
X. Mathematics, Grade 4

Grade 4 Mathematics Test

The spring 2011 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 *Mathematics Curriculum 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. The tool kit pieces and an image of the ruler are 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 tables at the conclusion of this chapter indicate each released and unreleased common 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 released item table.

Mathematics

SESSION 1

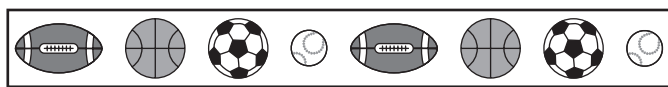
You may use your tool kit and MCAS ruler during this session.
You may *not* use a calculator during this session.



DIRECTIONS

This session contains nine 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.

- 1 Travis put a ball pattern on his bedroom walls. The picture below shows the pattern repeated two times.



Start

Travis continued the pattern all the way around his bedroom.

What is the 18th ball in the pattern?

- A. A football.
- B. A basketball.
- C. A soccer ball.
- D. A baseball.

- 2 There are 23 students in Mr. Leahy's class. Each student wrote 34 journal entries this year. Mr. Leahy read all the journal entries. He used the number sentence below to find the number of journal entries he read.

$$23 \times 34 = \square$$

Which number sentence shows another way to find the number of journal entries Mr. Leahy read?

- A. $34 \times 23 = \square$
- B. $34 + 23 = \square$
- C. $\square + 23 = 34$
- D. $\square \times 23 = 34$

- 3 What is 40,971 rounded to the nearest **ten thousand**?
- A. 40,000
 - B. 41,000
 - C. 42,000
 - D. 50,000
- 4 Which of the following is $\frac{1}{5}$ written as a decimal?
- A. 0.15
 - B. 0.2
 - C. 1.5
 - D. 2.0

Questions 5 and 6 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.

- 5 Brett put the nine tiles shown below into a jar.



All the tiles are the same size and shape. Brett is going to pick one tile out of the jar without looking.

What color tile is Brett **least likely** to pick?

- 6 Mr. Chavez is making wooden toys. He needs 7 nails to make each toy. He has 132 nails. What is the total number of toys Mr. Chavez can make?

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 fourth-grade students at Jackson School are going on a field trip.

- There are 6 fourth-grade classes at the school.
 - Each class has 24 students.
- a. What is the total number of fourth-grade students at the school? Show or explain how you got your answer.

All the fourth-grade students are going on the field trip.

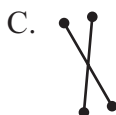
- b. The students will be riding on 3 buses. The same number of students will be riding on each bus. How many students will be riding on each bus? Show or explain how you got your answer.

The teachers need to collect \$7 from each student for the field trip. There are 115 students who have already paid.

- c. What is the total amount of money, in dollars, that has already been paid? Show or explain how you got your answer.
- d. What is the total amount of money, in dollars, that the teachers still need to collect? Show or explain how you got your answer.

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 Which of the following figures best represents perpendicular line segments that intersect?



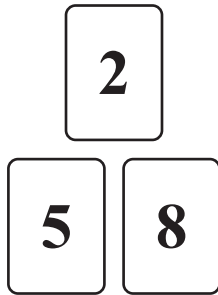
- 9 The manager of the Flower Market keeps a record of the number of flowers sold each day.
- On Monday, 54 roses, 32 carnations, and 28 daisies were sold.
 - On Tuesday, 65 carnations, 27 daisies, and 17 roses were sold.
 - On Wednesday, 40 daisies, 34 roses, and 21 carnations were sold.

The manager of the Flower Market wants to know how many daisies were sold on the three days.

Which of the following should the manager use to figure out how many **daisies** were sold?

- A. $28 + 27 + 40$
- B. $28 + 17 + 21$
- C. $54 + 32 + 28$
- D. $54 + 65 + 40$

- 10 Maggie is using the number cards below to make three-digit numbers.



For each three-digit number, she can use each number card only one time.

What is the total number of different three-digit numbers Maggie should be able to make with the number cards?

- A. 3
- B. 6
- C. 9
- D. 12

- 11 The pictograph below shows the numbers of apples four students ate last month.

Apples Eaten in a Month

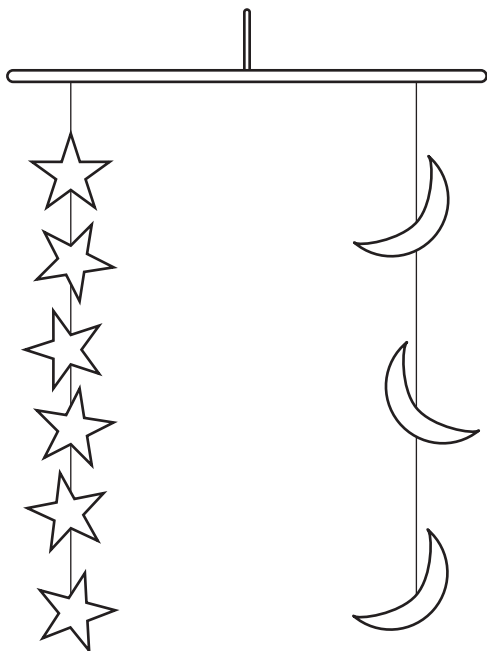
Student	Number of Apples
Andrew	
Linden	
Bruce	
Jody	

Key	
	represents 4 apples

Which two students together ate exactly 20 apples last month?

- A. Andrew and Linden
- B. Linden and Bruce
- C. Bruce and Jody
- D. Jody and Andrew

- 12 The mobile shown below is balanced. Each star has the same weight. Each moon has the same weight.



How many stars balance one moon?

- A. 2
- B. 3
- C. 4
- D. 6

Mathematics

SESSION 2

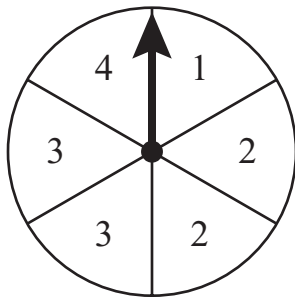
You may use your tool kit and MCAS ruler during this session.
You may **not** use a calculator during this session.



DIRECTIONS

This session contains seven 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.

- 13 All the sections on the spinner shown below are equal in size.



Craig will spin the arrow on the spinner one time.

What is the probability that the arrow will land on a section labeled with the number 3?

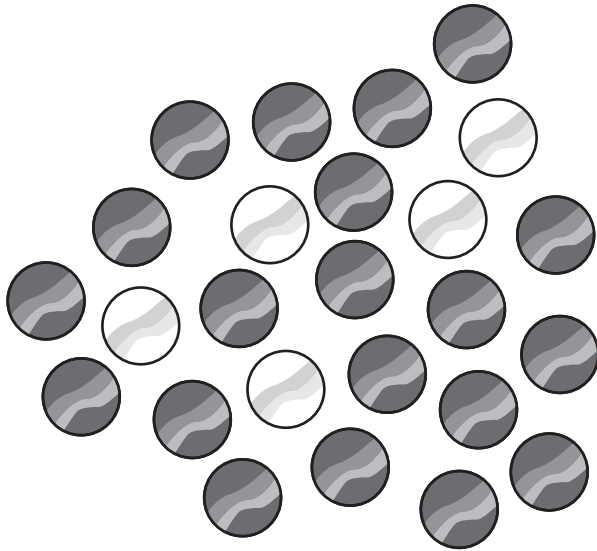
- A. $\frac{1}{6}$
- B. $\frac{1}{4}$
- C. $\frac{2}{6}$
- D. $\frac{2}{4}$

- 14 Tanisha has 5 pets in all. She has 3 cats, and the rest of her pets are dogs.

Which of the following number sentences can be used to find d , the number of dogs Tanisha has?

- A. $3 + d = 5$
- B. $d - 5 = 3$
- C. $5 + 3 = d$
- D. $d - 3 = 5$

- 15 Mel had 5 light marbles and 20 dark marbles, as shown below.



Mel put all of the marbles into a jar. Each marble is the same size and shape. He will pick one marble out of the jar without looking.

Which word best describes Mel's chances of picking a dark marble?

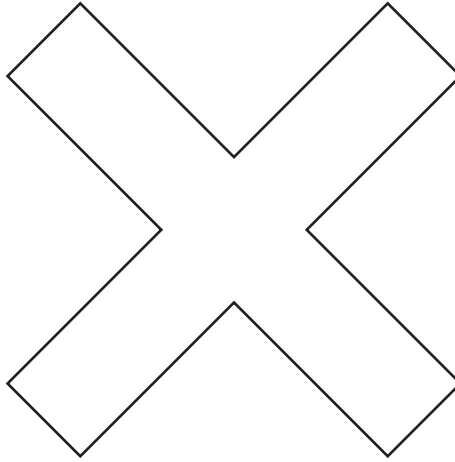
- A. likely
- B. certain
- C. unlikely
- D. impossible

- 16 Samar wrote a list of three square numbers. Which of the following could be Samar's list?

- A. 4, 6, 8
- B. 4, 7, 10
- C. 4, 8, 12
- D. 4, 9, 16

Question 17 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.

- 17 How many lines of symmetry does the shape below have?



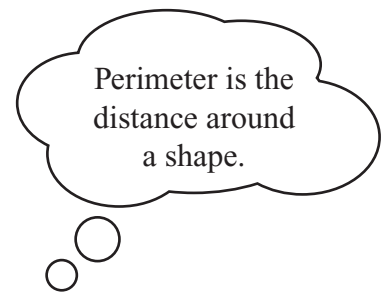
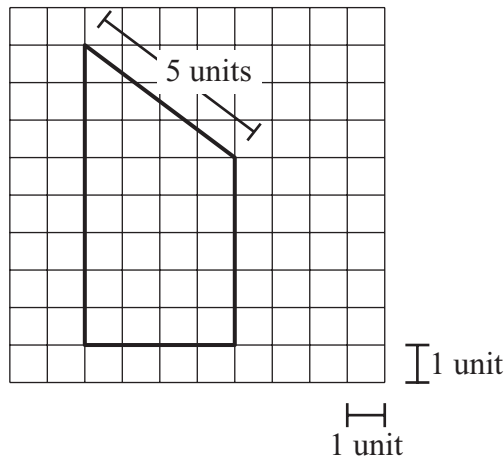
Question 18 is an open-response question.

- **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 18 in the space provided in your Student Answer Booklet.

- 18 A diagram of John’s garden and the length of one side are shown on the grid below.

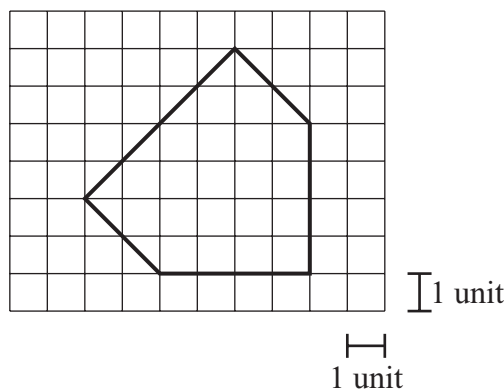
John’s Garden



- a. What is the **perimeter**, in units, of John’s garden? Show your work or explain how you got your answer.

John’s sister, Kara, also has a garden. The diagram below shows Kara’s garden.

Kara’s Garden



- b. What is the **area**, in square units, of Kara’s garden? Show your work or explain how you got your answer.
- c. Whose garden has a bigger **area**? Explain how you know your answer is correct.



Mark your answers to multiple-choice questions 19 through 21 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.

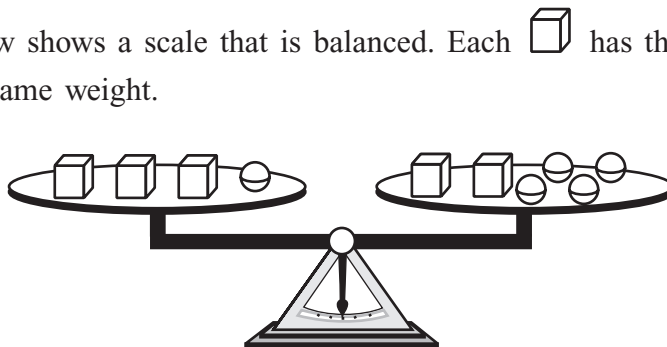
- 19 In the number sentences in the box below, each shape has the same value every time it appears.

$$\begin{array}{l} 6 = \square - 9 \\ \square - \triangle = 6 \end{array}$$

















If both number sentences are true, what are the values of the \square and the \triangle ?

- A. $\square = 3$ $\triangle = 2$
B. $\square = 9$ $\triangle = 3$
C. $\square = 12$ $\triangle = 6$
D. $\square = 15$ $\triangle = 9$

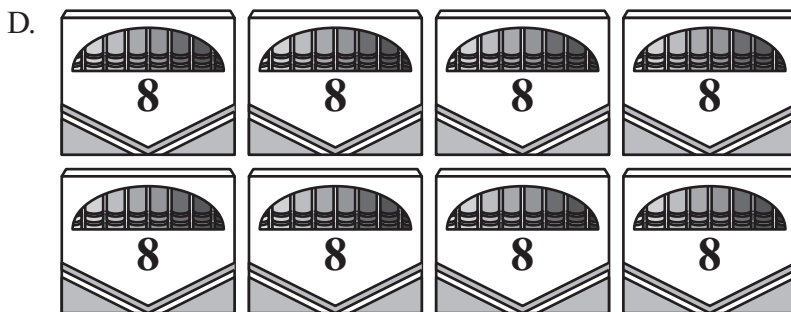
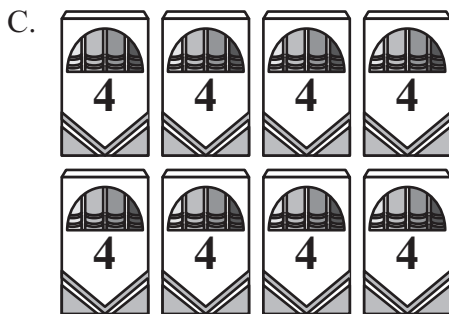
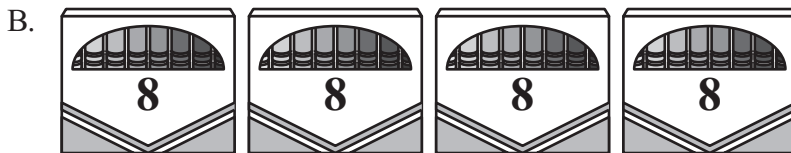
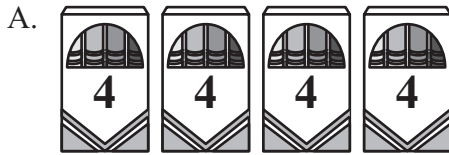
- 20 The diagram below shows a scale that is balanced. Each  has the same weight, and each  has the same weight.



Based on the diagram, which of the following is true?

- A.  +  =  + 
- B.  +  >  + 
- C.  +  =  + 
- D.  +  >  + 

- 21 There are 32 markers in boxes on a table. There are 4 students at the table. Each student will get one box with the same number of markers in it, and there will be no boxes left over. Which model correctly shows the boxes of markers on the table?





Massachusetts Department of
**ELEMENTARY & SECONDARY
EDUCATION**

Massachusetts Comprehensive Assessment System Grade 4 Mathematics Tool Kit

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

Grade 4 Mathematics
Spring 2011 Released Items:
Reporting Categories, Standards, and Correct Answers*

Item No.	Page No.	Reporting Category	Standard	Correct Answer (MC/SA)*
1	155	<i>Patterns, Relations, and Algebra</i>	4.P.1	B
2	155	<i>Number Sense and Operations</i>	4.N.9	A
3	156	<i>Number Sense and Operations</i>	4.N.16	A
4	156	<i>Number Sense and Operations</i>	4.N.5	B
5	157	<i>Data Analysis, Statistics, and Probability</i>	4.D.6	yellow
6	157	<i>Number Sense and Operations</i>	4.N.13	18
7	158	<i>Number Sense and Operations</i>	4.N.10	
8	159	<i>Geometry</i>	4.G.5	A
9	160	<i>Data Analysis, Statistics, and Probability</i>	4.D.1	A
10	161	<i>Data Analysis, Statistics, and Probability</i>	4.D.5	B
11	161	<i>Data Analysis, Statistics, and Probability</i>	4.D.3	C
12	162	<i>Patterns, Relations, and Algebra</i>	4.P.5	A
13	163	<i>Data Analysis, Statistics, and Probability</i>	4.D.4	C
14	163	<i>Patterns, Relations, and Algebra</i>	4.P.2	A
15	164	<i>Data Analysis, Statistics, and Probability</i>	4.D.6	A
16	164	<i>Number Sense and Operations</i>	4.N.7	D
17	165	<i>Geometry</i>	4.G.8	4
18	166	<i>Measurement</i>	4.M.4	
19	167	<i>Patterns, Relations, and Algebra</i>	4.P.3	D
20	168	<i>Patterns, Relations, and Algebra</i>	4.P.4	B
21	169	<i>Number Sense and Operations</i>	4.N.8	B

* 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.

Grade 4 Mathematics
Spring 2011 Unreleased Common Items:
Reporting Categories and Standards

Item No.	Reporting Category	Standard
22	<i>Data Analysis, Statistics, and Probability</i>	4.D.3
23	<i>Number Sense and Operations</i>	4.N.18
24	<i>Number Sense and Operations</i>	4.N.2
25	<i>Measurement</i>	4.M.5
26	<i>Patterns, Relations, and Algebra</i>	4.P.5
27	<i>Data Analysis, Statistics, and Probability</i>	4.D.3
28	<i>Data Analysis, Statistics, and Probability</i>	4.D.3
29	<i>Number Sense and Operations</i>	4.N.11
30	<i>Geometry</i>	4.G.1
31	<i>Data Analysis, Statistics, and Probability</i>	4.D.3
32	<i>Patterns, Relations, and Algebra</i>	4.P.1
33	<i>Data Analysis, Statistics, and Probability</i>	4.D.2
34	<i>Number Sense and Operations</i>	4.N.4
35	<i>Number Sense and Operations</i>	4.N.9
36	<i>Number Sense and Operations</i>	4.N.3
37	<i>Measurement</i>	4.M.5
38	<i>Number Sense and Operations</i>	4.N.10
39	<i>Number Sense and Operations</i>	4.N.6
40	<i>Measurement</i>	4.M.3
41	<i>Number Sense and Operations</i>	4.N.10
42	<i>Patterns, Relations, and Algebra</i>	4.P.5