
X. Mathematics, Grade 4

Grade 4 Mathematics Test

The spring 2015 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 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.

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. The tool kit pieces and an image of the ruler are 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

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 seven 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 A pet store needs to put 23 birds into birdcages. Each birdcage can hold 4 birds.

What is the least number of cages the pet store needs to hold **all** the birds?

- A. 7
- B. 6
- C. 5
- D. 4

- 2 The table below shows the number of lunches sold each day for three days.

Lunches Sold

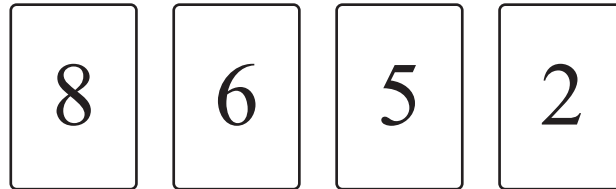
Day	Number of Lunches
Monday	251
Tuesday	454
Wednesday	298

Which of these has a value that is **closest** to the total number of lunches sold for the three days?

- A. $200 + 400 + 200$
- B. $250 + 450 + 300$
- C. $300 + 500 + 300$
- D. $350 + 450 + 300$

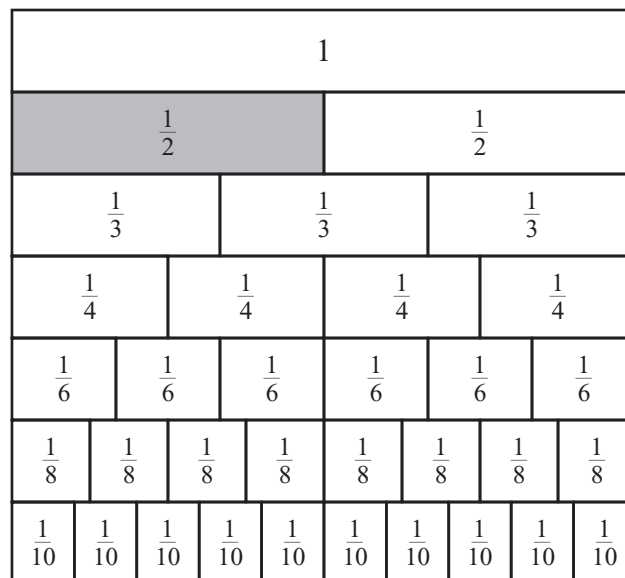
Questions 3 and 4 are short-answer questions. Write your answers to these questions in the boxes provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.

- 3 Diane has the four number cards shown below.



Diane used two of her cards to make a two-digit number that is a multiple of 4. What could be the number Diane made?

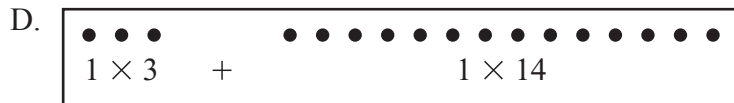
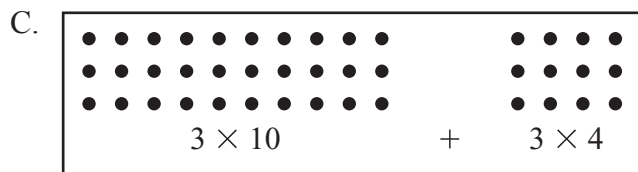
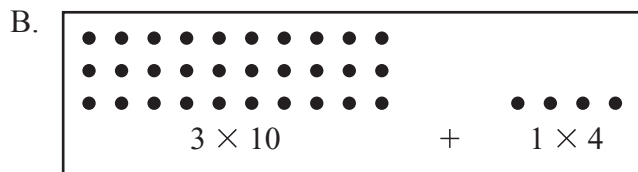
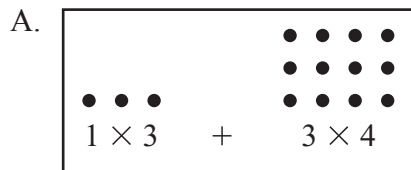
- 4 The fraction $\frac{1}{2}$ is shaded on the fraction model below.



Write **two** different fractions that are each equivalent to $\frac{1}{2}$.

Mark your answers to multiple-choice questions 5 through 9 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.

5 Which model shows a way to multiply 3 by 14?



6 Which of these is true?

A. $\frac{4}{5} = \frac{5}{6}$

B. $\frac{4}{5} > \frac{5}{6}$

C. $\frac{7}{10} > \frac{5}{6}$

D. $\frac{7}{10} < \frac{4}{5}$

7 Jody read the clues below about a mystery number.

- It is a multiple of 2.
- It is a factor of 18.
- It is a composite number.

Which of these numbers could be the mystery number?

A. 2

B. 6

C. 9

D. 12

8 Tameca scored 6 points in a basketball game. Leah scored 3 times as many points as Tameca in the basketball game.

Which equation shows the number of points Leah scored?

A. $6 \div 3 = 2$

B. $6 - 3 = 3$

C. $6 + 3 = 9$

D. $6 \times 3 = 18$

9 Ella collected 5 times as many bugs as Mari. Mari collected 15 bugs.

What was the total number of bugs Ella collected?

A. 75

B. 55

C. 20

D. 3

Question 10 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 10 in the space provided in your Student Answer Booklet.

- 10** For this question, you will draw three shapes on the grid in your Student Answer Booklet.
- On the grid in your Student Answer Booklet, draw a parallelogram. Label your parallelogram *A*.
 - On the grid in your Student Answer Booklet, draw a triangle that has two sides that are perpendicular to each other.
 - Label your triangle *B*.
 - Put an X on each of the sides that are perpendicular.
 - Explain how you know the sides you labeled X are perpendicular.
 - On the grid in your Student Answer Booklet, draw a shape that has at least one pair of parallel sides, at least one pair of perpendicular sides, and only two right angles. Label your shape *C*.
 - What is the mathematical name of the shape you drew in part (c)?

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.



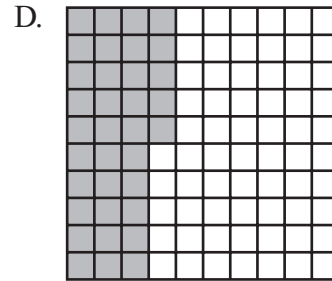
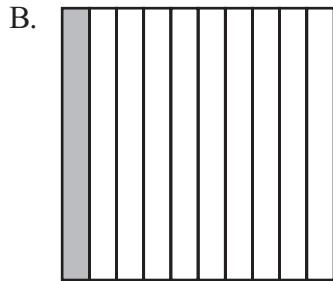
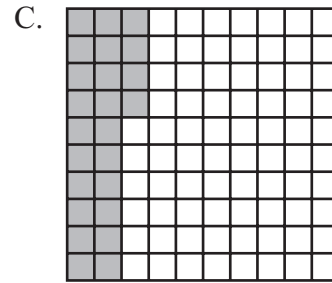
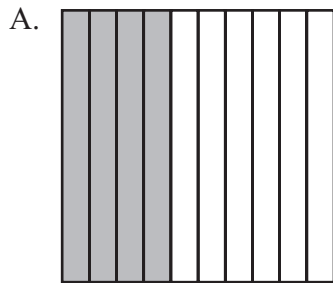
DIRECTIONS

This session contains nine 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.

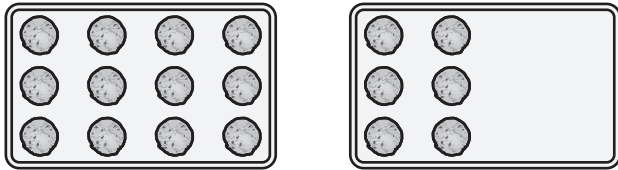
- 11 A decimal number is missing from the number sentence below.

$$0.24 > \boxed{?}$$

Which of the following represents a decimal number that belongs in the $\boxed{?}$ to make the number sentence true?



- 12 The picture below shows the $1\frac{1}{2}$ pans of cookies that Reggie baked.

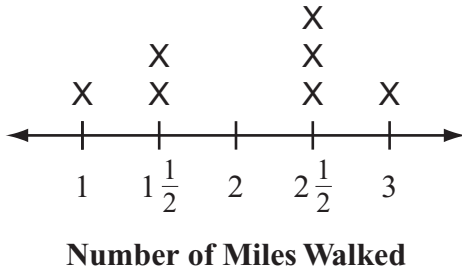


Which of the following is another way to write $1\frac{1}{2}$?

- A. $\frac{11}{2}$
 - B. $\frac{18}{2}$
 - C. $1\frac{6}{12}$
 - D. $1\frac{6}{18}$
- 13 Mr. Jones put 162 books on the library shelves. There are 6 shelves. He put the same number of books on each shelf.
- How many books did Mr. Jones put on each shelf?
- A. 22
 - B. 26
 - C. 27
 - D. 28

- 14 Which equation is true?
- A. $30,000 \div 10 = 300,000$
 - B. $30,000 \div 100 = 300,000$
 - C. $300,000 \div 10 = 30,000$
 - D. $300,000 \div 100 = 30,000$

- 15 Greta recorded the number of miles she walked each day last week on a line plot, as shown below.



How many miles in all did Greta walk last week?

- A. 8 miles
- B. 10 miles
- C. $12\frac{1}{2}$ miles
- D. $14\frac{1}{2}$ miles

- 16 What is the value of the 7 in 472,582?

- A. 7 ten thousands
- B. 7 thousands
- C. 7 hundreds
- D. 7 tens

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.

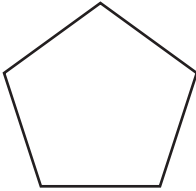
You may use your MCAS ruler to answer question 17.

- 17** In your Student Answer Booklet, draw an angle that measures 180° .

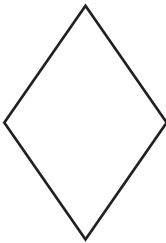
Mark your answers to multiple-choice questions 18 through 20 in the spaces provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.

18 Which of the following shapes has the greatest number of lines of symmetry?

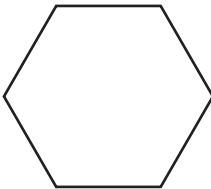
A.



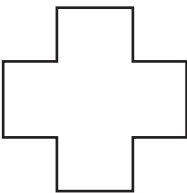
B.



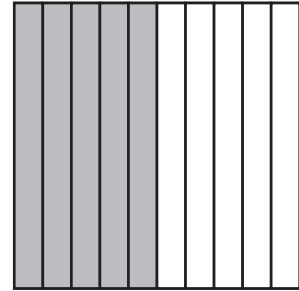
C.



D.



19 Lisa shaded $\frac{5}{10}$ of the square shown below.



Which number shows the part of the square Lisa shaded?

- A. 0.05
- B. 0.12
- C. 0.20
- D. 0.50

20 Conner wrote the equation shown below.

$$6 \times 8 = n$$

Which statement about Conner's equation is true?

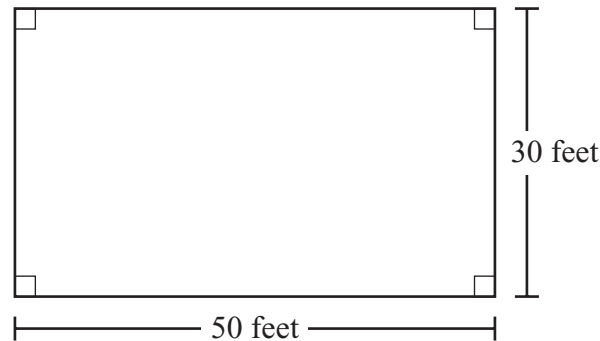
- A. The value of n is 6 less than 8.
- B. The value of n is 6 divided by 8.
- C. The value of n is 6 greater than 8.
- D. The value of n is 6 times as many as 8.

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 length and width of a field are shown in the diagram below.



- What is the perimeter, in feet, of the field? Show or explain how you got your answer.
- What is the area, in square feet, of the field? Show or explain how you got your answer.

Both the length and the width of the field will be increased by 10 feet.

- What will be the new area, in square feet, of the field? Show or explain how you got your answer.



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 2015 Released Items:
Reporting Categories, Standards, and Correct Answers*

Item No.	Page No.	Reporting Category	Standard	Correct Answer (MC/SA)*
1	155	<i>Operations and Algebraic Thinking</i>	OA.3	B
2	155	<i>Number and Operations in Base Ten</i>	NBT.3	B
3	156	<i>Operations and Algebraic Thinking</i>	OA.4	68 OR 56 OR 52 OR 28
4	156	<i>Number and Operations-Fractions</i>	NF.1	$\frac{2}{4}, \frac{3}{6}$
5	157	<i>Number and Operations in Base Ten</i>	NBT.5	C
6	158	<i>Number and Operations-Fractions</i>	NF.2	D
7	158	<i>Operations and Algebraic Thinking</i>	OA.4	B
8	158	<i>Operations and Algebraic Thinking</i>	OA.1	D
9	158	<i>Operations and Algebraic Thinking</i>	OA.2	A
10	159	<i>Geometry</i>	G.2	
11	160	<i>Number and Operations-Fractions</i>	NF.7	B
12	161	<i>Number and Operations-Fractions</i>	NF.1	C
13	161	<i>Number and Operations in Base Ten</i>	NBT.6	C
14	161	<i>Number and Operations in Base Ten</i>	NBT.1	C
15	162	<i>Measurement and Data</i>	MD.4	D
16	162	<i>Number and Operations in Base Ten</i>	NBT.1	A
17	163	<i>Measurement and Data</i>	MD.6	Any straight line
18	164	<i>Geometry</i>	G.3	C
19	164	<i>Number and Operations-Fractions</i>	NF.6	D
20	164	<i>Operations and Algebraic Thinking</i>	OA.1	D
21	165	<i>Measurement and Data</i>	MD.3	

* 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 2015 Unreleased Common Items:
Reporting Categories and Standards

Item No.	Reporting Category	Standard
22	<i>Number and Operations-Fractions</i>	NF.5
23	<i>Number and Operations in Base Ten</i>	NBT.2
24	<i>Measurement and Data</i>	MD.2
25	<i>Operations and Algebraic Thinking</i>	OA.5
26	<i>Geometry</i>	G.2
27	<i>Measurement and Data</i>	MD.3
28	<i>Geometry</i>	G.3
29	<i>Operations and Algebraic Thinking</i>	OA.2
30	<i>Measurement and Data</i>	MD.7
31	<i>Measurement and Data</i>	MD.6
32	<i>Operations and Algebraic Thinking</i>	OA.3
33	<i>Geometry</i>	G.1
34	<i>Operations and Algebraic Thinking</i>	OA.4
35	<i>Number and Operations in Base Ten</i>	NBT.3
36	<i>Number and Operations in Base Ten</i>	NBT.2
37	<i>Number and Operations in Base Ten</i>	NBT.4
38	<i>Number and Operations in Base Ten</i>	NBT.5
39	<i>Number and Operations-Fractions</i>	NF.3
40	<i>Measurement and Data</i>	MD.1
41	<i>Operations and Algebraic Thinking</i>	OA.5
42	<i>Number and Operations-Fractions</i>	NF.4