XI. Mathematics, Grade 5

Grade 5 Mathematics Test

The spring 2017 grade 5 Mathematics test was a next-generation assessment, featuring a new test design and new item types. The test was administered in two formats: a computer-based version and a paper-based version. The test included both operational items, which count toward a student's score, and matrix items. The matrix portion of the test consisted of field-test questions that do not count toward a student's score.

In general, all students were administered the same operational items, regardless of whether they took the computer-based test or the paper-based test. In some instances, the wording or content of a paper item differed slightly from the computer-based version. More information about the differences between the computer-based and paper-based tests will be posted to the MCAS website at www.doe.mass.edu/mcas/.

This document displays the **paper-based versions** of the 2017 operational items that have been released. The **computer-based versions** of the released items are available on the MCAS Resource Center website at mcas.pearsonsupport.com.

Test Sessions and Content Overview

The grade 5 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 5 Mathematics test was based on standards in the five major domains for grade 5 in the *Massachusetts Curriculum Framework for Mathematics* (March 2011). The grade 5 standards can be found on pages 48–52 in the *Framework*, and the five major domains are listed below.

- Operations and Algebraic Thinking
- Number and Operations in Base Ten
- Number and Operations—Fractions
- Measurement and Data
- Geometry

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 chapter provide the following information about each released and unreleased operational item: reporting category, standard(s) covered, item type, and item description. The correct answers for released selected-response and short-answer questions are also displayed in the released item table.

Reference Materials and Tools

Each student taking the paper-based version of the grade 5 Mathematics test was provided with a plastic ruler and a grade 5 Mathematics Reference Sheet. A copy of the reference sheet follows the final question in this chapter. An image of the ruler is not reproduced in this publication.

During both Mathematics test sessions, the use of bilingual word-to-word dictionaries was allowed for current and former English language learner students only. No calculators, other reference tools, or materials were allowed.

Grade 5 Mathematics

This session contains 5 questions.

You may use your reference sheet during this session.
*You may **not** use a calculator during this session.*

Directions

Read each question carefully and then answer it as well as you can. You must record all answers in your Student Answer Booklet.

For some questions, you will mark your answers by filling in the circles in your Student Answer Booklet. Make sure you darken the circles completely. Do not make any marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely.

For other questions, you will need to fill in an answer grid. Directions for completing questions with answer grids are provided on the next page.

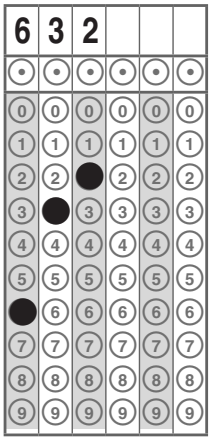
If a question asks you to show or explain your work, you must do so to receive full credit. Write your response in the space provided in your Student Answer Booklet. Only responses written within the provided space will be scored.

Directions for Completing Questions with Answer Grids

1. Work the question and find an answer.
2. Write your answer in the boxes at the top of the grid.
3. Print only one number or symbol in each box. Do not leave a blank box in the middle of an answer.
4. Under each box, fill in the circle that matches the number or symbol you wrote above. Make a solid mark that completely fills the circle.
5. Do not fill in a circle under an unused box.
6. If you need to change an answer, be sure to erase your first answer completely.
7. See below for examples on how to correctly complete an answer grid.

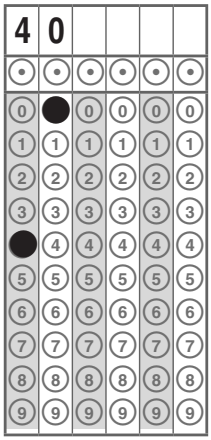
EXAMPLES

To answer 632 in a question, fill in the answer grid as shown below.



A brick path has 10 rows of 4 bricks. What is the total number of bricks in the path?

Enter your answer in the box.



Mathematics

1 There are 720 students at a school. All the students at the school are going on a field trip to a science museum. The students will ride school buses to the museum. Each bus holds 60 students when completely full.

Part A

What is the least number of buses needed to take **all** the students from the school to the science museum? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

Part B

Write an equation to represent the problem you solved in Part A.

Enter your equation in the space provided. Enter **only** your equation.

Part C

The school can also use smaller buses to take the students to the museum. Each smaller bus holds 50 students when completely full.

What is the least number of smaller buses needed to take **all** the students from the school to the science museum? Show or explain how you got your answer.

Enter your answer and your work or explanation in the space provided.

2 At a café, the cost of a turkey sandwich is $1 less than twice the cost of a side salad. A side salad costs $3.50.

Which of the following expressions can be used to find the cost, in dollars, of a turkey sandwich at the café?

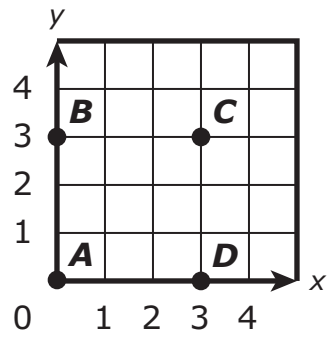
A. $3.50 \times 2 - 1$

B. $3.50 \times 2 + 1$

C. $(3.50 - 1) \times 2$

D. $(3.50 + 1) \times 2$

3 Raul plotted point *A*, point *B*, point *C*, and point *D* on a grid, as shown.



Which of Raul's points is best represented by the ordered pair (3, 0)?

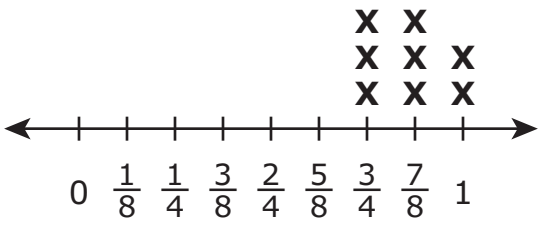
A. point *A*

B. point *B*

C. point *C*

D. point *D*

4 A soccer coach bought eight soccer balls. This line plot shows the weight of each ball the coach bought.



Weight of Soccer Balls
(in pounds)

What is the total weight, in pounds, of all the soccer balls the coach bought?

A. $2\frac{5}{8}$

B. $4\frac{1}{2}$

C. $6\frac{7}{8}$

D. $7\frac{5}{8}$

5 Ashley's ladder is 1.85 meters high. What is the height, in **centimeters**, of Ashley's ladder?

Enter your answer in the box.

MASSACHUSETTS DEPARTMENT OF ELEMENTARY AND SECONDARY EDUCATION

Massachusetts Comprehensive Assessment System
Grade 5 Mathematics Reference Sheet

CONVERSIONS

1 cup = 8 fluid ounces
1 pint = 2 cups
1 quart = 2 pints
1 gallon = 4 quarts
1 liter = 1000 cubic centimeters

1 mile = 5280 feet
1 mile = 1760 yards

1 pound = 16 ounces
1 ton = 2000 pounds

AREA (A) FORMULAS

square . . . . . $A = s \times s$
(s = length of a side)

rectangle . . . . . $A = b \times h$
(b = length of base; h = height)
OR
$A = l \times w$
(l = length; w = width)

VOLUME (V) FORMULAS

rectangular prism . . . . . $V = l \times w \times h$
(l = length; w = width; h = height)
OR
$V = B \times h$
(B = area of base; h = height)

Grade 5 Mathematics
Spring 2017 Released Operational Items:
Reporting Categories, Standards, Item Descriptions, and Correct Answers

Item No.	Page No.	Reporting Category	Standard	Item Type*	Description	Correct Answer**
1	155	*Number & Operations in Base Ten*	5.NBT.2.06	CR	Solve real-world problems involving writing equations, and division of a three-digit whole number and a two-digit whole number.	
2	156	*Operations & Algebraic Thinking*	5.OA.1.02	SR	Determine which expression represents a given real-world context.	A
3	157	*Geometry*	5.G.1.01	SR	Determine which point represents the location of a given ordered pair on a coordinate plane.	D
4	158	*Measurement & Data*	5.MD.2.02	SR	Solve a real-world problem presented on a line plot by adding fractions.	C
5	159	*Measurement & Data*	5.MD.1.01	SA	Convert meters to centimeters in a real-world context.	185 centimeters

* 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. Sample responses and scoring guidelines for any constructed-response items will be posted to the Department's website later this year.

Grade 5 Mathematics
Spring 2017 Unreleased Operational Items:
Reporting Categories, Standards, and Item Descriptions

Item No.	Reporting Category	Standard	Item Type*	Description
6	*Geometry*	5.G.1.02	SR	Determine which relationship is represented by points that are graphed in a coordinate plane based on a real-world context.
7	*Operations & Algebraic Thinking*	5.OA.2.03	SR	Determine which number from a pattern corresponds to a number in a second pattern.
8	*Operations & Algebraic Thinking*	5.OA.1.01	SR	Find the value that is equivalent to a given expression with parentheses.
9	*Number & Operations in Base Ten*	5.NBT.2.05	SA	Determine the product of a multiplication problem with a two-digit whole number and a four-digit whole number.
10	*Number & Operations in Base Ten*	5.NBT.1.03.a	SR	Determine the expanded form of a given decimal.
11	*Measurement & Data*	5.MD.3.05.c	SA	Solve problems involving finding the volumes of given rectangular prisms in a real-world context.
12	*Operations & Algebraic Thinking*	5.OA.1.01	SR	Find the value of a given expression with parentheses.
13	*Number & Operations in Base Ten*	5.NBT.1.03	SR	Find the least value from a table that includes mixed numbers and decimals.

Item No.	Reporting Category	Standard	Item Type*	Description
14	*Number & Operations-Fractions*	5.NF.2.04.b	SR	Find the area of a rectangle with fractional side lengths.
15	*Number & Operations-Fractions*	5.NF.1.01	SR	Find the sum of two fractions with unlike denominators.
16	*Number & Operations-Fractions*	5.NF.1.02	SR	Determine whether a student has correctly estimated the sum of two fractions based on benchmark fractions, and choose the best justification for your answer.
17	*Number & Operations-Fractions*	5.NF.2.04.a	SR	Find the product of a fraction and a whole number.
18	*Operations & Algebraic Thinking*	5.OA.2.03	SR	Determine which statement describes two given patterns.
19	*Geometry*	5.G.1.02	SR	Determine which points on a coordinate plane correspond to given ordered pairs.
20	*Number & Operations-Fractions*	5.NF.2.05.a	SR	Determine which number sentence correctly compares the product of a fraction and a whole number to one of the factors.
21	*Measurement & Data*	5.MD.3.05	CR	Solve a real-world problem by finding the volumes of rectangular prisms.
22	*Number & Operations in Base Ten*	5.NBT.1.04	SA	Given a real-world context, round a given decimal to the nearest tenth.
23	*Operations & Algebraic Thinking*	5.OA.1.02	SR	Select the expression that represents its written equivalent.
24	*Number & Operations-Fractions*	5.NF.2.03	SR	Given a real-world context, select the two whole numbers between which a fraction lies.
25	*Number & Operations-Fractions*	5.NF.2.07.b	SR	Determine which visual fraction model represents a whole number divided by a unit fraction.
26	*Number & Operations-Fractions*	5.NF.2.07.c	SA	Determine the quotient of a whole number divided by a fraction in a real-world context.
27	*Geometry*	5.G.2.03	SR	Identify the two-dimensional figures that are rectangles.
28	*Number & Operations-Fractions*	5.NF.1.01	SR	Solve real-world problems by determing the sum of mixed numbers and fractions with unlike denominators.
29	*Operations & Algebraic Thinking*	5.OA.1.01	SR	Find the value of a given expression with parentheses.
30	*Number & Operations in Base Ten*	5.NBT.1.02	SA	Determine the quotient of a decimal and a power of ten.
31	*Measurement & Data*	5.MD.3.04	CR	Find the volume of a figure by counting cubes, and determine the dimensions of a rectangular prism with the same volume in a real-world context.
32	*Operations & Algebraic Thinking*	5.OA.1.01	SA	Determine the value of a given expression with two sets of parentheses.
33	*Operations & Algebraic Thinking*	5.OA.2.03	SR	Select the pattern that follows a rule of another given pattern.
34	*Number & Operations in Base Ten*	5.NBT.2.07	SA	Determine the sum of two decimals based on a real-world context.
35	*Number & Operations-Fractions*	5.NF.2.04.a	SR	Find the product of two fractions based on real-world context.
36	*Number & Operations-Fractions*	5.NF.2.03	SR	Divide whole numbers and determine between which two whole numbers a fraction lies in a real-world context.
37	*Operations & Algebraic Thinking*	5.OA.1.02	SR	Select the expression that represents its written equivalent.
38	*Number & Operations in Base Ten*	5.NBT.2.07	CR	Solve real-world problems involving addition, subtraction and multiplication of decimals.
39	*Number & Operations-Fractions*	5.NF.1.02	SR	Determine which fraction would not be a reasonable estimate for the difference of two fractions with unlike denominators.
40	*Geometry*	5.G.1.01	SA	Determine the *y*-coordinate of a point graphed on a given coordinate plane.

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