Computer-Based Released Items
Grade 7 Mathematics
Spring 2021

The spring 2021 grade 7 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 7 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.

2021 Session Sampling

In 2021, due to the COVID-19 pandemic, the Department reduced testing time for students in grades 3–8 through a session sampling approach, in which each student took only a portion of each MCAS assessment. Instead of taking two sessions in each subject, individual students took one session each.

Grade 7 Mathematics
Spring 2021 Computer-Based Released Operational Items

CBT Item No.	Reporting Category	Standard	Item Type*	Item Description	Correct Answer**
1	Expressions and Equations	7.EE.B.3	SA	Use operations with a fraction and a percentage to solve a real-world problem and represent the solution in a fraction model.	*see page 6*
2	The Number System	7.NS.A.2	CR	Use operations with positive and negative rational numbers to solve mathematical problems.	*see page 6*
3	Expressions and Equations	7.EE.A.1	SR	Apply the distributive property to determine which expression is equivalent to a given expression.	C
4	Ratios and Proportional Relationships	7.RP.A.1	SR	Identify multiple rates associated with given fractional ratios in a real-world problem.	*see page 7*
5	Expressions and Equations	7.EE.A.1	SR	Apply properties of addition to determine which expression is not equivalent to a given expression.	A
6	Ratios and Proportional Relationships	7.RP.A.2	SR	Determine which equation models a proportional relationship shown in a table.	B
7	Geometry	7.G.A.1	SR	Determine the scale used in a given real-world context.	C
8	The Number System	7.NS.A.1	SR	Represent distance on a number line using an absolute value expression.	B
9	Expressions and Equations	7.EE.B.4	SA	Solve an equation of the form px + q = r.	-20
10	Statistics and Probability	7.SP.C.5	SA	Determine the likelihood of an event in a real-world context.	*see page 7*
11	The Number System	7.NS.A.3	SR	Solve a multi-step, real-world problem by converting units.	C
12	Statistics and Probability	7.SP.A.1	SR	Determine which sampling strategy will produce a valid sample that represents a specific population.	D
13	Statistics and Probability	7.SP.C.6	SR	Determine which range of expected probabilities best predicts a random outcome.	C

14	Statistics and Probability	7.SP.B.4	SR	Complete statements to compare the medians and ranges of two data sets.	*see page 7*
15	Geometry	7.G.B.6	CR	Solve real-world problems involving area and volume for right prisms of varying dimensions.	*see page 8*
16	Statistics and Probability	7.SP.C.8	SA	Determine the probability of a compound event, given a tree diagram.	*see page 8*
17	Ratios and Proportional Relationships	7.RP.A.2	SA	Use proportional reasoning to solve a real-world problem and write an equation to represent the proportional relationship shown in a table.	*see page 9*
18	Expressions and Equations	7.EE.A.2	SR	Determine which expression can be used to represent a real-world problem involving area.	A
19	Statistics and Probability	7.SP.A.2	SA	Use data from a random sample to draw an inference about a population and create a bar graph to represent the inference.	*see page 9*
20	Ratios and Proportional Relationships	7.RP.A.3	SA	Use proportional reasoning to solve a two-step simple interest problem.	765

* 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 6 through 9 of this document provide correct answers for technology-enhanced (TE) items and scoring rubrics for constructed-response items. Sample responses and scoring guidelines for constructed-response items will be posted to the Department's website later this year.
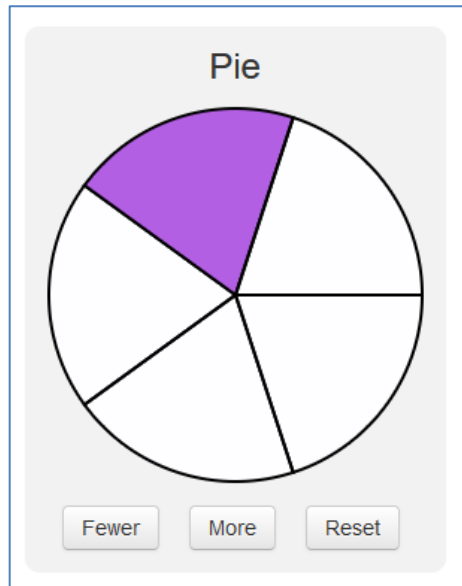
Grade 7 Mathematics
Spring 2021 Computer-Based Unreleased Operational Items

CBT Item No.	Reporting Category	Standard	Item Type*	Item Description
21	The Number System	7.NS.A.3	SA	Solve a real-world problem involving addition and subtraction with decimals.
22	Geometry	7.G.B.6	SA	Solve a real-world problem involving the area of a two-dimensional object.
23	Ratios and Proportional Relationships	7.RP.A.3	SR	Use ratio and proportional reasoning to calculate actual distance given a scale on a map.
24	Expressions and Equations	7.EE.B.3	SR	Determine which equation is equivalent to a given equation.
25	The Number System	7.NS.A.3	SA	Use operations with positive and negative integers to solve a given real-world problem involving temperature.
26	Expressions and Equations	7.EE.B.3	SA	Solve a multi-step, real-world problem using rational numbers in different forms.
27	Statistics and Probability	7.SP.C.7	CR	Develop a probability model from a visual model, develop another probability model from a set of data, and explain the differences in predictions made from both models.
28	The Number System	7.NS.A.1	SA	Graph on a number line a point representing the additive inverse of a number.
29	Expressions and Equations	7.EE.B.3	SA	Solve a multi-step, real-world problem involving fractions, decimals, and percentages.
30	Expressions and Equations	7.EE.A.2	SR	Determine which expression is not equivalent to a given expression within a real-world context.
31	Expressions and Equations	7.EE.A.1	SR	Use properties of operations to determine which expression is equivalent to a given expression.
32	Geometry	7.G.B.5	SR	Identify angles in a diagram that represent vertical angles.
33	Ratios and Proportional Relationships	7.RP.A.3	CR	Use proportional relationships to solve multi-step ratio, rate, and percent problems within a real-world context.
34	Geometry	7.G.A.1	SR	Determine the area of a scale drawing.

35	Ratios and Proportional Relationships	7.RP.A.2	SR	Determine which equation can be used to represent a proportional relationship in a table.
36	The Number System	7.NS.A.3	SA	Use operations with decimals to solve a real-world problem.
37	Expressions and Equations	7.EE.A.2	SR	Rewrite an expression in a different form and then evaluate the expression for a given value.
38	Statistics and Probability	7.SP.C.5	SR	Determine how likely an event is to occur given the probability of the event.
39	Expressions and Equations	7.EE.B.4	SA	Solve a real-world problem involving the maximum value of an inequality.
40	The Number System	7.NS.A.3	SR	Solve a multi-step, real-world problem by converting units.

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

Correct Answer for CBT Item #1: Technology-Enhanced Item

Rubric for CBT Item #2: Constructed Response

	Scoring Guide
Score	Description
4	The student response demonstrates an exemplary understanding of the Number System concepts involved in applying and extending previous understandings of multiplication and division and of fractions to multiply and divide integers and other rational numbers. The student explains if the quotient of an integer and a fraction is a rational number.
3	The student response demonstrates a good understanding of the Number System concepts involved in applying and extending previous understandings of multiplication and division and of fractions to multiply and divide integers and other rational numbers. 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 Number System concepts involved in applying and extending previous understandings of multiplication and division and of fractions to multiply and divide integers and other rational numbers. 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 Number System concepts involved in applying and extending previous understandings of multiplication and division and of fractions to multiply and divide integers and other rational numbers.
0	The student response contains insufficient evidence of an understanding of the Number System concepts involved in applying and extending previous understandings of multiplication and division and of fractions to multiply and divide integers and other rational numbers. As a result, the response does not merit any points.

Correct Answer for CBT Item #4: Technology-Enhanced Item

	$\frac{1}{10}$ cup	$\frac{1}{8}$ cup	$1\frac{3}{5}$ cups	2 cups	3 cups
blueberries	○	○	○	⦿	○
strawberries	○	○	⦿	○	○

Correct Answer for CBT Item #10: Technology-Enhanced Item

$$\frac{5}{11}$$

↶	+	−	×	÷	⊟	⊞
↷	y^x	$\sqrt{\ }$	$\sqrt[3]{\ }$	=	(·)	%
🗑		▼				

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

The median age of the attendees in the yoga class is [greater than ˅] the median age of the attendees in the dance class.

The range of ages of the attendees in the yoga class is [the same as ˅] the range of ages of the attendees in the dance class.

Rubric for CBT Item #15: Constructed Response

Score	Description
	Scoring Guide
4	The student response demonstrates an exemplary understanding of the Geometry concepts involved in solving real-world problems involving area and volume of two- and three-dimensional objects composed of quadrilaterals, polygons, cubes and right prisms. Given a set of parameters, the student finds the dimensions of a right rectangular prism.
3	The student response demonstrates a good understanding of the Geometry concepts involved in solving real-world problems involving area and volume of two- and three-dimensional objects composed of quadrilaterals, polygons, cubes and right prisms. 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 Geometry concepts involved in solving real-world problems involving area and volume of two- and three-dimensional objects composed of quadrilaterals, polygons, cubes and right prisms. 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 Geometry concepts involved in solving real-world problems involving area and volume of two- and three-dimensional objects composed of quadrilaterals, polygons, cubes and right prisms.
0	The student response contains insufficient evidence of an understanding of the Geometry concepts involved in solving real-world problems involving area and volume of two- and three-dimensional objects composed of quadrilaterals, polygons, cubes and right prisms. As a result, the response does not merit any points.

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

$$\frac{3}{18}$$ OR Equivalent
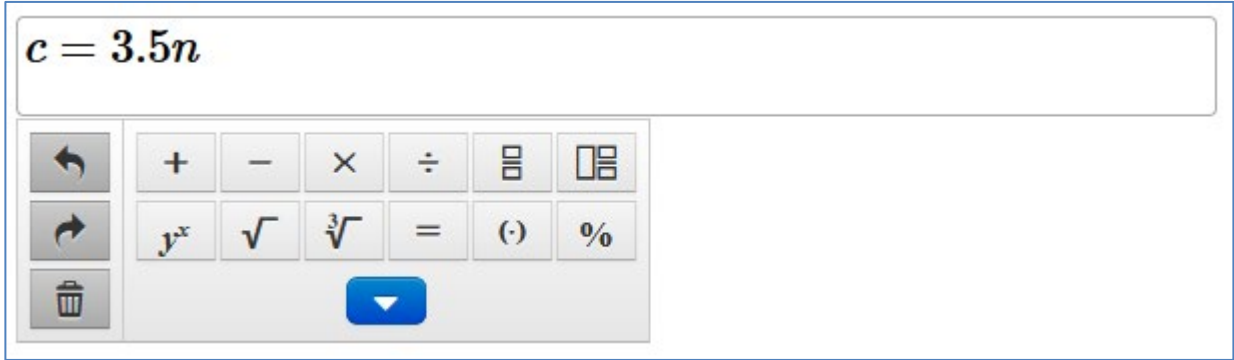
Correct Answer for CBT Item #17: Technology-Enhanced Item

Part A: C

Part B:

$$c = 3.5n$$

Correct Answer for CBT Item #19: Technology-Enhanced Item