X. Mathematics, Grade 4

Grade 4 Mathematics Test

The spring 2013 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 *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.

Test Sessions

The grade 4 Mathematics test included two separate test sessions. Each session included multiple-choice, short-answer, and open-response questions. Approximately half of the common test items are shown on the following pages as they appeared in test booklets.

Reference Materials and Tools

Each student taking the grade 4 Mathematics test was provided with a plastic ruler and a grade 4 Mathematics Tool Kit. A copy of the tool kit pieces used by students to answer question 5 immediately follows the last question in this chapter. An image of the ruler is not reproduced in this publication.

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

Cross-Reference Information

The tables at the conclusion of this chapter indicate each released and unreleased common item's reporting category and the framework standard it assesses. The correct answers for released multiple-choice and short-answer questions are also displayed in the released item table.

Grade 4 Mathematics
SESSION 1

You may use your tool kit and MCAS ruler during this session.
*You may **not** use a calculator during this session.*

DIRECTIONS
This session contains ten multiple-choice questions, one short-answer question, and one open-response question. Mark your answers to these questions in the spaces provided in your Student Answer Booklet.

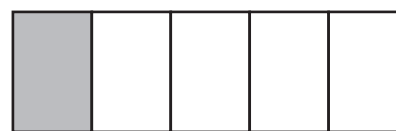1 The table below shows the weights of four animals at a zoo.

Animals at the Zoo

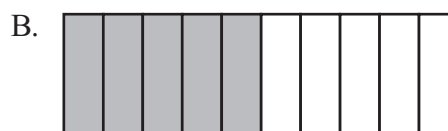| Animal	Weight (in pounds)
lion	517
bear	704
gorilla	485
zebra	782

Based on the table, which of the following is true about the weights of the animals?

A. lion > bear

B. zebra < gorilla

C. bear < gorilla

D. zebra > bear

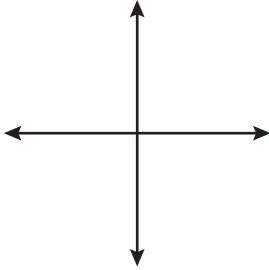2 The shaded part of the rectangle below represents $\frac{1}{5}$.

Which of the following rectangles is also shaded to represent $\frac{1}{5}$?

A.

B.

C.

D.

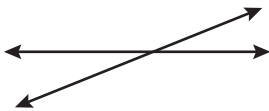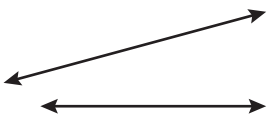**3** Which of the following appears to be a pair of parallel lines?

A.

B.

C.

D.

4 Nathan sold *n* tickets for a school play. Joe also sold tickets for the school play. The number of tickets Joe sold, *j*, is shown by the equation below.

$$2 \times n = j$$

Which statement is true about selling tickets to the school play?

A. Joe sold two more tickets than Nathan sold.

B. Joe sold two fewer tickets than Nathan sold.

C. Joe sold half as many tickets as Nathan sold.
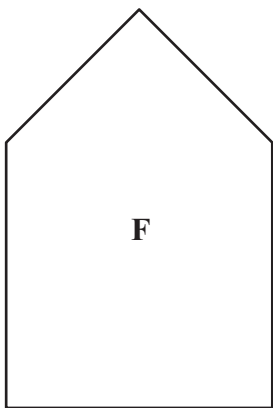
D. Joe sold twice as many tickets as Nathan sold.

Use the shapes labeled E, F, G, *and* H *from your tool kit to answer question 5.*

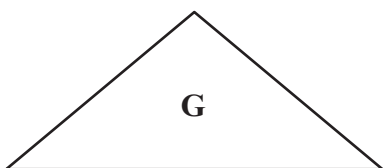**5** Which of these shapes has **more than** one line of symmetry?

A.

E

B.

F

C.

G

D.

H
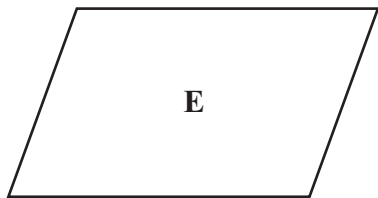
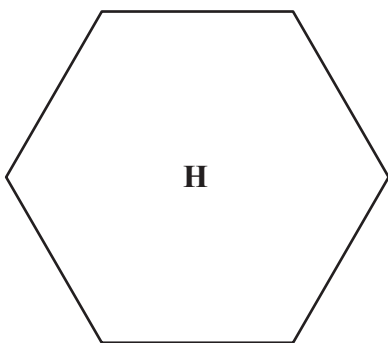**Question 6 is a short-answer question. Write your answer to question 6 in the box provided in your Student Answer Booklet. Do not write your answer in this test booklet. You may do your figuring in the test booklet.**

6   Leon's clues about a number are shown in the box below.

> • It is greater than 35 but less than 55.
> • It is a multiple of 8.

Write a number that matches both of Leon's clues.

Question 7 is an open-response question.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 7 in the space provided in your Student Answer Booklet.

7 The manager at a supermarket arranged 10 rows of cans. He put 2 cans in the first row, 4 cans in the second row, and 6 cans in the third row. The manager continued to add 2 cans to each new row.

a. How many cans did the manager put in the **fifth** row? Show or explain how you got your answer.

b. What is the **total** number of cans the manager arranged in all 10 of the rows? Show or explain how you got your answer.

c. Describe the relationship between the row number and the number of cans in the row.

Mark your answers to multiple-choice questions 8 through 12 in the spaces provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.

8   Charlotte has a box of 100 nails. She needs 8 nails for each birdhouse she builds.

What is the total number of birdhouses Charlotte can build with 100 nails?

A. 10

B. 11

C. 12

D. 13

9   Beth shaded the rectangle shown below to represent a decimal number.
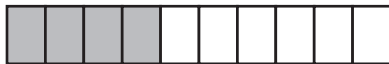
Which decimal number did she represent?

A. 0.04

B. 0.4

C. 4.0

D. 4.10

10   Krista has 32 crayons. Devon has 4 times as many crayons as Krista. Which of the following equations can be used to find d, the total number of crayons Devon has?

A. $4 \times d = 32$

B. $4 \times 32 = d$

C. $32 \div 4 = d$

D. $32 \div d = 4$

11   What value for $\square$ makes the number sentence below true?

$$3205 - \square = 68$$

A. 3137

B. 3147

C. 3263

D. 3273

12 What is 8614 rounded to the nearest **thousand**?

A. 8000

B. 8600

C. 8700

D. 9000

Grade 4 Mathematics
SESSION 2

You may use your tool kit and MCAS ruler during this session.
*You may **not** use a calculator during this session.*

DIRECTIONS

This session contains six multiple-choice questions, two short-answer questions, and one open-response question. Mark your answers to these questions in the spaces provided in your Student Answer Booklet.

13 Which of the following angles is obtuse?

A.

B.

C.

D.
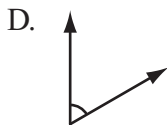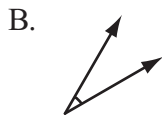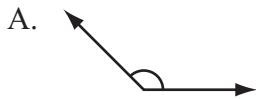
14 The Waterman School auditorium has 80 rows of seats. There are 50 seats in each row. What is the total number of seats in the Waterman School auditorium?

A. 40,000

B. 4,000

C. 400

D. 40

Use your MCAS ruler to answer question 15.

15   Wendy has two pieces of ribbon, as shown below.
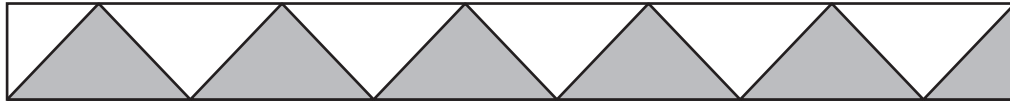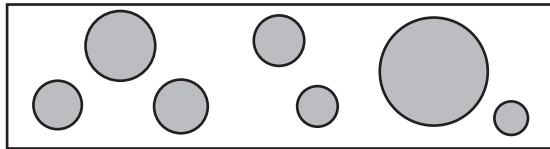
To the nearest inch, which of the following is closest to the total amount of ribbon Wendy has?

A.   7 inches

B.   8 inches

C.   9 inches

D. 10 inches

16   Eli cut a pizza into 6 equal slices. He ate $\frac{1}{2}$ of the pizza.

Which fraction best shows the part of the pizza Eli ate?

A. $\frac{1}{6}$

B. $\frac{1}{3}$

C. $\frac{3}{6}$

D. $\frac{3}{2}$

17   Rita has the shapes shown below.

Rita's Shapes
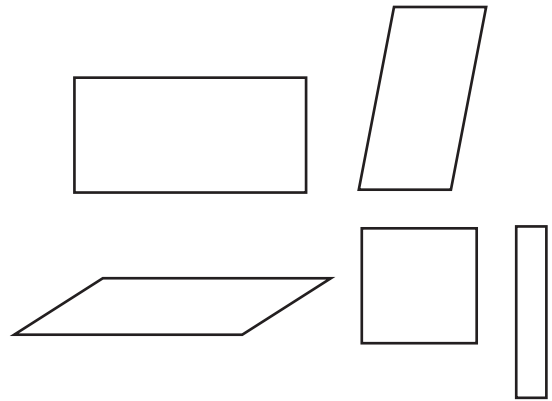
Which of the following best describes **all** of Rita's shapes?

A. squares

B. rectangles

C. rhombuses

D. parallelograms

Questions 18 and 19 are short-answer questions. Write your answers to these questions in the boxes provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.

18   The model below represents the fraction $\frac{13}{5}$.

What is $\frac{13}{5}$ written as a mixed number?

Write your answer to question 19 in the box provided in your Student Answer Booklet.

19 Renato has dominoes that are each 3 inches long, as shown below.

3 inches

When he puts 2 dominoes end to end, they look like the picture below.
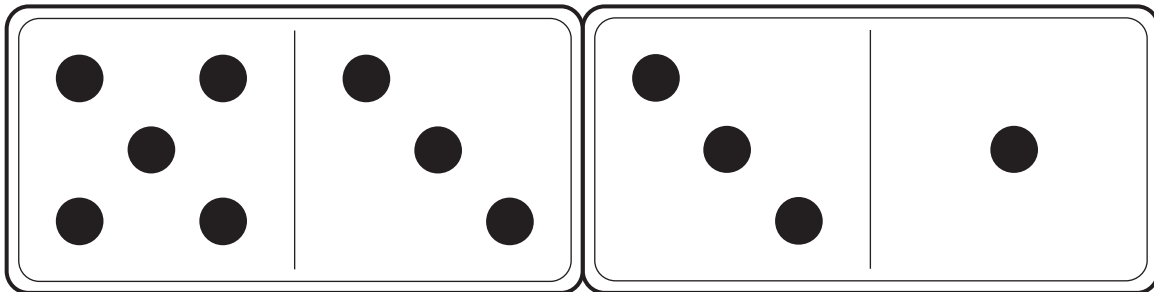
Renato puts 8 dominoes end to end. What is the total length, in **feet**, of Renato's 8 dominoes?

Mark your answer to multiple-choice question 20 in the space provided in your Student Answer Booklet. Do not write your answer in this test booklet. You may do your figuring in the test booklet.
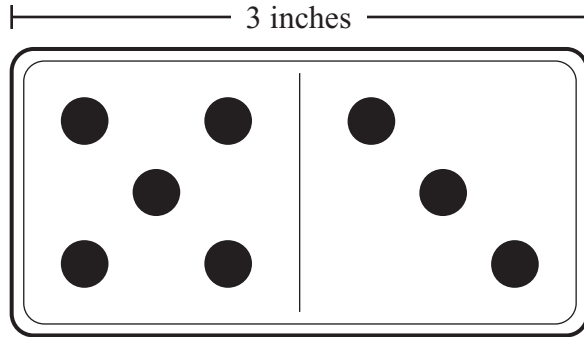
20 Which number is equivalent to $\frac{7}{10}$?

A. 0.07

B. 0.7

C. 7.0

D. 7.10

Mathematics

Question 21 is an open-response question.

- • **BE SURE TO ANSWER AND LABEL ALL PARTS OF THE QUESTION.**
- • **Show all your work (diagrams, tables, or computations) in your Student Answer Booklet.**
- • **If you do the work in your head, explain in writing how you did the work.**

Write your answer to question 21 in the space provided in your Student Answer Booklet.

21 The table below shows the heights of ten of Craig's friends.

Heights of Craig's Friends

Name	Height (in inches)
Matt	$52\frac{1}{2}$
Justin	$51\frac{1}{2}$
Danny	52
Antonio	51
Terrell	53
Kiara	51
Ellen	52
Kimi	$50\frac{1}{2}$
Fran	52
Gabriella	$51\frac{1}{4}$

In your Student Answer Booklet, copy the line plot and title exactly as shown below.

| 50 | $50\frac{1}{2}$ | 51 | $51\frac{1}{2}$ | 52 | $52\frac{1}{2}$ | 53 | $53\frac{1}{2}$ | 54 |

**Height of Craig's Friends
(in inches)**
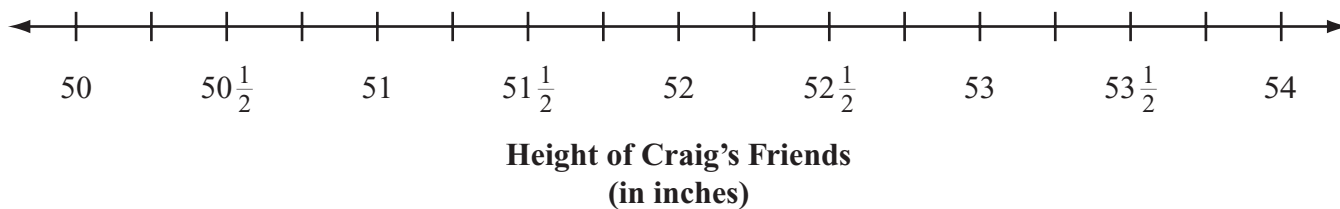
a. Complete the line plot you copied into your Student Answer Booklet using the information in the table.

b. What is the total number of Craig's friends who have a height that is **less than** $52\frac{1}{2}$ inches?

c. What is the difference, in inches, between the height of Craig's tallest friend and the height of Craig's shortest friend? Show or explain how you got your answer.

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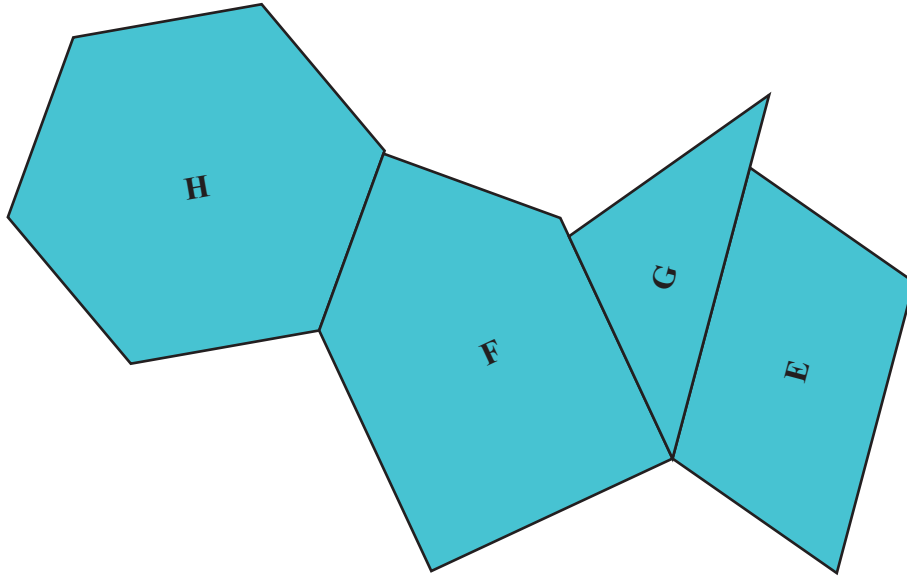
Grade 4 Mathematics
Spring 2013 Released Items:
Reporting Categories, Standards, and Correct Answers*

Item No.	Page No.	Reporting Category	Standard	Correct Answer (MC/SA)*
1	168	*Number and Operations in Base Ten*	NBT.2	D
2	168	*Number and Operations—Fractions*	NF.1	D
3	169	*Geometry*	G.1	B
4	169	*Operations and Algebraic Thinking*	OA.1	D
5	170	*Geometry*	G.3	D
6	171	*Operations and Algebraic Thinking*	OA.4	40 or 48
7	172	*Operations and Algebraic Thinking*	OA.5	
8	173	*Number and Operations in Base Ten*	NBT.6	C
9	173	*Number and Operations—Fractions*	NF.6	B
10	173	*Operations and Algebraic Thinking*	OA.2	B
11	173	*Number and Operations in Base Ten*	NBT.4	A
12	174	*Number and Operations in Base Ten*	NBT.3	D
13	175	*Geometry*	G.1	A
14	175	*Number and Operations in Base Ten*	NBT.5	B
15	176	*Measurement and Data*	MD.2	B
16	177	*Number and Operations—Fractions*	NF.1	C
17	177	*Geometry*	G.2	D
18	178	*Number and Operations—Fractions*	NF.3	$2\frac{3}{5}$
19	179	*Measurement and Data*	MD.2	2 feet
20	180	*Number and Operations—Fractions*	NF.6	B
21	181	*Measurement and Data*	MD.4	

* Answers are provided here for multiple-choice and short-answer items only. Sample responses and scoring guidelines for open-response items, which are indicated by the shaded cells, will be posted to the Department's website later this year.

Grade 4 Mathematics
Spring 2013 Unreleased Common Items:
Reporting Categories and Standards

Item No.	Reporting Category	Standard
22	*Number and Operations in Base Ten*	NBT.4
23	*Measurement and Data*	MD.3
24	*Number and Operations—Fractions*	NF.3
25	*Number and Operations in Base Ten*	NBT.5
26	*Number and Operations—Fractions*	NF.2
27	*Measurement and Data*	MD.1
28	*Number and Operations—Fractions*	NF.7
29	*Number and Operations in Base Ten*	NBT.2
30	*Geometry*	G.2
31	*Number and Operations—Fractions*	NF.5
32	*Operations and Algebraic Thinking*	OA.3
33	*Operations and Algebraic Thinking*	OA.5
34	*Measurement and Data*	MD.4
35	*Number and Operations in Base Ten*	NBT.2
36	*Number and Operations in Base Ten*	NBT.4
37	*Operations and Algebraic Thinking*	OA.3
38	*Operations and Algebraic Thinking*	OA.4
39	*Number and Operations—Fractions*	NF.3
40	*Measurement and Data*	MD.2
41	*Number and Operations in Base Ten*	NBT.4
42	*Measurement and Data*	MD.2