Computer-Based Released Items
Grade 5 Mathematics
Spring 2021

The spring 2021 grade 5 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 5 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 5 Mathematics
Spring 2021 Computer-Based Released Operational Items

CBT Item No.	Reporting Category	Standard	Item Type*	Item Description	Correct Answer**
1	Number and Operations in Base Ten	5.NBT.B.7	SR	Solve a real-world problem involving addition and multiplication of money.	B
2	Measurement and Data	5.MD.C.4	SA	Solve a real-world volume problem by counting unit cubes.	30
3	Number and Operations in Base Ten	5.NBT.A.1	SR	Demonstrate understanding of place value by selecting multi-digit decimal numbers that have a digit that is one-tenth the value of the same digit in a given number.	*see page 6*
4	Operations and Algebraic Thinking	5.OA.B.3	CR	Given the rules for two patterns, determine the first several terms of each pattern and create and graph ordered pairs using corresponding terms of the two patterns.	*see page 6*
5	Measurement and Data	5.MD.A.1	SR	Solve a real-world word problem by converting milliliters to liters.	C
6	Measurement and Data	5.MD.B.2	SA	Complete a line plot to display a set of data measurements given as mixed numbers with unlike denominators.	*see page 7*
7	Number and Operations in Base Ten	5.NBT.A.4	SR	Round a decimal number to the nearest whole number.	D
8	Geometry	5.G.B.4	SR	Identify which statement is true about the properties of special quadrilaterals.	C
9	Number and Operations in Base Ten	5.NBT.B.5	SR	Multiply a three-digit whole number by a two-digit whole number.	D
10	Number and Operations in Base Ten	5.NBT.A.2	SR	Identify which power of ten is equivalent to a given whole number.	C
11	Number and Operations in Base Ten	5.NBT.A.4	SA	Round a decimal to the nearest tenth.	375.9
12	Number and Operations-Fractions	5.NF.B.6	CR	Write an equation to represent a given problem and multiply fractions and whole numbers to solve real-world problems.	*see page 7*
13	Measurement and Data	5.MD.C.5	SR	Determine which right rectangular prism, shown with side lengths, has the greatest volume.	B

14	Measurement and Data	5.MD.A.1	SA	Order measures of weight expressed in different units from least to greatest value.	*see page 8*
15	Number and Operations in Base Ten	5.NBT.A.3	SR	Select which expressions correctly show a decimal to the thousandths in expanded form.	B,E
16	Number and Operations-Fractions	5.NF.B.5	SA	Identify expressions with a product greater than a given factor and write a fraction that can be multiplied by a whole number to get a product less than that whole number.	*see page 8*
17	Geometry	5.G.A.1	SR	Given an ordered pair, select the statement that correctly describes the location of the point represented by the ordered pair in relation to the origin on a coordinate plane.	B
18	Number and Operations-Fractions	5.NF.B.4	SA	Find the product of a fraction and a whole number.	*see page 8*
19	Operations and Algebraic Thinking	5.OA.A.1	SR	Determine the value of a given expression with parentheses.	D
20	Measurement and Data	5.MD.C.4	SA	Find the volume of a figure by counting cubes with given dimensions.	12

* 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 8 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 5 Mathematics
Spring 2021 Computer-Based Unreleased Operational Items

CBT Item No.	Reporting Category	Standard	Item Type*	Item Description
21	Geometry	5.G.B.3	SR	Determine which triangle meets specified criteria based on the given side lengths of each triangle.
22	Operations and Algebraic Thinking	5.OA.A.1	SR	Determine which expression with parentheses has an equivalent value if the parentheses are removed.
23	Number and Operations- Fractions	5.NF.A.1	SR	Identify which expression can be used to solve an addition problem by replacing given fractions with equivalent fractions with like denominators.
24	Number and Operations- Fractions	5.NF.B.5	SR	Given several expressions, determine whether the product of each expression is greater than, less than, or equal to the value of a given factor of the expression.
25	Number and Operations in Base Ten	5.NBT.B.7	SR	Divide a decimal to hundredths by a whole number.
26	Measurement and Data	5.MD.C.5	CR	Write an equation to find the volume of a given prism, find the total volume of two prisms placed together, and determine a set of dimensions that will result in a given volume.
27	Number and Operations- Fractions	5.NF.B.7	SR	Create a division equation involving a whole number and a unit fraction where the quotient is the solution to a word problem.
28	Number and Operations- Fractions	5.NF.A.2	SR	Estimate the sum of two fractions that are less than one to solve a word problem.
29	Number and Operations in Base Ten	5.NBT.A.3	SR	Match decimal numbers in expanded form with decimals in number form and compare two decimal numbers to thousandths.
30	Number and Operations in Base Ten	5.NBT.B.5	SA	Determine the product of two three-digit numbers.
31	Operations and Algebraic Thinking	5.OA.A.2	SR	Identify the word form of a given numerical expression.
32	Number and Operations- Fractions	5.NF.B.7	SA	Determine the quotient of a whole number divided by a fraction in a real-world context.
33	Geometry	5.G.B.4	SR	Classify triangles based on angle and side properties.
34	Geometry	5.G.A.2	SA	Graph three points in the first quadrant of the coordinate plane.

35	Number and Operations in Base Ten	5.NBT.B.6	CR	Write an equation to solve a real-world problem, critique another student's reasoning of the problem, and solve a similar problem using division with whole numbers.
36	Number and Operations in Base Ten	5.NBT.A.1	SR	Determine the relationship of the value of a digit in one number compared to the value of that digit in another number.
37	Number and Operations-Fractions	5.NF.B.6	SR	Determine the product of a mixed number and a fraction to solve a real-world problem.
38	Geometry	5.G.B.3	SR	Identify shapes that have two pairs of opposite angles that are congruent.
39	Operations and Algebraic Thinking	5.OA.A.2	SR	Select the numerical expression, with parentheses, that represents a given word expression.
40	Number and Operations-Fractions	5.NF.B.3	SR	Determine the fraction that represents a given word problem.

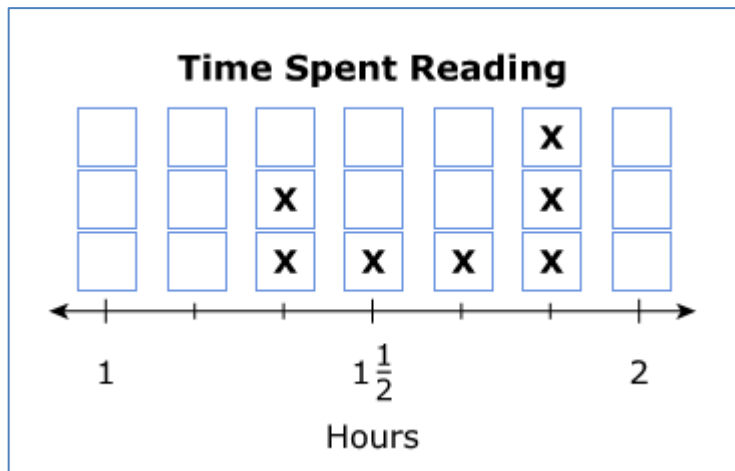* Mathematics item types are selected-response (SR), short-answer (SA), and constructed-response (CR).

Correct Answer for CBT Item #3: Technology-Enhanced Item

146.792	219.73	394.821
429.13	593.427	**652.49**

Rubric for CBT Item #4: Constructed Response

<table>
<tr><th colspan="2">Scoring Guide</th></tr>
<tr><th>Score</th><th>Description</th></tr>
<tr><td>4</td><td>The student response demonstrates an exemplary understanding of the Operations & Algebraic Thinking concepts involved in generating two numerical patterns using two given rules, identifying apparent relationships between corresponding terms, forming ordered pairs consisting of corresponding terms from the two patterns, and graphing the ordered pairs on a coordinate plane. The student correctly determines the first four terms of two patterns given the rules, creates ordered pairs from the corresponding terms in the patterns, and graphs the ordered pairs.</td></tr>
<tr><td>3</td><td>The student response demonstrates a good understanding of the Operations & Algebraic Thinking concepts involved in generating two numerical patterns using two given rules, identifying apparent relationships between corresponding terms, forming ordered pairs consisting of corresponding terms from the two patterns, and graphing the ordered pairs on a coordinate plane. 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.</td></tr>
<tr><td>2</td><td>The student response demonstrates a fair understanding of the Operations & Algebraic Thinking concepts involved in generating two numerical patterns using two given rules, identifying apparent relationships between corresponding terms, forming ordered pairs consisting of corresponding terms from the two patterns, and graphing the ordered pairs on a coordinate plane. The mixed evidence provided by the student merits 2 points.</td></tr>
<tr><td>1</td><td>The student response demonstrates a minimal understanding of the Operations & Algebraic Thinking concepts involved in generating two numerical patterns using two given rules, identifying apparent relationships between corresponding terms, forming ordered pairs consisting of corresponding terms from the two patterns, and graphing the ordered pairs on a coordinate plane.</td></tr>
<tr><td>0</td><td>The student response contains insufficient evidence of an understanding of the Operations & Algebraic Thinking concepts involved in generating two numerical patterns using two given rules, identifying apparent relationships between corresponding terms, forming ordered pairs consisting of corresponding terms from the two patterns, and graphing the ordered pairs on a coordinate plane. As a result, the response does not merit any points.</td></tr>
</table>

Correct Answer for CBT Item #6: Technology-Enhanced Item

Rubric for CBT Item #12: Constructed Response

	Scoring Guide
Score	Description
4	The student response demonstrates an exemplary understanding of the Numbers and Operations - Fractions concepts involved in solving real-world problems that require multiplication of fractions and mixed numbers. The student correctly writes an equation and multiplies fractions and whole numbers to solve real-world problems.
3	The student response demonstrates a good understanding of the Numbers and Operations - Fractions concepts involved in solving real-world problems that require multiplication of fractions and mixed 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 Numbers and Operations - Fractions concepts involved in solving real-world problems that require multiplication of fractions and mixed 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 Numbers and Operations - Fractions concepts involved in solving real-world problems that require multiplication of fractions and mixed numbers.
0	The student response contains insufficient evidence of an understanding of the Numbers and Operations - Fractions concepts involved in solving real-world problems that require multiplication of fractions and mixed numbers. As a result, the response does not merit any points.

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

Least			Greatest
26 ounces	2 pounds	46 ounces	3 pounds

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

Part A:

$\frac{2}{3} \times \frac{7}{8}$ $\boxed{\frac{2}{3} \times \frac{3}{2}}$ $\frac{2}{3} \times \frac{3}{5}$ $\frac{2}{3} \times \frac{3}{3}$ $\boxed{\frac{2}{3} \times 3}$ $\boxed{\frac{2}{3} \times 1\frac{1}{8}}$

Part B:

$$\frac{1}{3}$$

↶	+	−	×	÷	▯	▱	y^x
↷	=	<	>	(·)	[·]	$	°
🗑							

OR Any fraction less than 1.

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

$$\frac{18}{4}$$

↶	+	−	×	÷	▯	▱	y^x
↷	=	<	>	(·)	[·]	$	°
🗑							

OR Equivalent