part b to find the number of bracelets Diana must sell to meet her goal. Show your work or explain how you know.

**NECAP 2013 RELEASED ITEMS
GRADE 8 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, **5b**

Part b: 1 point for correct answer, **$p = 4b - 75$** , or **equivalent**

Part c: 2 points for correct answer, **100**, with sufficient explanation or work shown to indicate correct strategy
OR

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

Note: Do not penalize student for failure to explicitly use equation from part b to solve part c.

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 4

15

a. $(\$5.00)b$

Part a: The student's response is correct.

b. $p = (5 - 1)b - 75$

Part b: The student's response is correct.

c. She must sell
100 bracelets

$$\begin{aligned} p &= (5-1)b - 75 \\ 325 &= 4b - 75 \\ \frac{400}{4} &= \frac{4b}{4} \\ 100 &= b \end{aligned}$$

$$325 = (5-1)100 - 75$$

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

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 3
(EXAMPLE B)

15

a. $5b$

b. $p = 5b + 75$

c. $325 = 5b + 75$
 $\underline{-75} \quad \underline{-75}$

$\frac{250}{5} = \frac{5b}{5}$

$50 = b$

she sold 50 bracelets

Part a: The student's response is correct.

Part b: The student's response is incorrect.

Part c: The student's response is correct based on the answer to part b, with sufficient work shown.

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 2

15

a. $5 \cdot b$

Part a: The student's response is correct.

b. $5b - 76 = P$

Part b: The student's response is incorrect.

c. She needs to sell 100

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

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 1

15

a

$$5.00(b)$$

Part a: The student's response is correct.

b

$$5.00(b) - 76.00 = p$$

Part b: The student's response is incorrect.

$$5.00(81) - 76.00 = p$$

$$4105 - 76.00 = p$$

$$329 = p$$

She must sell
4105 bracelets

Part c: The student's response is incorrect.

NECAP 2013 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 0

15

$$A. \$5.00 + b$$

Part a: The student's response is incorrect.

$$B. b \div \$ = p$$

Part b: The student's response is incorrect.

$$C. 6 \cdot p = \cancel{\$}325$$

Part c: The student's response is incorrect.

Grade 8 Mathematics Released Item Information – 2013

Released Item Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
No Tools Allowed	✓						✓	✓					✓		
Content Strand ¹	NO	NO	GM	GM	FA	FA	FA	FA	DP	DP	GM	DP	NO	GM	FA
GLE Code	7-1	7-4	7-4	7-6	7-1	7-1	7-3	7-3	7-1	7-5	7-4	7-3	7-2	7-5	7-4
Depth of Knowledge Code	2	2	2	3	2	2	1	2	2	2	2	2	2	2	2
Item Type ²	MC	SA	SA	SA	SA	CR									
Answer Key	B	C	D	D	C	D	C	B	B	C					
Total Possible Points	1	1	1	1	1	1	1	1	1	1	1	1	2	2	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