

Computer-Based Released Items

Grade 8 Mathematics

Spring 2019

The spring 2019 grade 8 Mathematics test was administered in two primary formats: a computer-based version and a paper-based version. The vast majority of students took the computer-based test. The paper-based test was offered as an accommodation for students with disabilities who are unable to use a computer, as well as for English learners who are new to the country and are unfamiliar with technology.

The Department of Elementary and Secondary Education is releasing items from both versions of the test to provide information about the knowledge and skills that students are expected to demonstrate.

- Released items from the **computer-based test** are available online at mcas.pearsonsupport.com/released-items. The computer-based released items are collected in a mini test called an ePAT (electronic practice assessment tool). Items in the ePAT are displayed in TestNav 8, the testing platform for the computer-based tests.
- Released items from the **paper-based test** are available in PDF format on the Department's website at www.doe.mass.edu/mcas/testitems.html.

This document provides information about each released item from the *computer-based test*, including: reporting category, standard(s) covered, item type, item description, and correct answer (for selected-response items only). Information about unreleased operational items is also presented here, and scoring rubrics are provided for released constructed-response items.

A Note about Testing Mode

Most of the operational items on the grade 8 Mathematics test were the same, regardless of whether a student took the computer-based version or the paper-based version. In places where a technology-enhanced item was used on the computer-based test, an adapted version of the item was created for use on the paper test. These adapted paper items were multiple-choice, multiple-select, or short-answer items that tested the same Mathematics content and assessed the same standard as the technology-enhanced item.

Grade 8 Mathematics
Spring 2019 Computer-Based Released Operational Items

CBT Item No.	Reporting Category	Standard	Item Type*	Item Description	Correct Answer**
1	The Number System and Expressions and Equations	8.EE.A.4	SA	Convert a number given in scientific notation to a number in standard notation.	825,000
2	The Number System and Expressions and Equations	8.NS.A.2	SR	Identify a point on a number line that corresponds to the approximate location of an irrational number.	B
3	The Number System and Expressions and Equations	8.EE.A.1	SR	Use the properties of integer exponents to determine an expression equivalent to a given expression.	C
4	The Number System and Expressions and Equations	8.EE.C.7	SR	Determine the solution to a linear equation by using the distributive property.	D
5	Functions	8.F.A.2	CR	Compare properties of two different functions, representing real-world contexts, graphically and verbally; write equations that represent functions.	<i>see page 6</i>
6	The Number System and Expressions and Equations	8.NS.A.2	SR	Determine the location of an irrational number between two rational numbers on a number line.	A
7	The Number System and Expressions and Equations	8.EE.A.3	SR	Determine how many times greater one number is than another when both are expressed as single digits multiplied by integer powers of ten.	C
8	The Number System and Expressions and Equations	8.EE.A.1	SA	Apply the properties of integer exponents to simplify a given expression.	9
9	The Number System and Expressions and Equations	8.EE.C.7	SR	Solve a pair of linear equations expressed as verbal descriptions.	B
10	Geometry	8.G.A.5	SR	Determine the measure of an unknown angle in a figure containing two parallel lines cut by a transversal.	B
11	Geometry	8.G.B.7	SA	Choose side lengths to create a right triangle.	<i>see page 7</i>
12	Geometry	8.G.A.3	SR	Determine the coordinates of the image of a vertex of a polygon after the polygon has been reflected over the x-axis.	A

13	Geometry	8.G.A.5	SA	Given parallel lines cut by a transversal, select all angles that must be congruent to one of the angles.	<i>see page 7</i>
14	The Number System and Expressions and Equations	8.EE.B.5	SR	Interpret and compare proportional relationships on a graph, and identify an equation to represent the relationship.	<i>see page 7</i>
15	Statistics and Probability	8.SP.A.4	CR	Interpret a two-way table to answer statistical questions about categorical data collected from the same subjects.	<i>see page 8</i>
16	Geometry	8.G.A.3	SA	Transform a two-dimensional figure on a coordinate plane.	<i>see page 9</i>
17	Geometry	8.G.C.9	SR	Determine the volume of a sphere.	C
18	Functions	8.F.B.5	SR	Analyze a graph of a functional relationship to determine if different statements are true; then select another graph that exhibits a different qualitative feature of the functional relationship.	<i>see page 10</i>
19	Geometry	8.G.B.8	SR	Determine the length of a side of a right triangle graphed on the coordinate plane by using the Pythagorean Theorem.	C
20	Geometry	8.G.A.4	SR	Determine which measurements belong to a triangle similar to a given triangle.	D

* Mathematics item types are: selected-response (SR), short-answer (SA), and constructed-response (CR).

** Answers are provided here for selected-response and short-answer items only. Correct answers for technology-enhanced (TE) items can be found on pages 7, 9, and 10 of this document. Scoring rubrics for constructed-response items are also provided in this document. Sample responses and scoring guidelines for constructed-response items will be posted to the Department's website later this year.

Grade 8 Mathematics
Spring 2019 Computer-Based Unreleased Operational Items

CBT Item No.	Reporting Category	Standard	Item Type*	Item Description
21	Statistics and Probability	8.SP.A.1	SR	Determine which scatter plot matches a given description that includes information about linearity and direction of correlation.
22	The Number System and Expressions and Equations	8.EE.A.1	SR	Determine which expression with an exponent is equivalent to a given expression featuring multiplication of two numbers with the same base but different exponents.
23	The Number System and Expressions and Equations	8.NS.A.2	SR	Determine between which pair of integers a square root of a given number lies.
24	The Number System and Expressions and Equations	8.EE.C.8	CR	Given the graph of a system of linear equations, solve the system, write the equation of a graphed line, and determine whether a third line passing through two given points will intersect the line.
25	The Number System and Expressions and Equations	8.NS.A.1	SA	Convert a fraction to a decimal.
26	The Number System and Expressions and Equations	8.EE.A.1	SA	Apply the properties of integer exponents to generate an equivalent expression when one exponent is positive and the other exponent is negative.
27	Functions	8.F.B.4	SR	Determine the rate of change from a verbal description of a proportional relationship, and use that rate of change to solve a real-world problem.
28	The Number System and Expressions and Equations	8.EE.A.1	SR	Use the properties of integer exponents to determine an expression equivalent to a given expression.
29	The Number System and Expressions and Equations	8.EE.B.5	SA	Graph a real-world proportional relationship and identify an equation to represent a related relationship.
30	Functions	8.F.B.5	SA	Analyze a graph where a function is increasing and decreasing.
31	The Number System and Expressions and Equations	8.EE.A.3	SA	Given two quantities, each expressed as a single digit multiplied by an integer power of ten, determine how many times as much one quantity is than the other.
32	Statistics and Probability	8.SP.A.3	SR	Interpret the meaning of the slope in a linear equation.
33	Geometry	8.G.A.3	SR	Determine the coordinates of the image of a vertex of a polygon after the polygon has been reflected over the y -axis.

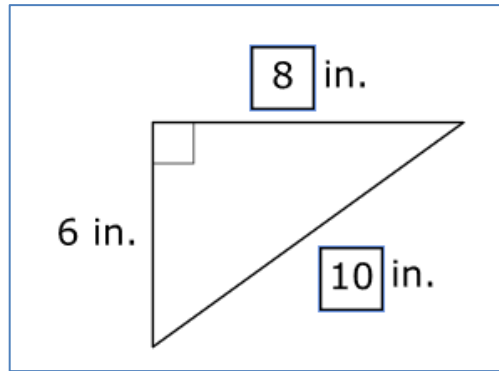
34	Functions	8.F.A.2	SR	Compare properties of two functions represented algebraically and in a table and interpret each function's rate of change and initial value.
35	Geometry	8.G.A.1	CR	Given a polygon and its image after a transformation, verify congruence by analyzing properties of both; describe a series of transformations that would result in the same image of the polygon.
36	Functions	8.F.B.4	SR	Determine which graph has a given slope.
37	Geometry	8.G.B.7	SR	Use the Pythagorean Theorem to solve a problem with real-world context.
38	Geometry	8.G.A.2	SA	Determine the measure of an unknown angle in a figure by using facts about similarity.
39	Functions	8.F.A.1	SR	Identify y as a function of x from given input/output tables.
40	Geometry	8.G.A.5	SR	Determine which angles are congruent when two parallel lines are intersected by a transversal.

* Mathematics item types are: selected-response (SR), short-answer (SA), and constructed-response (CR).

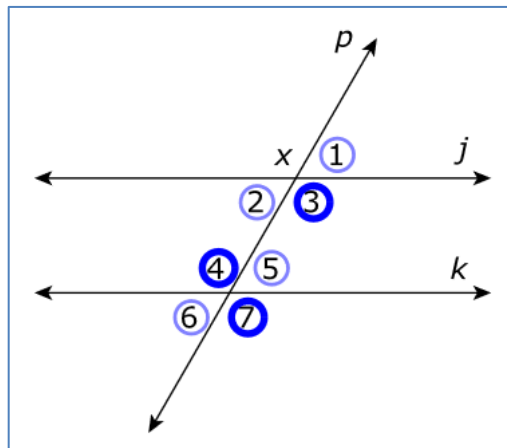
Rubric for CBT Item #5: Constructed Response

Scoring Guide	
Score	Description
4	The student response demonstrates an exemplary understanding of the Functions concepts involved in comparing properties of two functions each represented in a different way. The student compares functions based on real-world information from a verbal description and a graph.
3	The student response demonstrates a good understanding of the Functions concepts involved in comparing properties of two functions each represented in a different way. Although there is significant evidence that the student was able to recognize and apply the concepts involved, some aspect of the response is flawed. As a result, the response merits 3 points.
2	The student response demonstrates a fair understanding of the Functions concepts involved in comparing properties of two functions each represented in a different way. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student merits 2 points.
1	The student response demonstrates a minimal understanding of the Functions concepts involved in comparing properties of two functions each represented in a different way.
0	The student response contains insufficient evidence of an understanding of the Functions concepts involved in comparing properties of two functions each represented in a different way to merit any points.

Correct Answer for CBT Item #11: Technology-Enhanced Item



Correct Answer for CBT Item #13: Technology-Enhanced Item



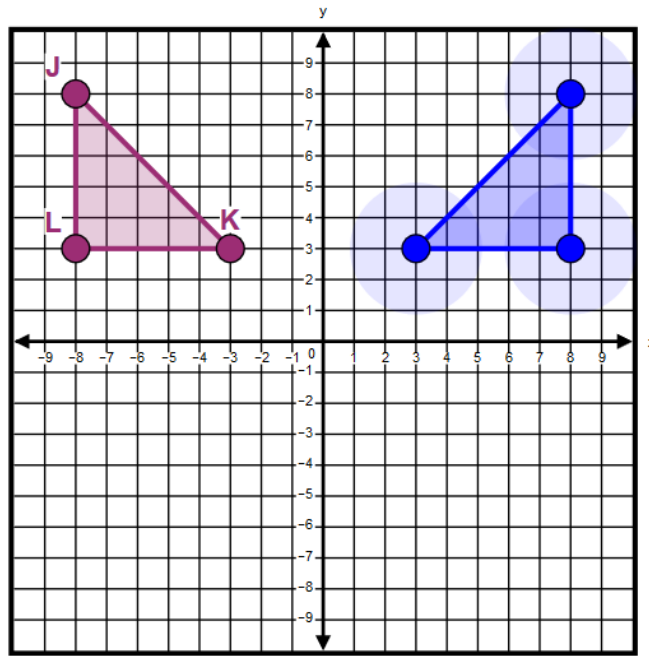
Correct Answer for CBT Item #14: Technology-Enhanced Item

Paul ran at a constant speed than Melinda. An equation that could represent the relationship between Paul's distance and his time is $y =$ x , where x is the time in hours, and y is the distance in miles Paul ran.

Rubric for CBT Item #15: Constructed Response

Scoring Guide	
Score	Description
4	The student response demonstrates an exemplary understanding of the Statistics and Probability concepts involved in interpreting a two-way table summarizing data on two categorical variables collected from the same subjects. The student determines the number of students in a category, calculates relative frequencies, and uses relative frequencies to analyze the validity of a possible association between the two variables.
3	The student response demonstrates a good understanding of the Statistics and Probability concepts involved in interpreting a two-way table summarizing data on two categorical variables collected from the same subjects. Although there is significant evidence that the student was able to recognize and apply the concepts involved, some aspect of the response is flawed. As a result, the response merits 3 points.
2	The student response demonstrates a fair understanding of the Statistics and Probability concepts involved in interpreting a two-way table summarizing data on two categorical variables collected from the same subjects. While some aspects of the task are completed correctly, others are not. The mixed evidence provided by the student merits 2 points.
1	The student response demonstrates a minimal understanding of the Statistics and Probability concepts involved in interpreting a two-way table summarizing data on two categorical variables collected from the same subjects.
0	The student response contains insufficient evidence of an understanding of the Statistics and Probability concepts involved in interpreting a two-way table summarizing data on two categorical variables collected from the same subjects to merit any points.

Correct Answer for CBT Item #16: Technology-Enhanced Item



Correct Answer for CBT Item #18: Technology-Enhanced Item

Part A:

Statement	True	False
The student stopped for a rest break on his way to the park.	<input checked="" type="radio"/>	<input type="radio"/>
The student stopped for a rest break on his way home from the park.	<input type="radio"/>	<input checked="" type="radio"/>
The student's rest break at the park lasted longer than the other rest break he took.	<input type="radio"/>	<input checked="" type="radio"/>
The student reached his fastest speed on his way home from the park.	<input type="radio"/>	<input checked="" type="radio"/>

Part B:

