Computer-Based Released Items
Grade 10 Mathematics
Spring 2022

The spring 2022 grade 10 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 and short-answer items only).

A Note about Testing Mode

Most of the operational items on the grade 10 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 10 Mathematics
Spring 2022 Computer-Based Released Operational Items

CBT Item No.	Reporting Category	Standard	Item Type*	Item Description	Correct Answer**
1	Algebra and Functions	A-REI.B.3	SR	Determine the solution of a linear equation in one variable.	D
2	Algebra and Functions	A-CED.A.2	SR	Create two linear equations in two variables based on a description of a real-world situation.	*see page 5*
3	Geometry	G-SRT.B.5	SR	Given two similar triangles, use a proportional relationship to determine an unknown side length.	C
4	Algebra and Functions	A-SSE.A.2	SR	Factor a trinomial expression to identify an equivalent expression.	C
5	Algebra and Functions	F-BF.A.2	SR	Determine an expression that represents an arithmetic sequence, given its first five terms.	D
6	Number and Quantity	N-Q.A.2	CR	Interpret the units in a graph that represents a real-world situation and estimate solutions of associated problems.	
7	Geometry	G-CO.C.10	SR	Identify the triangle theorem that is illustrated by a folded paper demonstration.	*see page 5*
8	Algebra and Functions	A-REI.D.12	SR	Identify the graph of the solution set of a system of linear inequalities in two variables.	A
9	Geometry	G-CO.C.9	SR	Identify an equation that may not be true based on a diagram featuring parallel lines and a transversal.	D
10	Algebra and Functions	A-APR.A.1	SR	Expand a polynomial expression to create an equivalent expression.	A
11	Algebra and Functions	A-CED.A.4	SA	Rearrange an equation to solve for different aspects of the formula it represents.	*see page 5*
12	Number and Quantity	N-RN.A.2	SR	Given an exponential expression, use properties of exponents to create an equivalent expression.	*see page 5*
13	Algebra and Functions	F-IF.A.2	CR	Evaluate a linear function over specific values of its domain and interpret given values of the function in terms of a real-world context.	

14	Statistics and Probability	S-ID.C.7	SA	Interpret the slope and the y-intercept of a linear model based on real-world data.	263.3; A
15	Geometry	G-CO.A.4	SR	Describe a transformation of a line segment that will result in a parallel image.	*see page 5*
16	Algebra and Functions	F-BF.B.3	SA	Create an equation that represents the graph of a function after it has been translated.	*see page 6*
17	Algebra and Functions	A-SSE.B.3	SR	Factor a quadratic expression to solve a real-world problem.	C
18	Number and Quantity	N-RN.A.1	SR	Rewrite different radical expressions using rational exponents.	Part A: B Part B: *see page 6*
19	Geometry	G-CO.A.2	SA	Determine the coordinates of an end point of a line segment, graphed on a coordinate plane, after a rotation.	(2, 1)
20	Algebra and Functions	A-REI.C.6	SR	Determine the y-value of the solution of a system of linear equations.	A
21	Geometry	G-SRT.C.6	SA	Determine an angle measure in a right triangle based on the relationship of two of the triangle's side lengths.	30
22	Geometry	G-SRT.B.5	SR	Determine an unknown angle measure based on a diagram of two similar triangles.	B
23	Number and Quantity	N-Q.A.1	SR	Compare rates that relate distance and time, given in different units.	*see page 6*
24	Statistics and Probability	S-CP.A.3	SR	Compute a conditional probability based on dependent events in a real-world situation.	A
25	Algebra and Functions	F-LE.B.5	SR	Interpret the parameters of an exponential function based on a real-world context.	B
26	Geometry	G-GMD.A.1	SR	Use dissections to find the partial circumference of a circle.	B
27	Statistics and Probability	S-CP.B.6	CR	Calculate compound and conditional probabilities from data displayed in a graph and interpret the graph in terms of the probabilities.	
28	Geometry	G-SRT.A.1	SA	Graph a triangle on a coordinate plane after a dilation.	*see page 7*

29	Algebra and Functions	A-CED.A.2	SR	Create two-variable linear equations and use them to solve a real-world problem.	C
30	Geometry	G-C.A.3	SR	Determine the measure of an angle of a quadrilateral inscribed in a circle.	B
31	Number and Quantity	N-Q.A.3	SR	Use estimation and rounding strategies to solve a real-world problem.	*see page 7*
32	Geometry	G-GPE.B.7	SA	Calculate the perimeter and the area of a pentagon graphed on a coordinate plane.	B; 31
33	Statistics and Probability	S-ID.A.1	SR	Interpret a histogram based on a set of real-world data.	D
34	Geometry	G-GMD.A.3	CR	Use volume formulas for cylinders and spheres to solve real-world problems.	
35	Algebra and Functions	F-IF.B.5	SR	Determine the domain and range of a linear function based on a real-world context.	Part A: B Part B: *see page 7*
36	Geometry	G-SRT.A.3	SR	Determine the measure of an angle in one of a pair of similar triangles.	B
37	Statistics and Probability	S-ID.B.5	SA	Calculate a marginal relative frequency from data in a two-way table.	44
38	Geometry	G-CO.D.12	SR	Interpret the results of the construction of an angle bisector.	B
39	Geometry	G-C.B.5	SA	Determine the area of a sector of a circle and its arc length given the radius of the circle and a central angle measure.	D; 12.5
40	Algebra and Functions	F-LE.A.1	SR	Determine whether given situations can be modeled by a linear function or by an exponential function.	*see page 8*
41	Geometry	G-GPE.B.4	SR	Determine the nature of a quadrilateral given its coordinates represented by expressions.	C
42	Algebra and Functions	A-CED.A.1	SR	Create a one-variable equation, based on a real-world context, and use the equation to solve a problem.	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. Pages 5 through 8 of this document provide correct answers for technology-enhanced (TE) items. Sample responses and scoring guidelines for constructed-response items will be posted at www.doe.mass.edu/mcas/student/default.html.

Correct Answer for CBT Item #2: Technology-Enhanced Item

Company A: $y =$ [0.10] $x +$ [25]

Company B: $y =$ [0.20] $x +$ [15]

Correct Answer for CBT Item #7: Technology-Enhanced Item

The sum of [the interior angle measures ⌄] of a triangle is [equal to 180° ⌄] .

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

Part A:

$$h = \frac{V}{\pi r^2}$$

Part B:

$$r = \sqrt{\frac{V}{\pi h}}$$

Correct Answer for CBT Item #12: Technology-Enhanced Item

x [6] y [16]

Correct Answer for CBT Item #15: Technology-Enhanced Item

A [rotation ⌄] of segment GJ [180° clockwise about the origin ⌄] will result in an image that is parallel to segment GJ.

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

$$g(x) = 3x^2 - 11$$

Or

equivalent

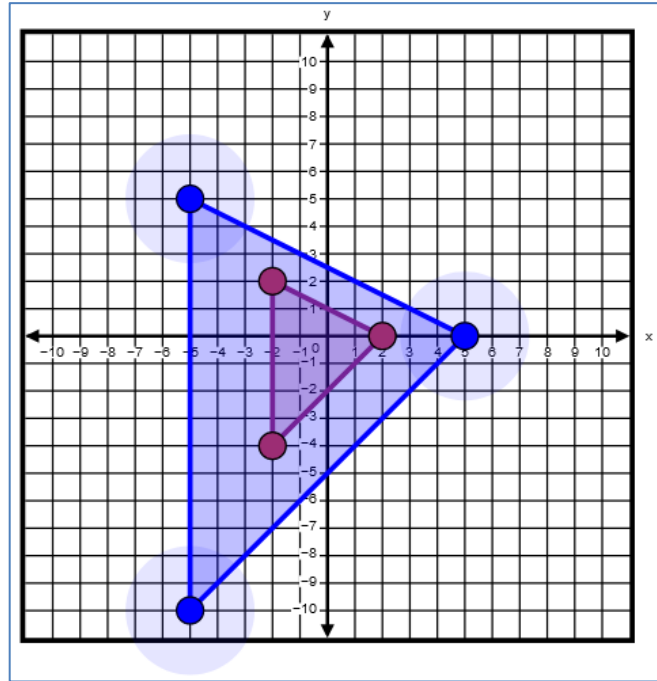**Correct Answer for CBT Item #18: Technology-Enhanced Item**

Part B:

$$x\frac{9}{5}$$

Correct Answer for CBT Item #23: Technology-Enhanced Item

Least		Greatest
100,000 yards per hour	1 mile per minute	100 feet per second

Correct Answer for CBT Item #28: Technology-Enhanced Item

Correct Answer for CBT Item #31: Technology-Enhanced Item

Number of Haircuts	Reasonable	Unreasonable
16	⦿	○
24	○	⦿
32	○	⦿

Correct Answer for CBT Item #35: Technology-Enhanced Item

Part B:

$$0 \leq M(h) \leq 250$$

Correct Answer for CBT Item #40: Technology-Enhanced Item

Situation	Modeled by a Linear Function	Modeled by an Exponential Function
As 5-pound bricks are added to a cart, the total weight increases.	●	○
The number of people registered on a website doubles every month.	○	●
The total distance traveled by a turtle walking at a constant speed increases over time.	●	○