X. Mathematics, Grade 4

Grade 4 Mathematics Test

The spring 2017 grade 4 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 4 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 4 Mathematics test was based on standards in the five domains for grade 4 in the *Massachusetts Curriculum Framework for Mathematics* (March 2011). The grade 4 standards can be found on pages 43–47 in the *Framework*, and the five 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 4 Mathematics test was provided with a plastic ruler. 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 4 Mathematics

This session contains 5 questions.

*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.

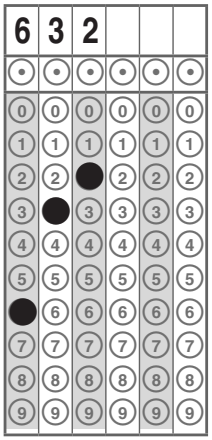
If a question asks you to show or explain your work, you must do so to receive full credit. Write your response in the space provided in your Student Answer Booklet. Only responses written within the provided space will be scored.

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.

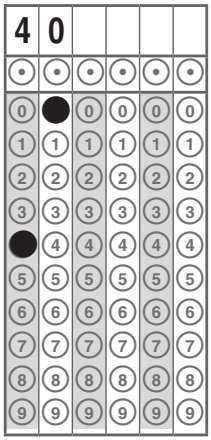
EXAMPLES

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 Mr. Felton will use exactly 42 feet of fencing to surround a garden that is in the shape of a rectangle. His garden has a length of 12 feet. The equation below represents the perimeter of Mr. Felton's garden.

$$w + w + 12 + 12 = 42$$

What is w, the width, in feet, of Mr. Felton's garden?

Enter your answer in the box.

2 Ayanna lives 0.67 mile from a school. Kellen lives farther from the school than Ayanna does.

Which of these could be the distance Kellen lives from the school?

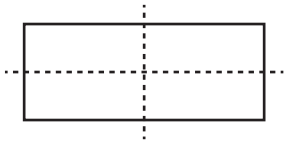
A. 0.59 mile

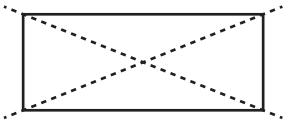
B. 0.74 mile

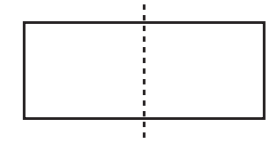
C. 0.48 mile

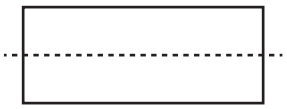
D. 0.61 mile

3 Which of the following rectangles is shown with **all** of its lines of symmetry?

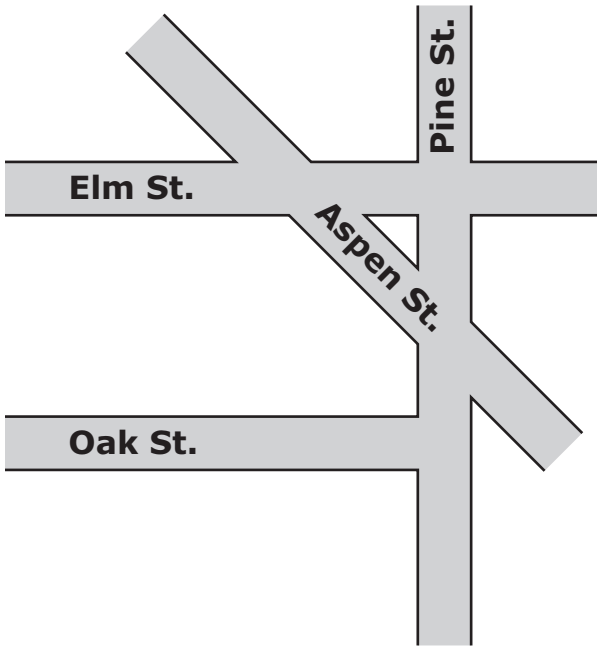
A. 

B. 

C. 

D. 

4 This picture shows some of the streets in Nathan's neighborhood.



Which of the following best represents two streets that are perpendicular?

A. Elm St. and Oak St.

B. Elm St. and Aspen St.

C. Oak St. and Pine St.

D. Pine St. and Aspen St.

5 During art class last week, Carmen put crayons into cups for her art teacher. She put exactly 9 crayons into each cup.

Altogether, Carmen put more than 20 crayons, but fewer than 30 crayons, into the cups.

Part A

What is the total number of crayons that Carmen put into the cups? Explain your reasoning.

Enter your answer and your explanation in the space provided.

Part B

Is your answer to Part A a prime number or a composite number? Explain your reasoning.

Enter your answer and your explanation in the space provided.

Part C

This week, Carmen's art teacher has a total of 28 crayons to put into cups. She wants Carmen to put the same number of crayons into each cup.

Write **all** the factor pairs of 28 that show possible ways Carmen can divide 28 crayons equally to put into cups.

Enter your answer in the space provided.

Grade 4 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	144	*Measurement & Data*	4.MD.1.03	SA	Given the length and perimeter of a rectangle in a real-world context, determine the width of the rectangle.	9 feet
2	145	*Number & Operations-Fractions*	4.NF.3.07	SR	Given a decimal, determine a greater decimal in a real-world context.	B
3	146	*Geometry*	4.G.1.03	SR	Determine which two-dimensional figure shows all of its lines of symmetry.	A
4	147	*Geometry*	4.G.1.01	SR	Identify the lines in a figure that are perpendicular.	C
5	148	*Operations & Algebraic Thinking*	4.OA.2.04	CR	Determine multiples, factors, and whether numbers are prime or composite and justify the reasoning used to determine the answers.	

* 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 4 Mathematics
Spring 2017 Unreleased Operational Items:
Reporting Categories, Standards, and Item Descriptions

Item No.	Reporting Category	Standard	Item Type*	Description
6	*Geometry*	4.G.1.01	SR	Identify the number of right angles in a given two-dimensional figure.
7	*Operations & Algebraic Thinking*	4.OA.1.02	SR	Determine which equation using multiplicative comparison represents a given real-world context.
8	*Number & Operations-Fractions*	4.NF.2.03.b	SR	Determine which expression has a value that is equivalent to a given fraction.
9	*Number & Operations in Base Ten*	4.NBT.2.05	SR	Find the product of a four-digit number and a one-digit number.
10	*Geometry*	4.G.1.03	SA	Determine which figure has a given number of lines of symmetry.
11	*Operations & Algebraic Thinking*	4.OA.1.03	SA	Solve multi-step real-world problems using all four operations and interpret a remainder.
12	*Number & Operations in Base Ten*	4.NBT.1.02	SR	Complete a given number sentence to compare the difference in size between two four-digit numbers.

Item No.	Reporting Category	Standard	Item Type*	Description
13	*Measurement & Data*	4.MD.1.01	SR	Determine which list of metric units is arranged by size based on a given order.
14	*Number & Operations in Base Ten*	4.NBT.2.05	SA	Determine the product of a three-digit number and a one-digit number.
15	*Operations & Algebraic Thinking*	4.OA.1.03	CR	Solve multi-step real-world problems using multiplication and division, and interpret a remainder.
16	*Geometry*	4.G.1.01	SR	Determine which two-dimensional figure has the given number of acute angles.
17	*Number & Operations-Fractions*	4.NF.2.04.b	SR	Determine which expression is equivalent to the product of a whole number and a fraction.
18	*Number & Operations in Base Ten*	4.NBT.2.04	SA	Determine the sum of a five-digit number and a four-digit number.
19	*Measurement & Data*	4.MD.3.07	SA	Determine the measures of unknown angles given other angle measures and calculate the sum of all the angles.
20	*Number & Operations in Base Ten*	4.NBT.2.06	SA	Determine the remainder when a four-digit number is divided by a one-digit number.
21	*Measurement & Data*	4.MD.1.02	CR	Solve multi-step real-world problems involving money using addition, subtraction and multiplication.
22	*Number & Operations-Fractions*	4.NF.1.02	SR	Determine which comparison of two fractions is true.
23	*Number & Operations-Fractions*	4.NF.2.03.d	SR	Determine which fraction equation represents a given real-world context.
24	*Number & Operations in Base Ten*	4.NBT.2.05	SA	Determine the product of a three-digit number and a one-digit number.
25	*Number & Operations-Fractions*	4.NF.1.02	SR	Determine which comparisons, between two fractions with unlike denominators, are true.
26	*Operations & Algebraic Thinking*	4.OA.1.03	SR	Solve a multi-step real-world problem involving addition, multiplication and division with whole numbers.
27	*Number & Operations in Base Ten*	4.NBT.2.04	SR	Solve real-world problems including addition and subtraction with four-digit whole numbers.
28	*Number & Operations-Fractions*	4.NF.1.01	SR	Determine which set of fractions are equivalent to each other.
29	*Measurement & Data*	4.MD.3.06	SA	Determine the angle measure of an angle shown on a protractor.
30	*Number & Operations-Fractions*	4.NF.2.04.b	SR	Determine which expression is equivalent to the product of a whole number and a fraction.
31	*Number & Operations in Base Ten*	4.NBT.2.04	SR	Determine which expression has a sum that is equivalent to a given four-digit number.
32	*Geometry*	4.G.1.02	SR	Identify which statement is true about the properties of a right triangle.
33	*Number & Operations in Base Ten*	4.NBT.2.06	SR	Find the quotient and remainder of a three-digit number divided by a one-digit number.
34	*Measurement & Data*	4.MD.3.07	SA	Determine the measures of unknown angles in a figure given some of the figure's angle measures.
35	*Operations & Algebraic Thinking*	4.OA.1.01	SR	Determine which statements represent a given multiplication equation.
36	*Number & Operations-Fractions*	4.NF.3.07	CR	Determine if the comparison of two decimals is accurate, and represent the two decimals as fractions to justify the answer.
37	*Number & Operations in Base Ten*	4.NBT.2.05	SA	Determine the product of 2 two-digit whole numbers.
38	*Number & Operations-Fractions*	4.NF.2.03.c	SR	Find the sum of two mixed numbers with like denominators.
39	*Operations & Algebraic Thinking*	4.OA.2.04	SR	Identify the number that is not a factor of a two-digit number.
40	*Geometry*	4.G.1.02	SR	Identify the two-dimensional figure with only obtuse angles.

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