



**NEW ENGLAND
COMMON ASSESSMENT PROGRAM**

**Released Items
Support Materials
2012**

**Grade 8
Mathematics**

NECAP 2012 RELEASED ITEMS
GRADE 8 MATH

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.*)



- 1 Vera's lunch cost \$9.00. She left a tip worth 15% of the cost of her lunch. What is the total amount, including the tip, Vera paid for her lunch?
- A. \$ 9.15
 - B. \$ 9.35
 - C. \$10.15
 - D. \$10.35

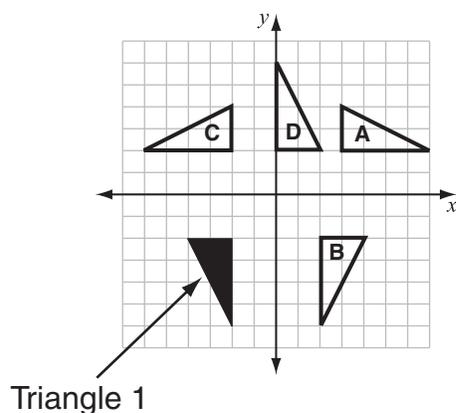
G&M 7.2 Applies theorems or relationships (triangle inequality or sum of the measures of interior angles of regular polygons) to solve problems.

- 2 The measure of each of the smaller angles of a parallelogram is 30° . What is the measure of each of the larger angles?
- A. 30°
 - B. 60°
 - C. 150°
 - D. 165°

NECAP 2012 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.



Which triangle is the image of Triangle 1 after it is rotated 90 degrees clockwise about the origin?

- A. Triangle A
- B. Triangle B
- C. Triangle C
- D. Triangle D

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 A round clock on a classroom wall has a diameter of 12 inches. What is the approximate area of the clock?

- A. 38 square inches
- B. 113 square inches
- C. 226 square inches
- D. 452 square inches

NECAP 2012 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 Look at this pattern.

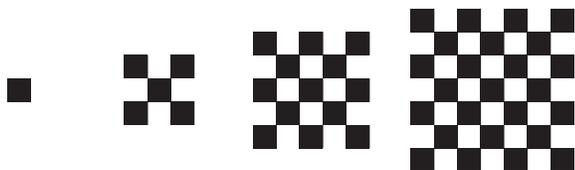


Figure 1 Figure 2 Figure 3 Figure 4

If the pattern continues, how many black tiles will be in Figure 7?

- A. 36
- B. 41
- C. 81
- D. 85

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 $y = 5x^3 - 2$).



6 What is the value of the expression below when $x = \frac{1}{2}$ and $y = 5$?

$$10x(y - 2)^2$$

- A. 45
- B. 30
- C. 21
- D. 5

NECAP 2012 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.

7 A cart loaded with 12 boxes weighs a total of 200 pounds.

- The empty cart weighs 25 pounds.
- Each box weighs x pounds.

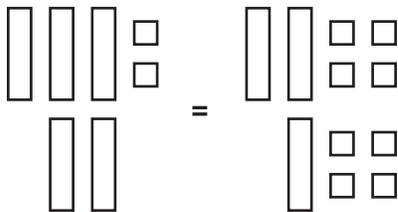
Which equation can be used to find the weight of one box?

- A. $12x + 25 = 200$
- B. $12 + 25x = 200$
- C. $12x + 25x = 200$
- D. $12 + 25 + x = 200$

**NECAP 2012 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.

- 8 Sam used algebra tiles to make this model of an equation.



Based on Sam's equation, which statement is true?

- A. =
- B. =
- C. =
- D. =

NECAP 2012 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 The students in an eighth-grade class voted for a class trip. Each student voted once. This circle graph shows the results.

Eighth-Grade Class Trip



A total of 150 students in the eighth-grade class voted. What is the best estimate of the number of students who voted for the ball game?

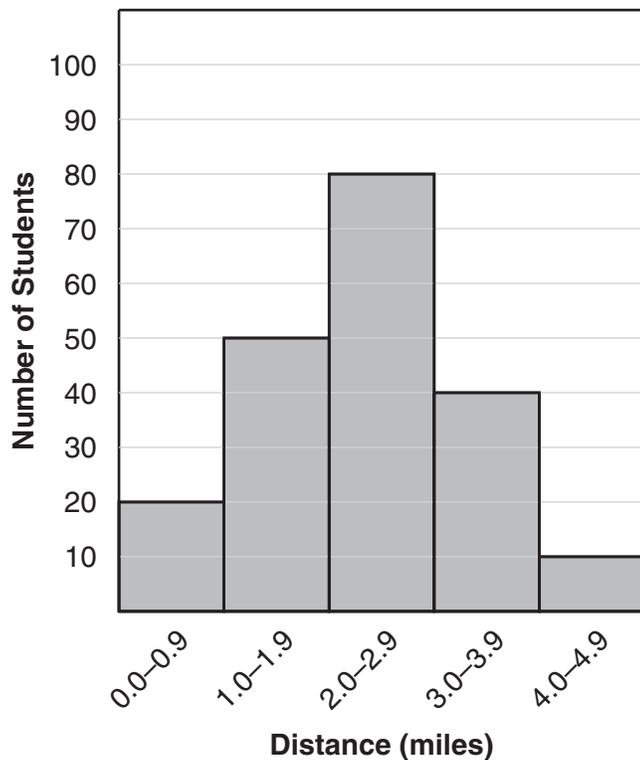
- A. 10
- B. 30
- C. 50
- D. 80

NECAP 2012 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.*)

- 10 This histogram shows the distances, to the nearest tenth of a mile, 8th-grade students live from Pennsville School.

Distances from Pennsville School



What fraction of 8th-grade students lives less than 3 miles from Pennsville School?

- A. $\frac{2}{5}$
B. $\frac{3}{5}$
C. $\frac{3}{4}$
D. $\frac{19}{20}$

**NECAP 2012 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 $y = 5x^3 - 2$).

11 Seth buys x packages and y boxes of pencils.

- Each package contains 2 pencils.
- Each box contains 6 pencils.

Write an expression that represents the total number of pencils Seth buys.

Scoring Guide:

Score	Description
1	for correct answer, $2x + 6y$, 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 2012 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 1

11

$$2x + 6y$$

The student's response is correct.

SCORE POINT 0
(EXAMPLE A)

11

$$x = 2 \quad y = 6$$

The student's response is incorrect.

SCORE POINT 0
(EXAMPLE B)

11

$$x \cdot y = 12 \text{ pencils}$$

The student's response is incorrect.

**NECAP 2012 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.

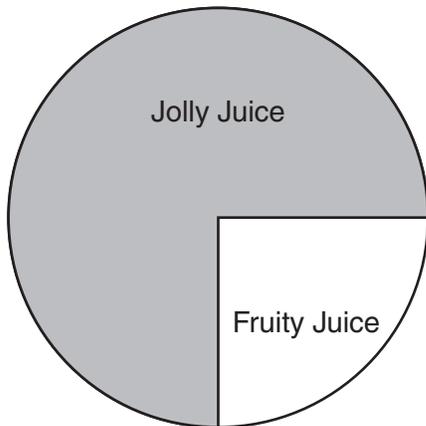
- 12 This table shows the results of a survey in which people tasted three brands of juice and selected the brand they liked best.

Juice Survey Results

Brand	Percent of People Who Liked It Best
Jolly Juice	60%
Lucy Juice	20%
Fruity Juice	20%

The Jolly Juice Company used this circle graph to show that 3 times as many people liked Jolly Juice best as liked Fruity Juice best.

Juice Survey Results



Explain why the circle graph is misleading.

Scoring Guide:

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

NECAP 2012 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 1

12

This graph is misleading because it doesn't show the Lucy Juice results, and the portions of the Jolly Juice and Fruity Juice are incorrect.

The student's response is correct.

SCORE POINT 0

12

It is misleading because that would mean 70% like Jolly Juice and 30% like Fruity Juice.

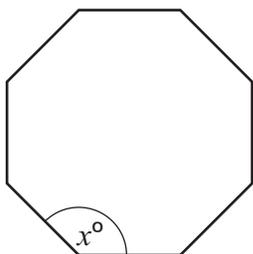
The student's response is incorrect.

NECAP 2012 RELEASED ITEMS
GRADE 8 MATH

G&M 7.2 Applies theorems or relationships (triangle inequality or sum of the measures of interior angles of regular polygons) to solve problems.



- 13 Look at this regular octagon.



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

Scoring Guide:

Score	Description
2	for correct answer, 135 , with sufficient explanation or work shown to indicate correct strategy
1	for correct answer with insufficient 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 2012 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 2
(EXAMPLE A)

13 The value of x is 135° because for an 8 sided polygon, the sum of the interior angle measures is $180(8-2)$ which is 1,080 divided by 8 is 135° .

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

SCORE POINT 2
(EXAMPLE B)

13 Sum of angles = $180(8-2) = 180(6) = 1080$
 $\frac{1080}{8} = 135^\circ$ $x = 135^\circ$

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

SCORE POINT 1
(EXAMPLE A)

13 $x = 135^\circ$

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

NECAP 2012 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 1
(EXAMPLE B)

13

$$\begin{array}{r} 4180 \\ \times 6 \\ \hline 1080 \end{array}$$

$$\begin{array}{r} 125 \\ 8 \overline{)10800} \\ \underline{-3} \\ 20 \\ \underline{-16} \\ 40 \end{array}$$

$x = 125^\circ$

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

SCORE POINT 0
(EXAMPLE A)

13

Each angle must be the same value, it is an octagon with 8 sides.

$x^\circ = 180^\circ$

$$\begin{array}{r} 180 \\ 8 \overline{)1440} \\ \underline{1440} \\ 0000 \end{array}$$

$$\begin{array}{r} 180 \\ 6 \overline{)180} \\ \underline{180} \\ 0 \end{array}$$

The student's response is incorrect.

SCORE POINT 0
(EXAMPLE B)

13

Sum of Angle measures in polygon formula:

$$180(8-2) = 1,080^\circ = x^\circ$$

$$\begin{array}{r} 180 \\ \times 6 \\ \hline 1080 \end{array}$$

The student's response is incorrect.

**NECAP 2012 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 $y = 5x^3 - 2$).

- 14** A carpenter needs 14 feet of wood to build a frame for each window in a house. The carpenter also needs 17 feet of wood to build a frame for each doorway in the house. The house has w windows and d doorways.
- a. How much wood, in feet, does the carpenter need to build frames for a house with 8 windows and 10 doorways?

 - b. Write an algebraic expression, in terms of w and d , to represent the total number of feet of wood the carpenter needs to build frames for w windows and d doorways in the house.

Scoring Guide:

Score	Description
2	for correct answer in part a, 282 (feet), and part b, $14w + 17d$ or equivalent
1	for correct answer in part a only OR for correct answer in part b only OR for correct answer in part b based on incorrect expression 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 2012 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 2
(EXAMPLE A)

14

(A) ① 112 feet for windows
② 170 feet for doorways

(B) $W \times 14 + D \times 17 = F$

Part a: The student's response is correct.

Part b: The student's response is correct.

SCORE POINT 2
(EXAMPLE B)

14

A: 282 ft.

$BHW + 17D$

Part a: The student's response is correct.

Part b: The student's response is correct.

NECAP 2012 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 1
(EXAMPLE A)

14

$$\begin{array}{r} 314 \\ \cdot 8 \\ \hline 2472 \end{array}$$

$$\begin{array}{r} 170 \\ + 242 \\ \hline 412 \end{array}$$

a. 412 feet

b. $14w + 17d$

Part a: The student's response is incorrect.

Part b: The student's response is correct.

SCORE POINT 1
(EXAMPLE B)

14

$$2 \cdot (8 \cdot 14) + (17 \cdot 10) =$$

$$112 + 170 = 282 \text{ ft}$$

$$b \{ (w \cdot 8) + (d \cdot 10) \} = S$$

Part a: The student's response is correct.

Part b: The student's response is incorrect.

SCORE POINT 0

14

A) 14 feet of wood
17 feet of wood

$$\begin{array}{r} 14 \\ 17 \\ \hline 31 \text{ feet} \end{array}$$

B) $wd + f$

Part a: The student's response is incorrect.

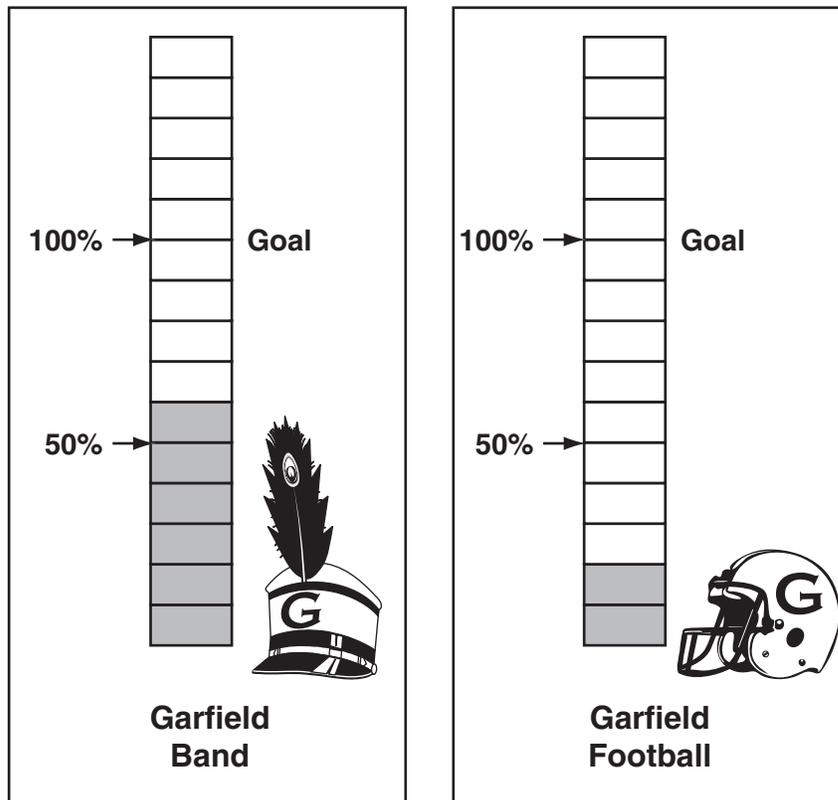
Part b: The student's response is incorrect.

NECAP 2012 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.



- 15 At Garfield High School, the band was raising money for new uniforms. At the same time, the football team was raising money for lights for the field. The number of shaded-gray bars in each of these posters represents the amount of money the group had raised toward its goal after one month.



The band's goal is to raise \$5000.

- a. The six shaded-gray bars represent the amount the band had raised after one month. How much money, in dollars, did the band raise after one month?

At the time the posters were made, the two groups had raised the same amount of money in dollars.

- b. What was the goal, in dollars, of the football team? Show your work or explain how you know.

By the end of the fund-raisers, band members had raised a total of 130% of their goal. They used \$5000 to buy uniforms. The band members gave the remaining money to the football team.

- c. How many bars can be shaded gray on the football poster to represent the amount of money the band gave to the football team? Show your work or explain how you know.

**NECAP 2012 RELEASED ITEMS
GRADE 8 MATH**

Scoring Guide:

Score	Description
4	5 points
3	4 points OR 3 points with at least 1 point each in parts b and c
2	2 – 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, (\$)**3000**

Part b: 2 points for correct answer, (\$)**15,000**, with sufficient explanation or work shown to indicate correct strategy

or

for correct answer based on incorrect answer in part a, 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, **1**, with sufficient explanation or work shown to indicate correct strategy

or

for correct answer based on incorrect answer in part a, with sufficient explanation or work shown to indicate correct strategy

OR

1 point for correct answer, with no work shown or explanation given

or

for correct strategy that shows understanding of percents with incorrect or no answer

NECAP 2012 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 4
(EXAMPLE A)

15

a) 3,000 dollars

Part a: The student's response is correct.

b) $3,000 \text{ dollars} = 20\%$
 $\begin{array}{c} \times \\ 5 \end{array}$ $\begin{array}{c} \times \\ 5 \end{array}$

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

$15,000 \text{ dollars} = 100\%$

c) The band had 30% left over and 60% is 3,000 so 30% is 1,500 and on the shirt for the football team 1,500 is 10% so the football team shades in another bar on the poster

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

NECAP 2012 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 4
(EXAMPLE B)

15

$$A) \frac{5000}{10} = 500$$

$$500 \times 6 = 3000$$

\$3000

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

$$B) \frac{2}{10} \text{ football goal} = \frac{6}{10} \text{ band goal}$$

$$3000 = 3000$$

$$\$15,000 = \text{goal}$$

$$\frac{2}{10} = 3000$$

$$\frac{1}{10} = 1500$$

$$1500 \cdot 10 = 15,000$$

$$C) \frac{5000}{10} = 500$$

$$500 \times 3 = 1500$$

$$\frac{15,000}{10} = 1500$$

$$\$1500 = 1 \text{ gray bar}$$

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

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

NECAP 2012 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 3

15

a)

$$\begin{array}{r} 500 \\ \times 4 \\ \hline 2000 \end{array}$$

$$\begin{aligned} 10\% \text{ of } 5,000 &= 500 \\ 40\% \text{ of } 5,000 &= 2,000 \end{aligned}$$

$$\begin{aligned} \text{goal} &= 5,000 = 100\% \\ \text{total} &= 60\% \end{aligned}$$

after 1 month
they raised \$2,000.00

Part a: The student's response is incorrect.

b)

$$\begin{array}{r} 500 \\ \times 2 \\ \hline 1000 \end{array}$$

$$\begin{aligned} 20\% \text{ of } 5,000 &= 1,000 \\ 60\% \text{ of } 5,000 &= 3,000 \end{aligned}$$

$$\begin{array}{r} 3,000 \\ \times 5 \\ \hline 15,000 \end{array}$$

It is 15,000 because
each 2 blocks would really be
3,000 for 20% of football & 60%
of band

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

c)

$$\begin{array}{r} 500 \\ \times 3 \\ \hline 1500 \end{array}$$

$$30\% \text{ of } 5,000 = 1,500$$

1st bar can be shaded
because each bar is \$1,500.

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

NECAP 2012 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 2

15

a) \$3,000 b) \$15,000

Part b: The student's response is correct, with no work shown.

c) \$6,500 - 2 bars and a $\frac{1}{4}$ of one.

Part c: The student's response is incorrect.

Part a: The student's response is correct.

NECAP 2012 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 1

15

a) \$3000.

Part a: The student's response is correct.

b) we have 20% our goal.
\$3000

Part b: The student's response is incorrect.

c) 3 bars can be shaded to show how much the band gave away because each bar is 10%.

Part c: The student's response is incorrect.

NECAP 2012 RELEASED ITEMS
GRADE 8 MATH

SCORE POINT 0

15

A. after one month they raised 4,600 dollars.

Part a: The student's response is incorrect.

B. The goal for the football team was 5600 dollars.

Part b: The student's response is incorrect.

C. 5 bars can be shaded grey because at the 100% mark is where the band got 5000 dollars and there is 5 bars left over.

Part c: The student's response is incorrect.

Grade 8 Mathematics Released Item Information – 2012

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	GM	GM	GM	FA	FA	FA	FA	DP	DP	FA	DP	GM	FA	NO
GLE Code	7-4	7-2	7-4	7-6	7-1	7-3	7-4	7-4	7-1	7-1	7-3	7-3	7-2	7-3	7-1
Depth of Knowledge Code	2	2	1	1	2	1	2	1	2	2	2	2	1	2	3
Item Type ²	MC	SA	SA	SA	SA	CR									
Answer Key	D	C	C	B	D	A	A	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