X. Mathematics, Grade 4

Grade 4 Mathematics Test

The spring 2009 grade 4 MCAS Mathematics test was based on learning standards in the Massachusetts *Mathematics Curriculum Framework* (2000). The *Framework* identifies five major content strands, listed below. Page numbers for the grades 3–4 learning standards appear in parentheses.

- Number Sense and Operations (*Framework*, pages 22–23)
- Patterns, Relations, and Algebra (*Framework*, page 32)
- Geometry (*Framework*, page 40)
- Measurement (*Framework*, page 48)
- Data Analysis, Statistics, and Probability (*Framework*, page 56)

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

In test item analysis reports and on the Subject Area Subscore pages of the MCAS *School Reports* and *District Reports*, Mathematics test results are reported under five MCAS reporting categories, which are identical to the five *Framework* content strands listed above.

Test Sessions

The MCAS 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 piece used by students to answer question 9 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 limited English proficient students only, during both Mathematics test sessions. No calculators, other reference tools, or materials were allowed.

Cross-Reference Information

The table at the conclusion of this chapter indicates each released item's reporting category and the *Framework* learning standard it assesses. The correct answers for released multiple-choice and short-answer questions are also displayed in the table.

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

1 Which of the following is a square number?

A. 10

B. 24

C. 36

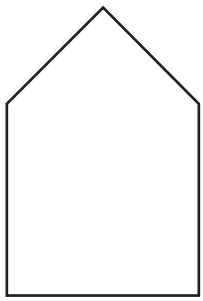
D. 55

2 Calvin drew a shape that has the attributes listed below.

- It has exactly 4 sides.
- It has exactly 2 right angles.

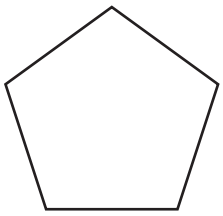
Which of the following could be the shape that Calvin drew?

A.

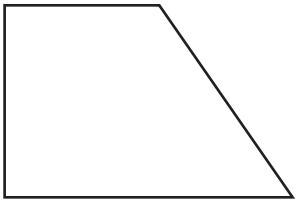


B.

C.



D.



3 There are 500 rows of parking spaces in the parking lot at a stadium. Each row has 40 parking spaces.

What is the total number of parking spaces at the stadium?

A. 2,000

B. 20,000

C. 200,000

D. 2,000,000

Question 4 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 4 in the space provided in your Student Answer Booklet.

4 Christina's schedule for Tuesday afternoon is shown in the chart below.

Christina's Schedule

Time	Activity
3:00 p.m.	Get out of school
3:30 p.m.	Dance class begins
4:15 p.m.	Dance class ends
5:00 p.m.	Do homework
5:45 p.m.	Eat dinner

a. How many minutes does Christina have between when she gets out of school and when her dance class begins?

b. How many minutes is Christina's dance class? Show or explain how you got your answer.

c. It takes Christina's family 1 hour 15 minutes to eat dinner. At what time will her family finish eating dinner? Show or explain how you got your answer.

Question 5 is a short-answer question. Write your answer to this question 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.

5 Write five and twenty-six hundredths as a decimal number.

Question 6 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 6 in the space provided in your Student Answer Booklet.

6 Fernando made an increasing pattern by drawing hexagons, as shown below.

Step 1 **Step 2** **Step 3** **Step 4** **Step 5** **Step 6**

a. If the pattern continues, what is the total number of hexagons Fernando should draw for Step 7?

b. Use words or numbers to describe the rule for Fernando's pattern.

c. If the pattern continues, for which step in the pattern will Fernando need to draw exactly 15 hexagons? Show your work or explain how you got your answer.

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 ten multiple-choice questions and one short-answer question. Mark your answers to these questions in the spaces provided in your Student Answer Booklet.

7 Amanda wrote the number sentence shown below.

$$56 \div 7 = 8$$

Which number sentence could Amanda use to check her work?

A. $8 \times 7 = \square$

B. $8 \div 7 = \square$

C. $56 \times 7 = \square$

D. $56 + 8 = \square$

8 What is 31,169 rounded to the nearest ten thousand?

A. 30,000

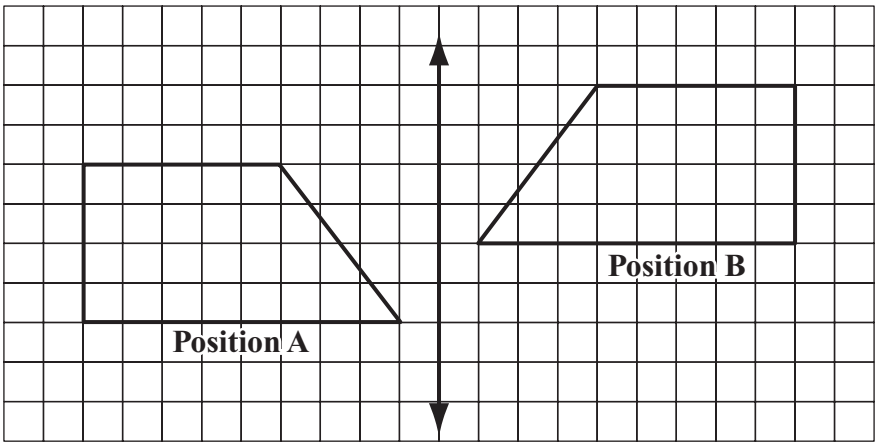
B. 31,000

C. 31,200

D. 32,000

Use shape J *from your tool kit to answer question 9.*

9 A shape was moved from Position A to Position B, as shown below.



Which of the following best describes how the shape was moved from Position A to Position B?

A. flipped over the line, then slid up

B. flipped over the line, then slid down

C. flipped over the line, then turned 90° clockwise

D. flipped over the line, then turned 90° counterclockwise

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10 Which of the following would best be displayed by using a line graph?

A. a student's favorite colors

B. a student's height for the past five years

C. the distances students live from a school

D. the number of students in each class at 10 a.m. one day

11 Ms. Wheeler wrote the statement shown below on the board in her classroom.

0.75 = _____

Which of the following completes the statement to make it true?

A. $\frac{7}{5}$

B. $\frac{5}{7}$

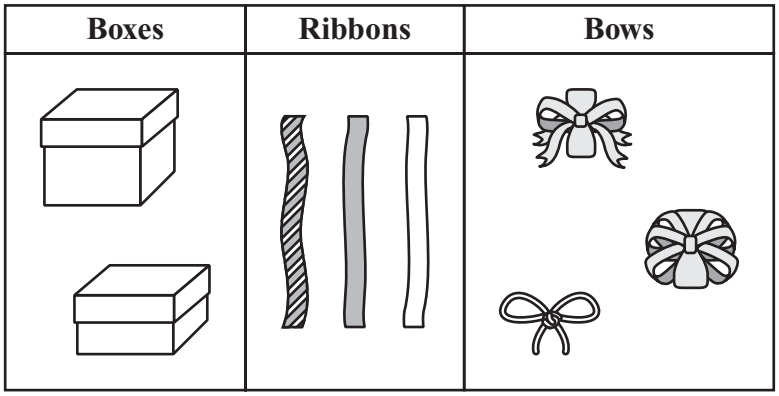
C. $\frac{3}{4}$

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

Question 12 is a short-answer question. Write your answer to this question 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.

12 Eddie is going to wrap a gift. He will choose 1 box, 1 ribbon, and 1 bow. The boxes, ribbons, and bows he can choose are shown below.

Eddie's Choices



How many different combinations of 1 box, 1 ribbon, and 1 bow can Eddie choose?

Mark your answers to multiple-choice questions 13 through 17 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.

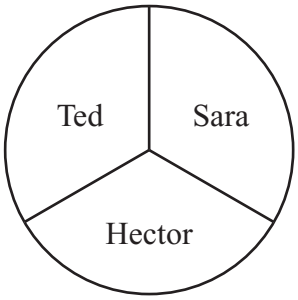
13 The table below shows the results of an election for class president.

Election Results

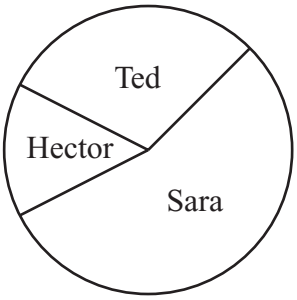
Person	Number of Votes
Ted	15
Sara	55
Hector	30

Which circle graph best represents the election results?

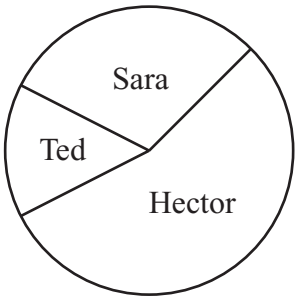
A. **Election Results**



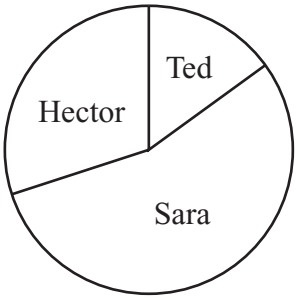
C. **Election Results**



B. **Election Results**

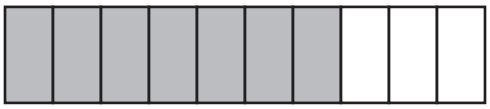


D. **Election Results**



14 Scott and Julio made fraction bars that are the same size. Scott shaded $\frac{7}{10}$ of his fraction bar and Julio shaded $\frac{4}{10}$ of his fraction bar, as shown below.

Scott's Fraction Bar



Julio's Fraction Bar

Which fraction shows how much more Scott shaded than Julio?

A. $\frac{3}{20}$

B. $\frac{3}{10}$

C. $\frac{11}{10}$

D. $\frac{11}{20}$

15 The table below shows the numbers of stickers on three students' notebooks.

Stickers on Notebooks

Student	Number of Stickers
Donna	12
Kevin	8
José	5

Donna and José wanted to know how many stickers the three students have in all. They used the number sentences in the boxes below to find their answers.

$(12 + 8) + 5 = \square$	$12 + (8 + 5) = \square$
Donna's number sentence	**José's number sentence**

Which of the following statements is true?

A. Only José is correct.

B. Only Donna is correct.

C. Both Donna and José are correct.

D. Both Donna and José are not correct.

16 Jane has 12 pencils in her pencil case, as listed below.

- 3 red pencils
- 2 blue pencils
- 6 yellow pencils
- 1 green pencil

All the pencils are the same size and shape. Jane will pick one pencil out of her pencil case without looking.

What is the probability that Jane will pick a red pencil?

A. $\frac{3}{12}$

B. $\frac{3}{9}$

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

D. $\frac{3}{4}$

17 A baker plans to make 3 cookies for each guest at a party. The letter g represents the number of guests at the party.

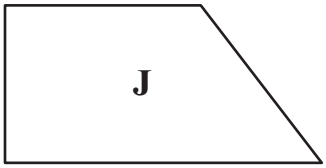
Which of the following represents how many cookies the baker should make?

A. $g + 3$

B. $g - 3$

C. $g \times 3$

D. $g \div 3$



During testing, students were provided additional tool kit pieces to answer test items that are not released.

Grade 4 Mathematics
Spring 2009 Released Items:
Reporting Categories, Standards, and Correct Answers*

Item No.	Page No.	Reporting Category	Standard	Correct Answer (MC/SA)*
1	145	*Number Sense and Operations*	4.N.7	C
2	145	*Geometry*	4.G.1	D
3	146	*Number Sense and Operations*	4.N.11	B
4	147	*Measurement*	4.M.5	
5	148	*Number Sense and Operations*	4.N.6	5.26
6	149	*Patterns, Relations, and Algebra*	4.P.1	
7	150	*Number Sense and Operations*	4.N.8	A
8	150	*Number Sense and Operations*	4.N.16	A
9	151	*Geometry*	4.G.7	A
10	151	*Data Analysis, Statistics, and Probability*	4.D.1	B
11	151	*Number Sense and Operations*	4.N.5	C
12	152	*Data Analysis, Statistics, and Probability*	4.D.5	18
13	153	*Data Analysis, Statistics, and Probability*	4.D.2	D
14	154	*Number Sense and Operations*	4.N.18	B
15	155	*Number Sense and Operations*	4.N.9	C
16	156	*Data Analysis, Statistics, and Probability*	4.D.4	A
17	156	*Patterns, Relations, and Algebra*	4.P.4	C

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