2018 Next Generation MCAS

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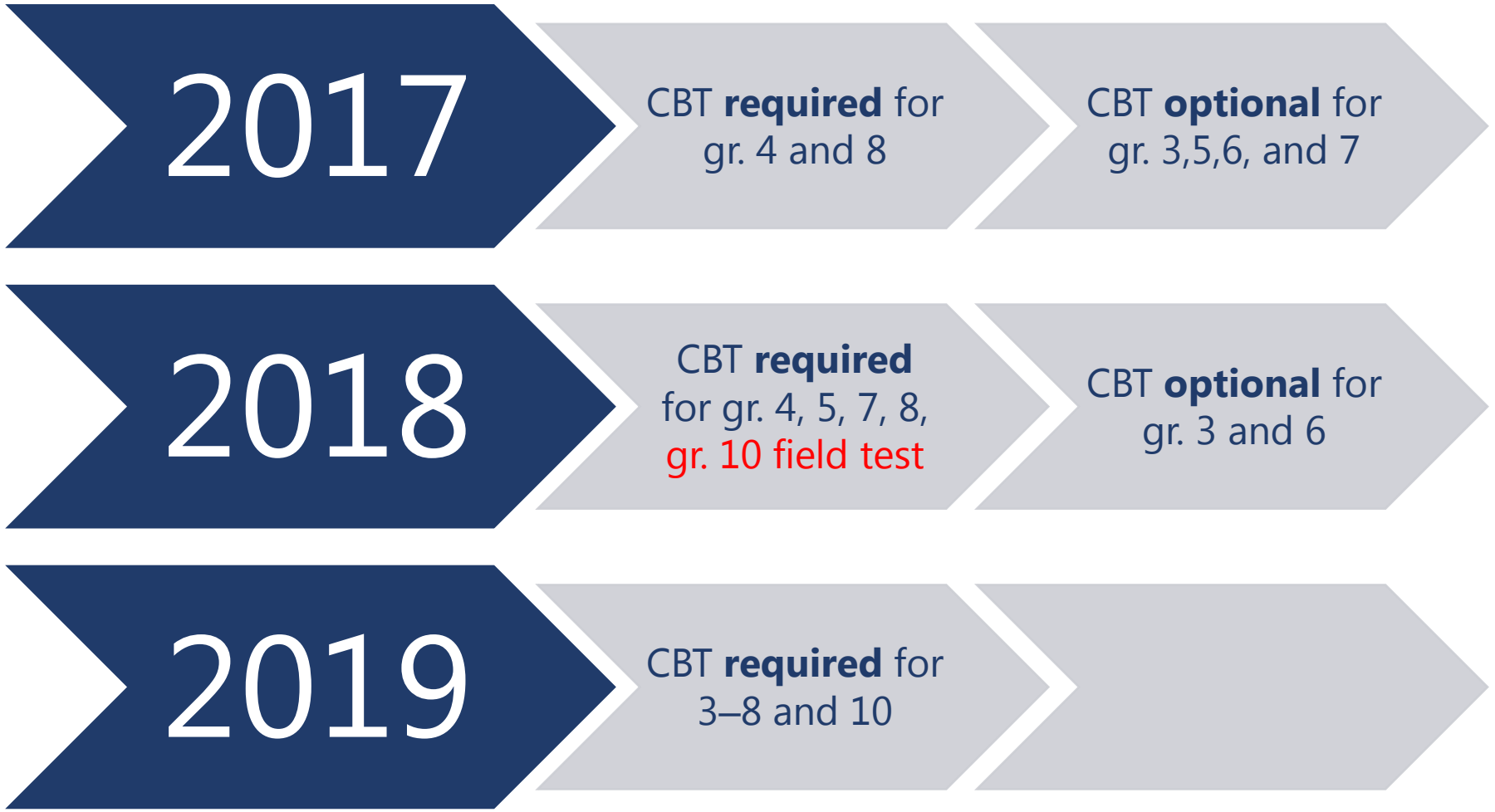
ATMIM Winter Conference, January 23, 2018

MASSACHUSETTS DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION

Agenda

- Grade 10 Transition to Computer-based testing
- Key Things to Know
- Clusters
- Test Design
- Question Types
  - Equation Editor
- Online Tools
  - Calculator
  - Reference Sheet
- Accommodations
- Resources

Transition to Next-Generation Tests for Mathematics



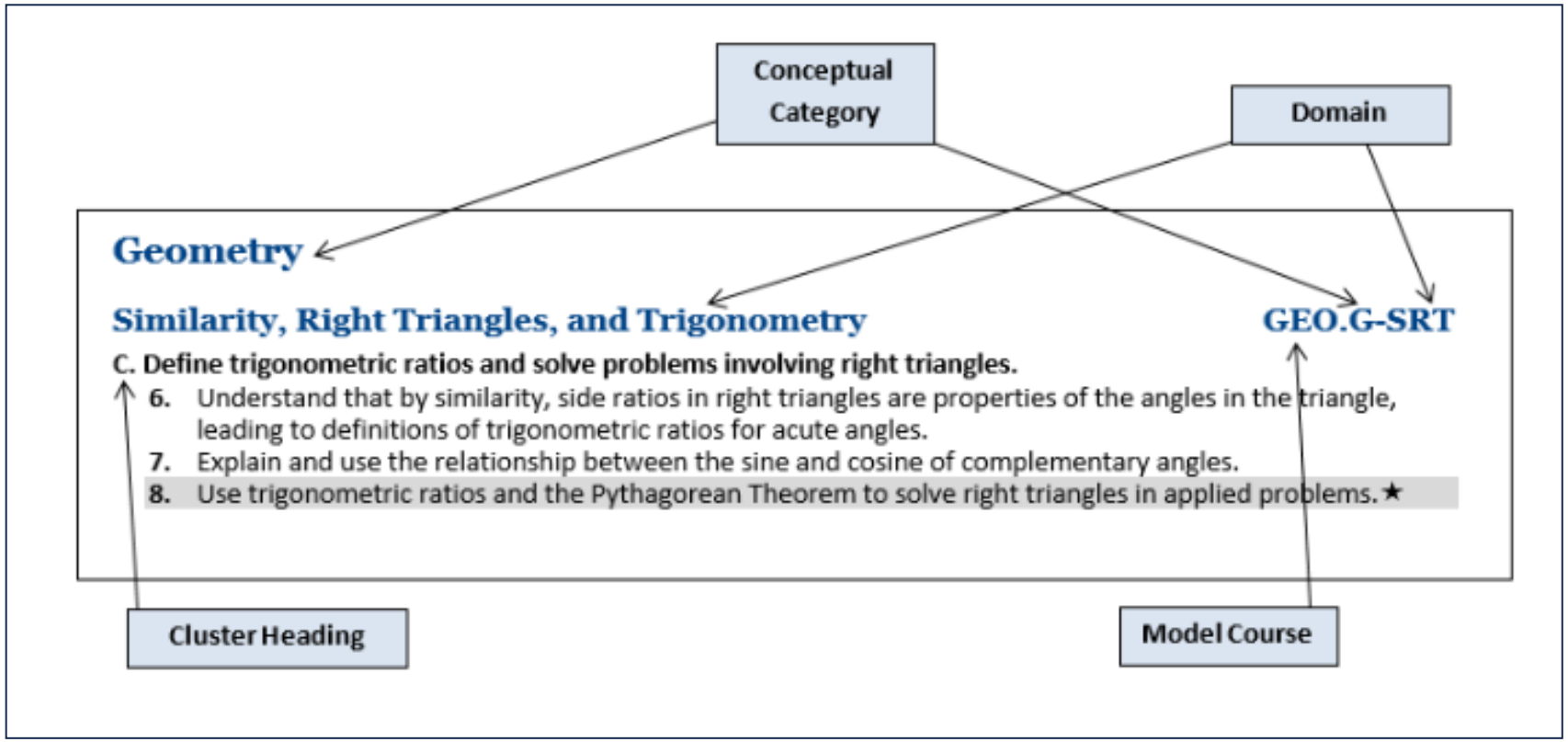
2018 MCAS Grade 10 Mathematics Field Test

Key things to know

- Does **not** replace the operational spring 2018 test.
- Does **not** affect participation in the operational spring 2018 test.
- Testing Schedule
  - April 23rd – May 11th
- Recommended Testing Time
  - 90 – 120 minutes

2018 MCAS Grade 10 Mathematics Field Test

Clusters



Question Coded to a Cluster

Standard: Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational…

N-RN.B.3

Which of the following is equivalent to this expression?

$$2\sqrt{3} + \sqrt{6} + 6\sqrt{12}$$

- A. $8\sqrt{21}$
- B. $2\sqrt{3} + 13\sqrt{6}$
- C. $\sqrt{6} + 14\sqrt{3}$
- D. $6\sqrt{12} + 4\sqrt{3}$

Cluster: Use properties of rational and irrational numbers

N-RN.B

Test Design

- 1 session
  - Multiple choice
  - Multiple select
  - Technology-enhanced
    - Including 2-point questions
  - Constructed Response
- Multiple forms
  - One form per student
  - Some require calculators
  - Some do not require calculators
- Each Form
  - 16 one-point questions
  - 3 two-point questions
  - 2 four-point constructed-response questions

Question Types

Question Type	Total Points
Multiple Choice *Students select one correct answer from among several answer options.*	1
Multiple Select *Students select more than one correct answer from among several answer options.*	1
Technology Enhanced *Students taking the computer-based tests answer questions using technology such as drag-and-drop and hot spot.*	1 or 2
Short Answer/Fill-in-the-Blank *Students construct a short written response, typically only a word or a number.*	1
Constructed Response *Students write a response to a multi-part item that includes calculations and explanations to a problem or set of problems.*	4

Multiple Choice Question

On a coordinate grid, point H is the midpoint of $\overline{TW}$.

- Point H has coordinates $(4, -4)$.
- Point W has coordinates $(12, 2)$.

What are the coordinates of point T?

A. $(16, -2)$

B. $(8, -1)$

C. $(-4, -10)$

D. $(-8, -6)$

Cluster: HSG-GPE.B

2017 Spring Release #29

Multiple Select Question

What are the solutions of the equation below?

$$x^2 + 4x - 12 = 0$$

Select the **two** correct solutions.

- [ ] A. -8
- [x] B. -6
- [ ] C. -4
- [ ] D. -2
- [x] E. 2
- [ ] F. 4

Cluster: HSA-REI.B

2017 Spring Release #12

Technology Enhanced Question - Match Table Grid

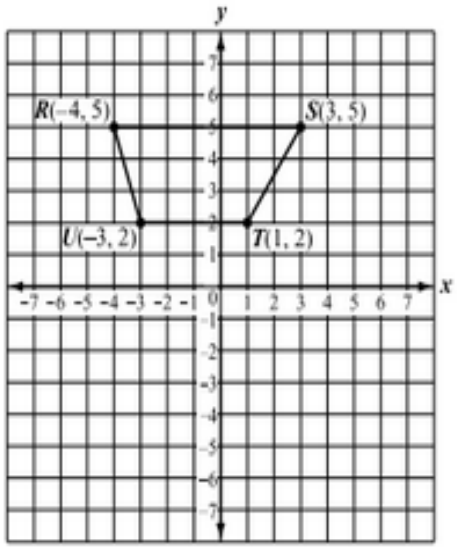
Classify each equation as defining y as a linear or nonlinear function of x. Select one cell per column.

function	$y = 7 \times 4x$	$y = (2x + 5)^2$	$y = 10x^2$	$y = 5x - 3$	$y = \frac{x}{2}$	$y = 2x^3 + 1$
linear	●	○	○	●	●	○
nonlinear	○	●	●	○	○	●

Grade 8 Practice Test

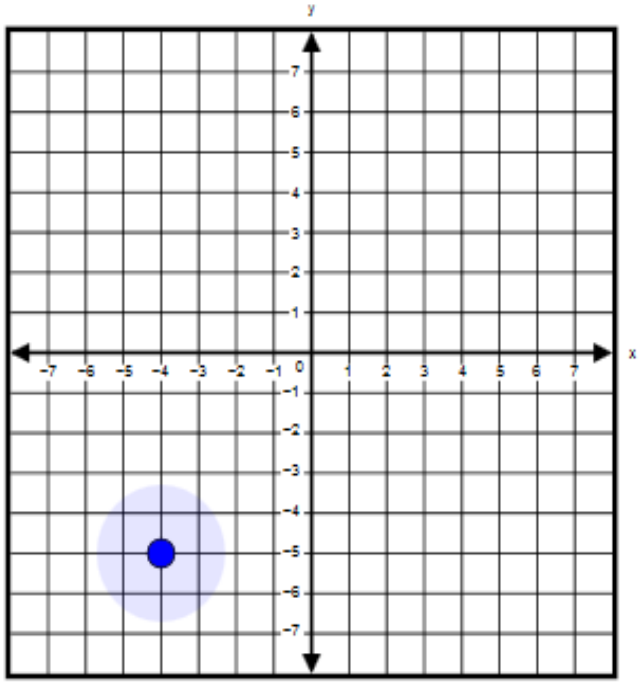
Technology Enhanced Question – Point Graph

Trapezoid $RSTU$ is shown on the coordinate grid below.



Trapezoid $RSTU$ will be reflected over the x-axis to create trapezoid $R'S'T'U'$. What will be the coordinates of point R', the image of point R after the reflection?

Plot the coordinates of point R' on this coordinate plane.



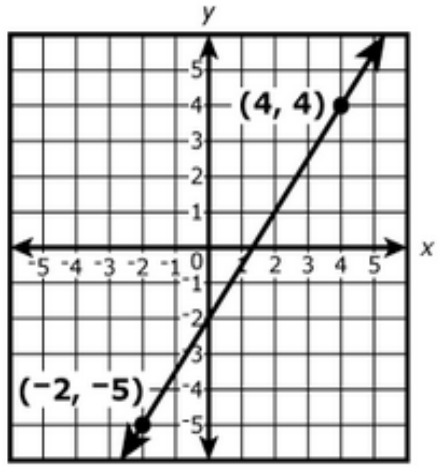
Cluster: HSA-REI.B

2016 Spring Release #22

Technology Enhanced Question - Inline

Functions H and K each show a relationship between x and y.

Function H:



Function K:

x	y
−2	4
0	6
2	8
4	10
6	12

Select from the drop-down menus to correctly complete each statement about the functions.

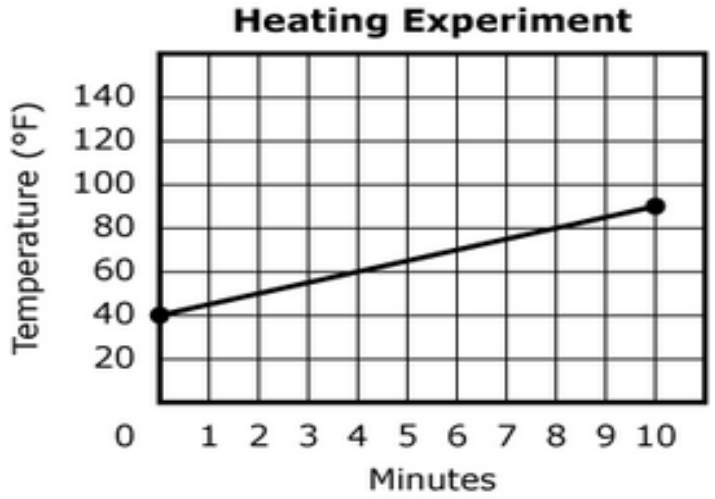
The slope of the line that represents function H is [3/2] and the y-intercept is [−2].

The rate of change of function K is [less than] the rate of change of function H.

Grade 8 Practice Test

Technology Enhanced Question – Drag and Drop

This graph shows the temperature, in degrees Fahrenheit, of a liquid for the first ten minutes of a heating experiment.



Based on the graph, construct a function that could be used to determine T, the temperature of the liquid after m minutes.

Drag and drop a number into each box to create the function. Each number may be used once, more than once, or not at all.

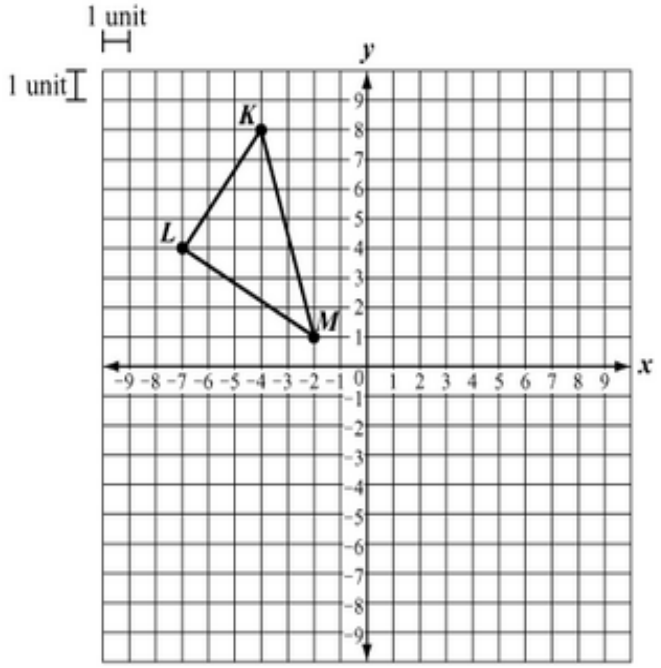
5 | –5 | 40 | –40

$T =$ [5] $m +$ [40]

Grade 8 Practice Test

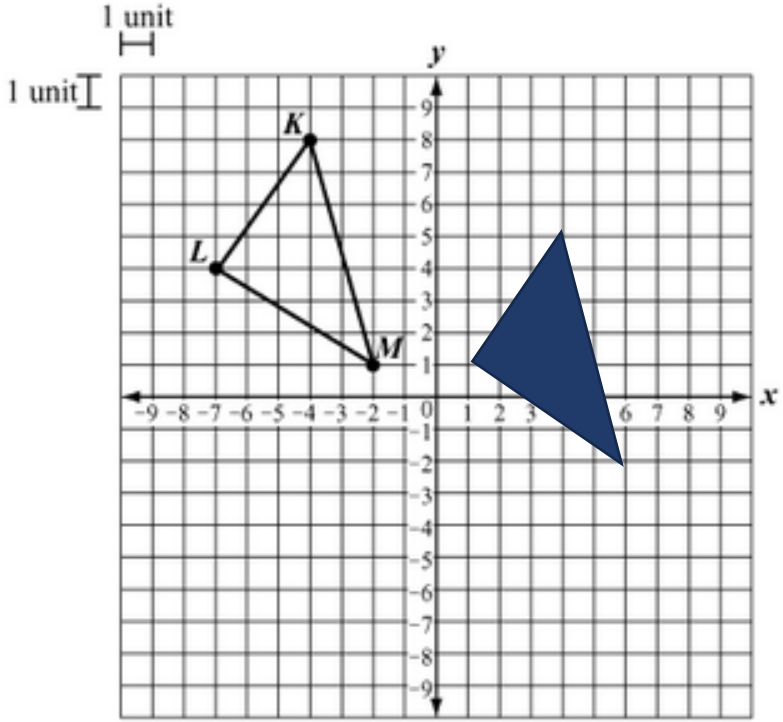
Technology Enhanced Question – Graphing Polygons

Triangle KLM is shown on the coordinate grid below.



Plot the coordinates of the image of triangle KLM after it has been translated **8** units right and **3** units down.

To graph the triangle, select the places on the coordinate plane to plot the vertices. Your vertices will be connected in the order that they are plotted



Cluster: HSG-CO.A

2017 Spring Release #17 Part A

Technology Enhanced Question – Graphing Equations

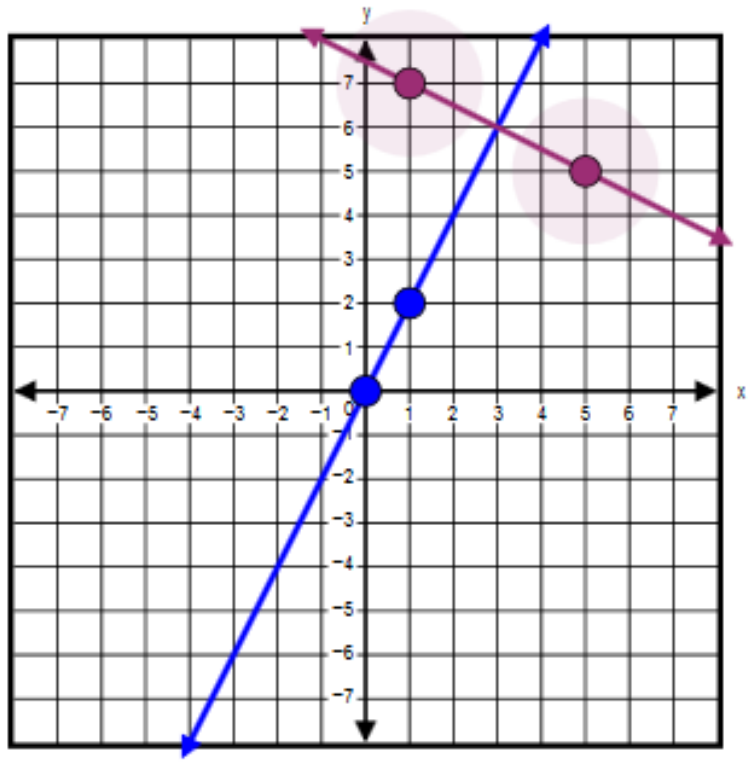
Graph the system of equations on the coordinate plane.

$$y = 2x$$
$$x + 2y = 15$$

To graph each line, select the button for the equation. Then select two points on the coordinate plane. A line will be drawn through the points.

y = 2x

x + 2y = 15



Technology Enhanced Question – Shading Inequalities

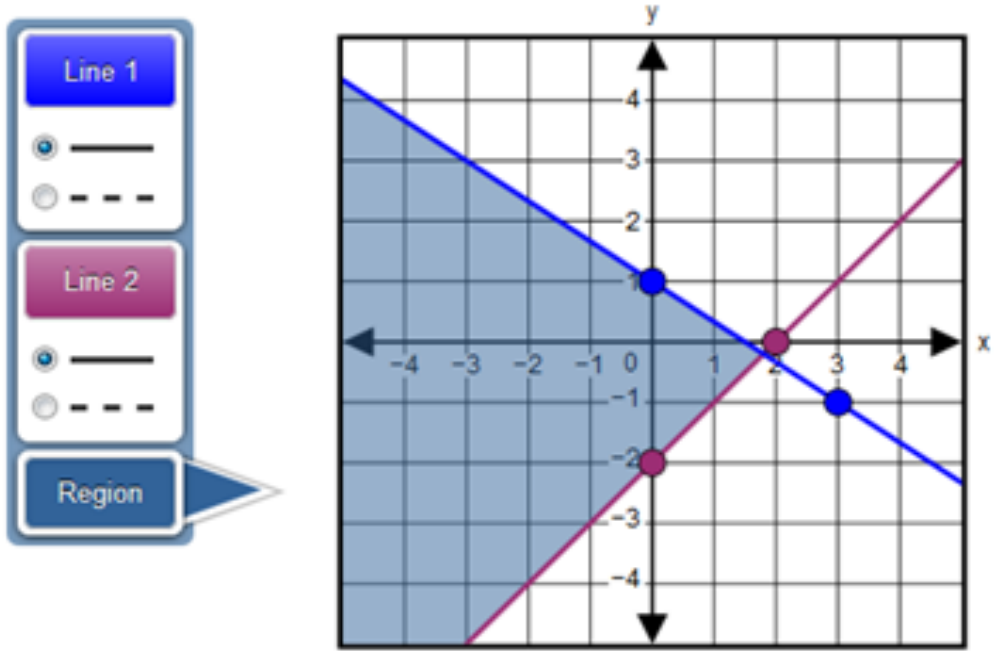
Consider the system of inequalities.

$$y \geq x - 2$$

$$y \leq -\frac{2}{3}x + 1$$

Graph the solution set of the system of inequalities on the coordinate plane.

- Select a Line button, choose the line style, and graph each line.
- To graph each line, select two points on the coordinate plane. A line will be drawn through the points. The lines can be graphed in any order.
- Select the Region button and then indicate the region of the solution set.



Cluster: HSA-REI.D

Short-Answer/Fill-In-The-Blank

Mr. Sayre purchased one can of peanuts and some apples.

- One can of peanuts cost $4.
- The apples cost $2 per pound.
- There was no tax on Mr. Sayre's purchase.

Mr. Sayre spent $13. How many pounds of apples did he purchase?

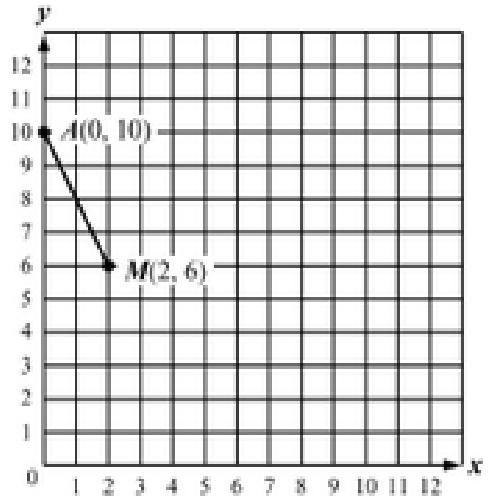
4.5 pounds

Cluster: HSA-CED.A

2014 November Retest #16

Short-Answer/Fill-In-The-Blank (*with Equation Editor*)

Points A and M are shown on the coordinate grid below.



If point M is the midpoint of $\overline{AB}$, what are the coordinates of point B?

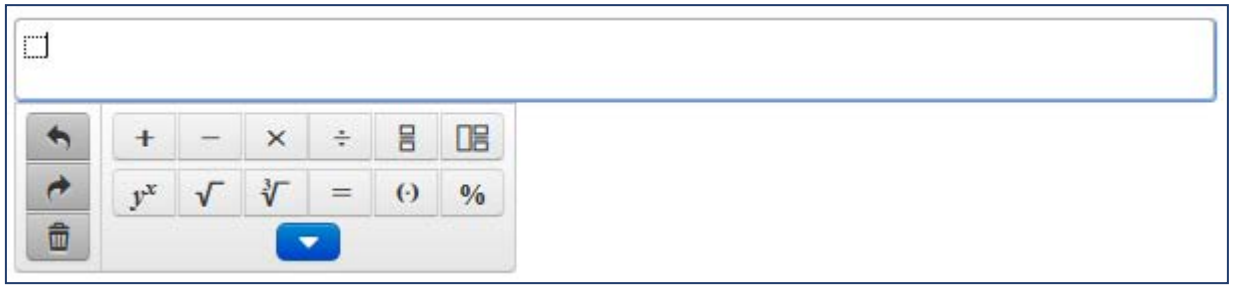
Enter your coordinates in the box. Enter **only** your coordinates.

$(4, 2)$

Cluster: HSG-GPE.B

2013 November Retest #19

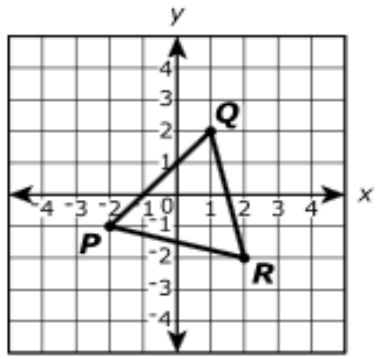
Answering a Short Answer/Fill-in-the-Blank Question
(*with Equation Editor for math only*)



2-point Question

This question has two parts.

Triangle PQR is shown on the coordinate plane.



Triangle *PQR* is rotated 90° counterclockwise about the origin to form the image triangle $P'Q'R'$(not shown). Then triangle $P'Q'R'$ is reflected across the *x*-axis to form triangle $P''Q''R''$ (not shown).

Part A

What are the signs of the coordinates (x, y) of point P'?

- A. Both $x$and y are positive.
- B. $x$is negative and y is positive.
- C. Both $x$and y are negative.
- D. $x$is positive and y is negative.

Part B

What are the signs of the coordinates (x, y) of point Q''?

- A. Both x and y are positive.
- B. x is negative and y is positive.
- C. Both x and y are negative.
- D. x is positive and y is negative.

Constructed Response Question

This question has four parts.

The table below shows the distribution of eye color and hair color for the **60** students in a chorus.

		Hair Color			
		Black	Blond	Brown	Red
Eye Color	Brown	7	3	10	2
	Blue	5	6	6	2
	Green	4	3	3	3
	Hazel	1	2	1	2

Part A

How many students in the chorus have brown hair? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

Cluster: HSS-ID.B

2017 Spring Release #41

Constructed Response Question

Part B

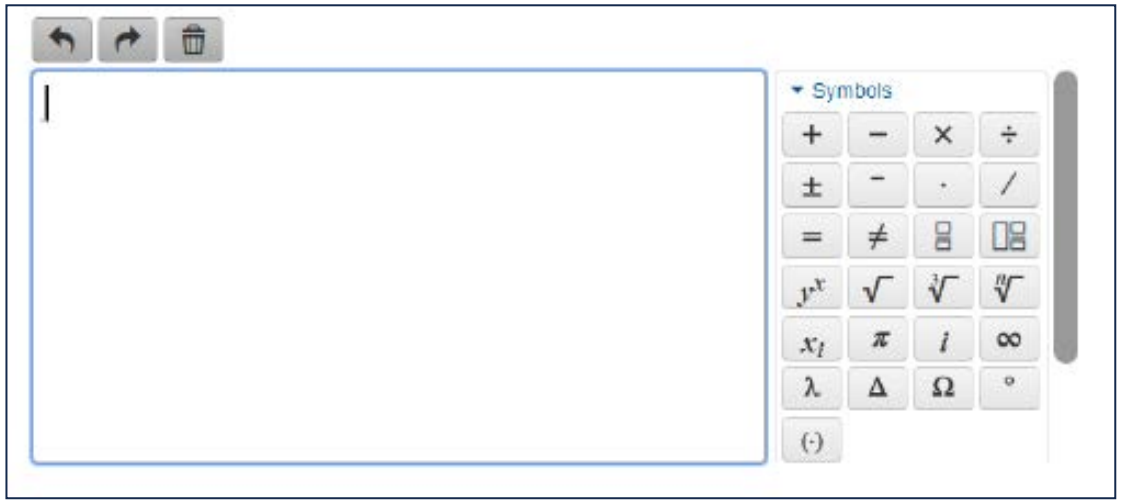
What fraction of the students with blond hair have hazel eyes? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

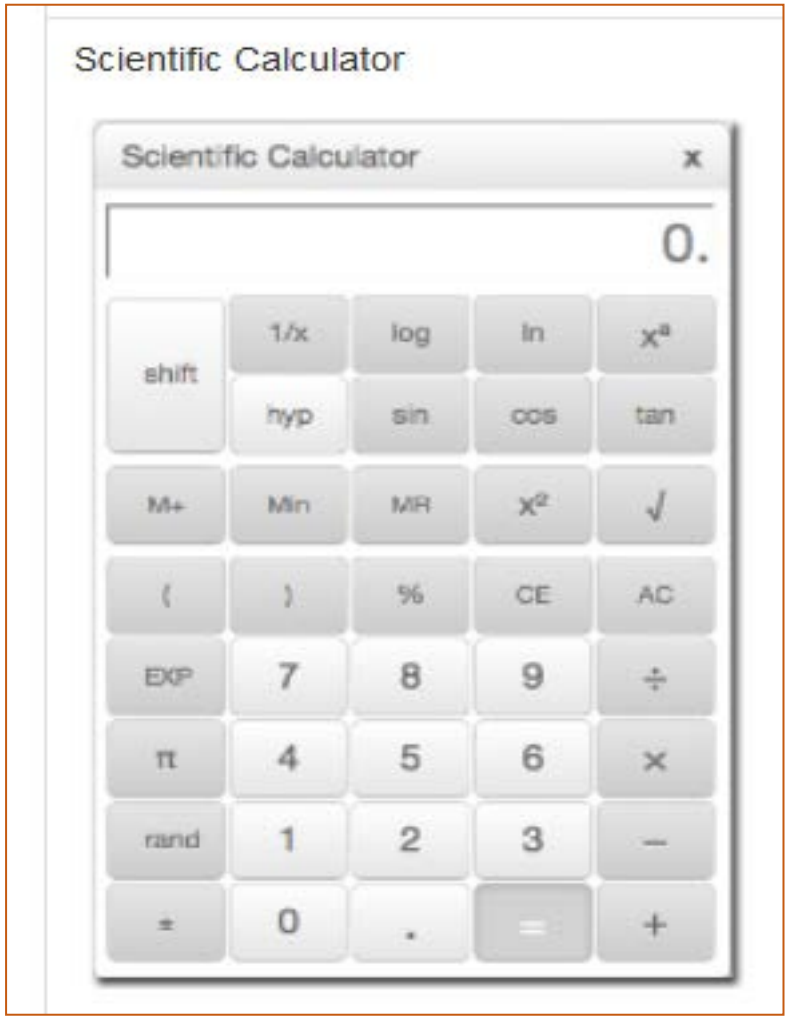
Cluster: HSS-ID.B

2017 Spring Release #41

Answering a Constructed Response Question
(*with Equation Editor for math and text*)



Online Calculator



Calculator Policy

- Embedded Calculator
- Equivalent handheld calculators
  - At a minimum, a handheld five-function calculator

Grade 10 Reference Sheet

Exhibits

Massachusetts Comprehensive Assessment System
Grade 10 Mathematics Reference Sheet

CONVERSIONS

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
1 gallon ≈ 3.785 liters
1 liter ≈ 0.264 gallon
1 liter = 1000 cubic centimeters

1 inch = 2.54 centimeters
1 meter ≈ 39.37 inches
1 mile = 5280 feet
1 mile = 1760 yards
1 mile ≈ 1.609 kilometers
1 kilometer ≈ 0.62 mile

1 pound = 16 ounces
1 pound ≈ 0.454 kilogram
1 kilogram ≈ 2.2 pounds
1 ton = 2000 pounds

AREA (A) FORMULAS

square . . . . . $A = s^2$
rectangle . . . . . $A = lw$
parallelogram . . . . . $A = bh$
triangle . . . . . $A = \frac{1}{2}bh$
trapezoid . . . . . $A = \frac{1}{2}h(b_1 + b_2)$
circle . . . . . $A = \pi r^2$

TOTAL SURFACE AREA (SA) FORMULAS

cube . . . . . $SA = 6s^2$
right square pyramid . . . . . $SA = s^2 + 2s\ell$
(ℓ = slant height)
right rectangular prism . . . $SA = 2(lw) + 2(hw) + 2(lh)$

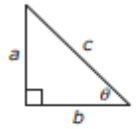
VOLUME (V) FORMULAS

cube . . . . . $V = s^3$
(s = length of an edge)
prism . . . . . $V = Bh$
cylinder . . . . . $V = \pi r^2 h$
cone . . . . . $V = \frac{1}{3}\pi r^2 h$
pyramid . . . . . $V = \frac{1}{3}Bh$
sphere . . . . . $V = \frac{4}{3}\pi r^3$

CIRCLE FORMULAS

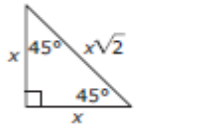
pi . . . . . $\pi \approx 3.14$
circumference . . . . $C = 2\pi r$ OR $C = \pi d$
area . . . . . $A = \pi r^2$

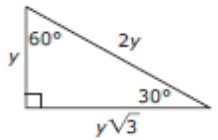
RIGHT TRIANGLES



Pythagorean Theorem
$a^2 + b^2 = c^2$
Trigonometric Ratios
$\sin\theta = \frac{a}{c}$
$\cos\theta = \frac{b}{c}$
$\tan\theta = \frac{a}{b}$

SPECIAL RIGHT TRIANGLES





Accommodations

- All accessibility features listed in the 2018 Accessibility and Accommodations Manual
  - No Braille
  - No Large Print

Universal Accessibility Features for All Students

Accessibility Features
Alternative background/font color *(PNP)*
Screen magnification/Zoom tool
Line reader tool
Answer Eliminator
Answer Masking *(PNP)*
Item flag/bookmark
Highlighter
Audio Aids
Human read-aloud (or sign) selected words on Math or STE, as requested by student
Test administrator repeats/clarifies test directions
Test administrator redirects student's attention to test

Resources for 2018 Grade 10 Field Test

- Pre-Administration Guide
  - http://www.doe.mass.edu/mcas/testadmin/ghs-cbt-pre-adminguide.docx
- Training Opportunities
  - http://www.doe.mass.edu/mcas/training.html
- Recordings of Previous Training Sessions (1/11, 1/18, and 1/23)
  - http://mcas.pearsonsupport.com/training/

Questions / Thank You

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