MASSACHUSETTS
Department of Elementary
and Secondary Education

# *Release of Spring 2024 MCAS Test Information*

*from the*

# *Grade 7 Mathematics Test*

**June 2024**
**Massachusetts Department of Elementary and Secondary Education**

MASSACHUSETTS
Department of Elementary
and Secondary Education

This document was prepared by the
Massachusetts Department of Elementary and Secondary Education
Russell D. Johnston
Acting Commissioner



Massachusetts Department of Elementary and Secondary Education
135 Santilli Highway, Everett, MA 02149
Phone 781-338-3000 TTY: N.E.T. Relay 800-439-2370
www.doe.mass.edu

# *Overview of Grade 7 Mathematics Test*

The spring 2024 grade 7 Mathematics test was administered in two formats: a computer-based version and a paper-based version. Most students took the computer-based test. The paper-based test was offered as an accommodation for eligible students who were unable to use a computer. More information can be found on the MCAS Test Administration Resources page at www.doe.mass.edu/mcas/admin.html.

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.

The Department is not releasing items from the spring 2024 MCAS grades 3–8 tests. Released items from previous years' computer-based tests are available on the MCAS Resource Center website at mcas.pearsonsupport.com/released-items.

## Test Sessions and Content Overview

The grade 7 Mathematics test was made up of two separate test sessions. Each session included selected-response, short-answer, and constructed-response questions. On the paper-based test, the selected-response questions were multiple-choice items and multiple-select items, in which students select the correct answer(s) from among several answer options.

## Standards and Reporting Categories

The grade 7 Mathematics test was based on standards in the five domains for grade 7 in the *Massachusetts Curriculum Framework for Mathematics* (2017). The five domains are listed below.

- Ratios and Proportional Relationships
- The Number System
- Expressions and Equations
- Geometry
- Statistics and Probability

The *Massachusetts Curriculum Framework for Mathematics* is available on the Department website at www.doe.mass.edu/frameworks/current.html.

Mathematics test results are reported under five MCAS reporting categories, which are identical to the five framework domains listed above.

The tables at the conclusion of this document provide the following information about each operational item: reporting category, standard(s) covered, item type, and item description.

## Reference Materials and Tools

Each student taking the grade 7 Mathematics test was provided with a ruler and a grade 7 Mathematics Reference Sheet. A copy of the reference sheet can be found on the next page of this document.

During Session 2, each student had sole access to a calculator. Calculator use was not allowed during Session 1.

During both Mathematics test sessions, the use of authorized bilingual word-to-word dictionaries and glossaries was allowed for students who are currently or were ever reported as English learners. No other reference tools or materials were allowed.

MASSACHUSETTS
Department of Elementary and Secondary Education

# Massachusetts Comprehensive Assessment System
# Grade 7 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 . . . . . $A = bh$
OR
$A = lw$

parallelogram . . $A = bh$

triangle . . . . . $A = \frac{1}{2}bh$

trapezoid . . . . . $A = \frac{1}{2}h(b_1 + b_2)$

circle . . . . . $A = \pi r^2$

## CIRCLE FORMULAS

area . . . . . $A = \pi r^2$

circumference . . $C = 2\pi r$
OR
$C = \pi d$

## VOLUME ($V$) FORMULAS

cube . . . . . $V = s^3$
($s$ = length of an edge)

right prism . . . . . $V = Bh$

## TOTAL SURFACE AREA ($SA$) FORMULAS

right rectangular prism . . $SA = 2(lw) + 2(hw) + 2(lh)$

# Grade 7 Mathematics
# Spring 2024 Computer-Based Operational Items

| CBT Item No. | Reporting Category | Standard | Item Type* | Item Description |
|---|---|---|---|---|
| 1 | *The Number System* | 7.NS.A.3 | SR | Solve a real-world problem involving the four operations using fractions and mixed numbers. |
| 2 | *Statistics and Probability* | 7.SP.B.3 | SA | Determine the difference of the medians in two different box plots. |
| 3 | *Expressions and Equations* | 7.EE.B.3 | SR | Determine which equation is equivalent to a given equation. |
| 4 | *Statistics and Probability* | 7.SP.C.8 | SR | Find the probability of a compound event using an organized list. |
| 5 | *Geometry* | 7.G.B.5 | CR | Solve a multi-step problem involving simple equations for unknown angles by using facts about supplementary, complementary, vertical, and adjacent angles. |
| 6 | *The Number System* | 7.NS.A.2 | SR | Determine if the products of positive and negative rational numbers have positive or negative values. |
| 7 | *Ratios and Proportional Relationships* | 7.RP.A.2 | SA | Determine the unit rate in a real-world problem, given a graph. |
| 8 | *The Number System* | 7.NS.A.2 | SA | Convert a fraction into a decimal. |
| 9 | *Ratios and Proportional Relationships* | 7.RP.A.1 | SR | Determine the unit rate associated with ratios of fractions in a real-world context. |
| 10 | *Expressions and Equations* | 7.EE.A.1 | SR | Use the distributive property to determine which linear expressions are equivalent to a given expression. |
| 11 | *The Number System* | 7.NS.A.2 | SA | Determine one of the values of a variable that will make an algebraic expression positive and rational. |
| 12 | *Expressions and Equations* | 7.EE.B.4 | CR | Write and solve expressions and inequalities to model a real-world problem. |
| 13 | *Ratios and Proportional Relationships* | 7.RP.A.1 | SR | Determine the unit rate associated with ratios of fractions and use the unit rate to solve a real-world problem. |
| 14 | *Geometry* | 7.G.A.3 | SR | Determine the two-dimensional shapes of the faces of figures that result from slicing both a cube and a pyramid in given directions. |
| 15 | *Expressions and Equations* | 7.EE.A.2 | SR | Determine which equivalent expressions can be used to represent a real-world problem. |
| 16 | *The Number System* | 7.NS.A.3 | SR | Determine which expression is equivalent to a given expression. |
| 17 | *The Number System* | 7.NS.A.2 | SR | Determine whether fractions convert to a decimal that terminates in 0s. |
| 18 | *Ratios and Proportional Relationships* | 7.RP.A.2 | SA | Use proportional relationships to create an equation that can be used to find a quantity. |
| 19 | *The Number System* | 7.NS.A.1 | SA | Use integers to solve a real-world problem. |
| 20 | *Expressions and Equations* | 7.EE.A.1 | SR | Determine which expression is equivalent to a given expression. |
| 21 | *Ratios and Proportional Relationships* | 7.RP.A.3 | SR | Solve a multi-step, real-world problem involving percent decrease. |
| 22 | *Expressions and Equations* | 7.EE.A.2 | SR | Identify equivalent algebraic expressions for the perimeter of a given rectangle in a real-world context. |
| 23 | *Statistics and Probability* | 7.SP.B.4 | SR | Compare the mean and range of two data sets. |
| 24 | *Ratios and Proportional Relationships* | 7.RP.A.2 | SR | Determine which proportion represents a given real-world relationship. |
| 25 | *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. |
| 26 | *Statistics and Probability* | 7.SP.C.5 | SR | Determine which probability could represent the likelihood of an event in a real-world context. |

| CBT Item No. | Reporting Category | Standard | Item Type* | Item Description |
|---|---|---|---|---|
| 27 | *Expressions and Equations* | 7.EE.B.4 | SR | Determine which inequality represents a real-world context. |
| 28 | *Statistics and Probability* | 7.SP.C.6 | SR | Determine the probabilities of chance events within a simple context. |
| 29 | *Statistics and Probability* | 7.SP.A.1 | SR | Determine which sampling strategy will produce a valid representative sample for a given population. |
| 30 | *The Number System* | 7.NS.A.3 | SA | Solve a multi-step, real-world problem involving percents and fractions and using money as a context. |
| 31 | *Expressions and Equations* | 7.EE.A.2 | SR | Rewrite an expression in a different form and then evaluate the expression for a given value. |
| 32 | *Statistics and Probability* | 7.SP.C.8 | CR | Determine probabilities of compound events and use these probabilities to solve mathematical problems. |
| 33 | *Geometry* | 7.G.A.1 | SR | Given a real-world context and a scale drawing in the shape of a rectangle, calculate actual side lengths and missing side lengths of the scale drawing. |
| 34 | *The Number System* | 7.NS.A.3 | SA | Solve real-world problems involving whole numbers, fractions, and mixed numbers. |
| 35 | *Expressions and Equations* | 7.EE.B.3 | SR | Solve a multi-step, real-life problem involving a positive whole number, a percent, and a fraction. |
| 36 | *Geometry* | 7.G.A.2 | SA | Draw a geometric shape with given conditions. |
| 37 | *Ratios and Proportional Relationships* | 7.RP.A.3 | SR | Determine the percent increase in a real-world problem. |
| 38 | *The Number System* | 7.NS.A.3 | SA | Compute with and order rational numbers in a real-world situation. |
| 39 | *Expressions and Equations* | 7.EE.A.1 | SR | Apply properties of operations to add and subtract linear expressions with rational coefficients. |
| 40 | *Statistics and Probability* | 7.SP.C.8 | SR | Determine the probability of a compound event, given a verbal description of a real-world sample space. |

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

# Grade 7 Mathematics
# Spring 2024 Paper-Based Operational Items

| PBT Item No. | Reporting Category | Standard | Item Type* | Item Description |
|---|---|---|---|---|
| 1 | *The Number System* | 7.NS.A.3 | SR | Solve a real-world problem involving the four operations using fractions and mixed numbers. |
| 2 | *Statistics and Probability* | 7.SP.B.3 | SA | Determine the difference of the medians in two different box plots. |
| 3 | *Expressions and Equations* | 7.EE.B.3 | SR | Determine which equation is equivalent to a given equation. |
| 4 | *Statistics and Probability* | 7.SP.C.8 | SR | Find the probability of a compound event using an organized list. |
| 5 | *Geometry* | 7.G.B.5 | CR | Solve a multi-step problem involving simple equations for unknown angles by using facts about supplementary, complementary, vertical, and adjacent angles. |
| 6 | *The Number System* | 7.NS.A.2 | SR | Determine if the products of positive and negative rational numbers have positive or negative values. |
| 7 | *Ratios and Proportional Relationships* | 7.RP.A.2 | SA | Determine the unit rate in a real-world problem, given a graph. |
| 8 | *The Number System* | 7.NS.A.2 | SA | Convert a fraction into a decimal. |
| 9 | *Ratios and Proportional Relationships* | 7.RP.A.1 | SR | Determine the unit rate associated with ratios of fractions in a real-world context. |
| 10 | *Expressions and Equations* | 7.EE.A.1 | SR | Use the distributive property to determine which linear expressions are equivalent to a given expression. |
| 11 | *The Number System* | 7.NS.A.2 | SA | Determine one of the values of a variable that will make an algebraic expression positive and rational. |
| 12 | *Expressions and Equations* | 7.EE.B.4 | CR | Write and solve expressions and inequalities to model a real-world problem. |
| 13 | *Ratios and Proportional Relationships* | 7.RP.A.1 | SR | Determine the unit rate associated with ratios of fractions and use the unit rate to solve a real-world problem. |
| 14 | *Geometry* | 7.G.A.3 | SR | Determine the two-dimensional shapes of the faces of figures that result from slicing both a cube and a pyramid in given directions. |
| 15 | *Expressions and Equations* | 7.EE.A.2 | SR | Determine which equivalent expressions can be used to represent a real-world problem. |
| 16 | *The Number System* | 7.NS.A.3 | SR | Determine which expression is equivalent to a given expression. |
| 17 | *The Number System* | 7.NS.A.2 | SR | Determine whether fractions convert to a decimal that terminates in 0s. |
| 18 | *Ratios and Proportional Relationships* | 7.RP.A.2 | SR | Use proportional relationships to choose an equation that can be used to find a quantity. |
| 19 | *The Number System* | 7.NS.A.1 | SA | Use integers to solve a real-world problem. |
| 20 | *Expressions and Equations* | 7.EE.A.1 | SR | Determine which expression is equivalent to a given expression. |
| 21 | *Ratios and Proportional Relationships* | 7.RP.A.3 | SR | Solve a multi-step, real-world problem involving percent decrease. |
| 22 | *Expressions and Equations* | 7.EE.A.2 | SR | Identify equivalent algebraic expressions for the perimeter of a given rectangle in a real-world context. |
| 23 | *Statistics and Probability* | 7.SP.B.4 | SR | Determine which sentences that compare the mean and range of two data sets are true. |
| 24 | *Ratios and Proportional Relationships* | 7.RP.A.2 | SR | Determine which proportion represents a given real-world relationship. |
| 25 | *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. |
| 26 | *Statistics and Probability* | 7.SP.C.5 | SR | Determine which probability could represent the likelihood of an event in a real-world context. |

| PBT Item No. | Reporting Category | Standard | Item Type* | Item Description |
|---|---|---|---|---|
| 27 | *Expressions and Equations* | 7.EE.B.4 | SR | Determine which inequality represents a real-world context. |
| 28 | *Statistics and Probability* | 7.SP.C.6 | SR | Determine the probabilities of chance events within a simple context. |
| 29 | *Statistics and Probability* | 7.SP.A.1 | SR | Determine which sampling strategy will produce a valid representative sample for a given population. |
| 30 | *The Number System* | 7.NS.A.3 | SA | Solve a multi-step, real-world problem involving percents and fractions and using money as a context. |
| 31 | *Expressions and Equations* | 7.EE.A.2 | SR | Identify an expression equivalent to given expression and then evaluate the expression for a given value. |
| 32 | *Statistics and Probability* | 7.SP.C.8 | CR | Determine probabilities of compound events and use these probabilities to solve mathematical problems. |
| 33 | *Geometry* | 7.G.A.1 | SR | Given a real-world context and a scale drawing in the shape of a rectangle, calculate actual side lengths and missing side lengths of the scale drawing. |
| 34 | *The Number System* | 7.NS.A.3 | SA | Solve real-world problems involving whole numbers, fractions, and mixed numbers. |
| 35 | *Expressions and Equations* | 7.EE.B.3 | SR | Solve a multi-step, real-life problem involving a positive whole number, a percent, and a fraction. |
| 36 | *Geometry* | 7.G.A.2 | SR | Identify the graph that shows a geometric shape with given conditions. |
| 37 | *Ratios and Proportional Relationships* | 7.RP.A.3 | SR | Determine the percent increase in a real-world problem. |
| 38 | *The Number System* | 7.NS.A.3 | SR | Compute with and order rational numbers in a real-world situation. |
| 39 | *Expressions and Equations* | 7.EE.A.1 | SR | Apply properties of operations to add and subtract linear expressions with rational coefficients. |
| 40 | *Statistics and Probability* | 7.SP.C.8 | SR | Determine the probability of a compound event, given a verbal description of a real-world sample space. |

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