XI. Mathematics, Grade 5

Grade 5 Mathematics Test

The spring 2013 grade 5 Mathematics test was based on standards in the five major domains for grade 5 in the Massachusetts *Curriculum Framework for Mathematics* (March 2011). The grade 5 standards can be found on pages 48–52 in the *Framework*, and the five major 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 5 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 5 Mathematics test was provided with a plastic ruler and a grade 5 Mathematics Reference Sheet. A copy of the reference sheet follows the final 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 5 Mathematics
SESSION 1

You may use your reference sheet and MCAS ruler during this session.
*You may **not** use a calculator during this session.*

DIRECTIONS

This session contains eight 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.
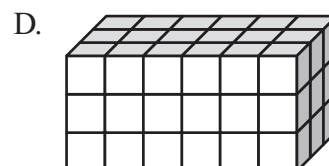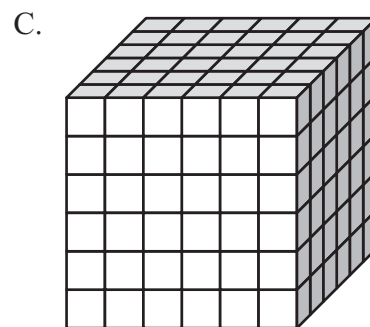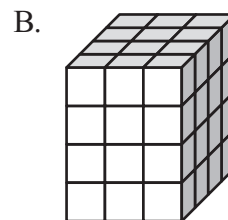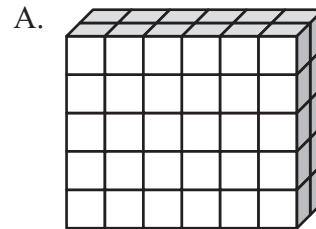
1 What is the value of the expression below when $p = 10$?

$$(20 + 30) \div p$$

A. 2

B. 5

C. 23

D. 60

2 Wanda used 1-centimeter cubes to build a right rectangular prism that has a volume of 60 cubic centimeters.

Which of the following could represent the prism that Wanda built?

A.

B.

C.

D.

3 Eva has 2 liters of juice and some glasses. She will pour $\frac{1}{4}$ liter of juice into each glass.

What is the total number of glasses Eva can fill with the juice?

A. 6

B. 7

C. 8

D. 9

Question 4 is a short-answer question. Write your answer to question 4 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.

4   Irina is using a rope that has a length of 150 feet. What is the length, in yards, of Irina's rope?

Question 5 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 5 in the space provided in your Student Answer Booklet.

5   Nora is riding her bicycle on a trail that is 18.5 miles long. She has already ridden 7.36 miles of the trail.

a. Write an equation that can be used to find m, the number of miles Nora has left to complete on the trail.

b. Use your equation from part (a) to find the total number of miles Nora has left to complete on the trail. Show your work.

Nora wants to ride half the number of miles she has left and then take a break.

c. How many more miles will Nora ride before she takes a break? Show or explain how you got your answer.

Mark your answers to multiple-choice questions 6 through 10 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.

6 Which expression is equivalent to 100,000?

    A. 10^3

    B. 10^4

    C. 10^5

    D. 10^6

7 Tess evaluated an expression by subtracting 6 from 15 and then multiplying the result by 4. Which of the following could be the expression Tess evaluated?

    A. $(4 \times 6) - 15$

    B. $4 \times (15 - 6)$

    C. $(6 + 15) \times 4$

    D. $6 \times (15 - 4)$

8 James is bowling. He knocked down 4 out of 10 bowling pins.

What fraction of the bowling pins were **not** knocked down?

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

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

    C. $\frac{2}{5}$

    D. $\frac{3}{5}$

9 Which of the following types of quadrilaterals **always** has perpendicular sides?

    A. rhombus

    B. rectangle

    C. trapezoid

    D. parallelogram

10 What digit is in the hundredths place of 1.258?

A. 1

B. 2

C. 5

D. 8

Grade 5 Mathematics
SESSION 2

You may use your reference sheet and MCAS ruler during this session.
*You may **not** use a calculator during this session.*

DIRECTIONS
This session contains eight 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.

11 A science museum has a fish tank in the shape of a rectangular prism.

- It has a length of 8 feet.
- It has a width of 3 feet.
- It has a height of 4 feet.

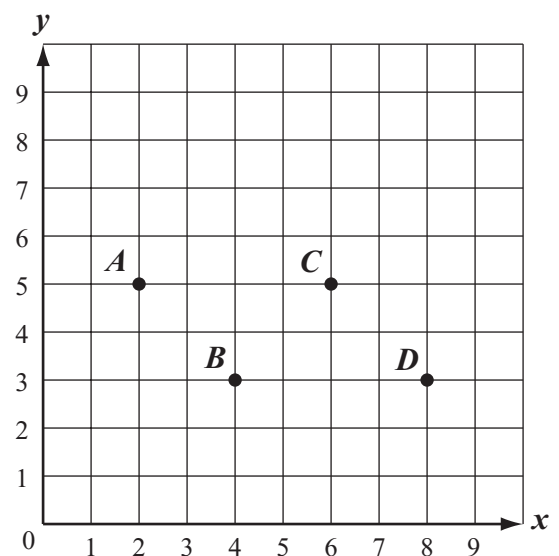What is the volume of the fish tank?

A. 15 cubic feet

B. 30 cubic feet

C. 96 cubic feet

D. 136 cubic feet

12 What is the value of the expression below?

$$6 - (1 \times 4) - 2$$

A. 0

B. 4

C. 10

D. 18

13 Amy is working on a coordinate plane, as shown below.

Amy put the tip of her pencil at (6, 4). Then she moved the tip of her pencil as described below.

- 3 units right
- 2 units down
- 5 units left
- 1 unit up

Which point on the coordinate plane is the point where Amy stopped?

A. point *A*

B. point *B*

C. point *C*

D. point *D*

14 Which of the following expressions represents a number that is 3 times larger than the sum of 8105 and 186?

  A. $(8105 + 186) \div 3$

  B. $3 \times (8105 + 186)$

  C. $8105 + 186 \div 3$

  D. $3 \times 8105 + 186$
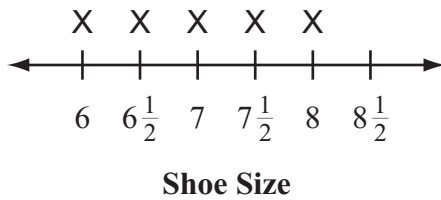
15 Which statement about quadrilaterals is true?

  A. Every rectangle is also a parallelogram.

  B. Every parallelogram is also a rectangle.

  C. Every rectangle is also a rhombus.

  D. Every rhombus is also a rectangle.

16 The list below shows the shoe sizes of eight students in a fifth-grade class.

Luke	8	Cara	$6\frac{1}{2}$
Dean	$6\frac{1}{2}$	Leah	6
Wally	$7\frac{1}{2}$	Suzanne	$6\frac{1}{2}$
Kareem	$7\frac{1}{2}$	Becca	7

Which of the following line plots correctly represents the shoe sizes of the students?

A.
```
   X  X  X  X  X
<--+--+--+--+--+--+-->
   6  6½  7  7½  8  8½
        Shoe Size
```

C.
```
         X     X
   X  X  X  X  X
<--+--+--+--+--+--+-->
   6  6½  7  7½  8  8½
        Shoe Size
```

B.
```
      X
      X     X
      X  X  X  X  X
<--+--+--+--+--+--+-->
   6  6½  7  7½  8  8½
        Shoe Size
```

D.
```
      X
      X     X
   X  X  X  X  X
<--+--+--+--+--+--+-->
   6  6½  7  7½  8  8½
        Shoe Size
```
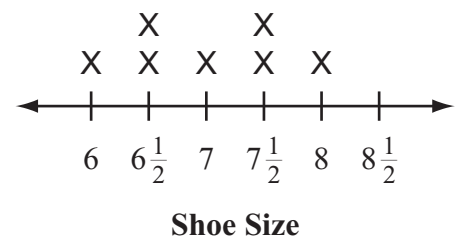
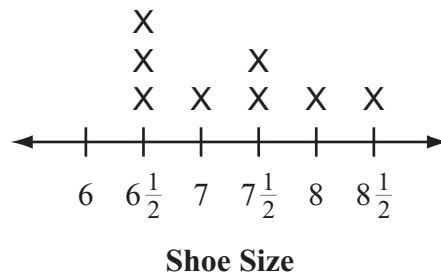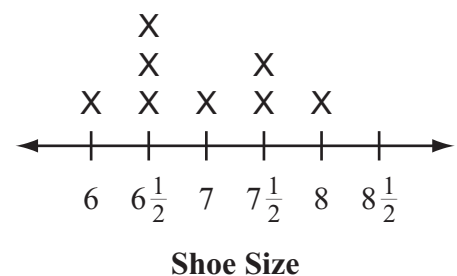**Questions 17 and 18 are short-answer questions. Write your answers to these questions in the boxes provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.**

17 Fritz did 875 sit-ups in 7 days. He did the same number of sit-ups each day.

What is the total number of sit-ups Fritz did each day?

18 What is the value of the expression below when $m = 11$?

$$41 - (m \times 3)$$

Question 19 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 19 in the space provided in your Student Answer Booklet.

19 Brenda is making tree costumes for a play. The list below shows the amounts of the different colors of cloth Brenda will use to make one tree costume.

- $3\frac{5}{8}$ yards brown cloth
- $2\frac{1}{2}$ yards orange cloth
- $\frac{2}{3}$ yard yellow cloth

a. What is the difference, in yards, between the amount of orange cloth and the amount of brown cloth that Brenda will use to make one tree costume? Show or explain how you got your answer.

Brenda plans to use brown cloth for the trunk and branches of the tree, and orange and yellow cloth for the leaves.

b. What is the total amount of cloth, in yards, Brenda will use to make the **leaves** of one tree costume? Show or explain how you got your answer.

Brenda wants to make **two** tree costumes.

c. What is the total amount of cloth, in yards, Brenda will use to make two tree costumes? Show or explain how you got your answer.

Mark your answers to multiple-choice questions 20 and 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.

20 Juliana has two pieces of rope.

- The first piece is $1\frac{1}{2}$ meters long.
- The second piece is 2 meters long.

What is the total length, in centimeters, of the two pieces of rope?

A.   300 centimeters

B.   350 centimeters

C. 3000 centimeters

D. 3500 centimeters

21 The total distance around a running track is $1\frac{5}{8}$ miles. Wayne ran $\frac{1}{4}$ of the track.

Which of the following equations can be used to find d, the distance in miles that Wayne ran?

A. $\frac{1}{4} \times \frac{13}{8} = d$

B. $\frac{1}{4} \times \frac{15}{8} = d$

C. $\frac{4}{1} \times \frac{13}{8} = d$

D. $\frac{4}{1} \times \frac{15}{8} = d$

PERIMETER (*P*) FORMULAS

perimeter = distance around

square . . . . $P = 4 \times s$
           (*s* = length of a side)

rectangle . . . . $P = (2 \times l) + (2 \times w)$
           (*l* = length; *w* = width)

triangle . . . . $P = a + b + c$
           (*a*, *b*, and *c* are the lengths of the sides)

VOLUME (*V*) FORMULAS

rectangular prism . . . . . $V = l \times w \times h$
           (*l* = length; *w* = width; *h* = height)

cube . . . . $V = s \times s \times s$
           (*s* = length of an edge)

AREA (*A*) FORMULAS

square . . . . $A = s \times s$
           (*s* = length of a side)

rectangle . . . . $A = l \times w$
           (*l* = length; *w* = width)

triangle . . . . $A = \frac{1}{2} \times b \times h$

           (*b* = length of the base;
           h = height)

Grade 5 Mathematics
Spring 2013 Released Items:
Reporting Categories, Standards, and Correct Answers*

Item No.	Page No.	Reporting Category	Standard	Correct Answer (MC/SA)*
1	187	*Operations and Algebraic Thinking*	OA.1	B
2	187	*Measurement and Data*	MD.4	A
3	188	*Number and Operations—Fractions*	NF.7	C
4	189	*Measurement and Data*	MD.1	50 yards
5	190	*Number and Operations in Base Ten*	NBT.7	
6	191	*Number and Operations in Base Ten*	NBT.2	C
7	191	*Operations and Algebraic Thinking*	OA.2	B
8	191	*Number and Operations—Fractions*	NF.3	D
9	191	*Geometry*	G.4	B
10	192	*Number and Operations in Base Ten*	NBT.1	C
11	193	*Measurement and Data*	MD.5	C
12	193	*Operations and Algebraic Thinking*	OA.1	A
13	193	*Geometry*	G.2	B
14	194	*Operations and Algebraic Thinking*	OA.2	B
15	194	*Geometry*	G.3	A
16	195	*Measurement and Data*	MD.2	D
17	196	*Number and Operations in Base Ten*	NBT.6	125
18	196	*Operations and Algebraic Thinking*	OA.1	8
19	197	*Number and Operations—Fractions*	NF.1	
20	198	*Measurement and Data*	MD.1	B
21	198	*Number and Operations—Fractions*	NF.6	A

* 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 5 Mathematics
Spring 2013 Unreleased Common Items:
Reporting Categories and Standards

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