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## XI. Mathematics, Grade 5

## Grade 5 Mathematics Test

The spring 2015 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 *Massachusetts Curriculum Framework for Mathematics* is available on the Department website at [www.doe.mass.edu/frameworks/current.html](http://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 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.

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 5 Mathematics

## SESSION 1

You may use your reference sheet and MCAS ruler during this session.

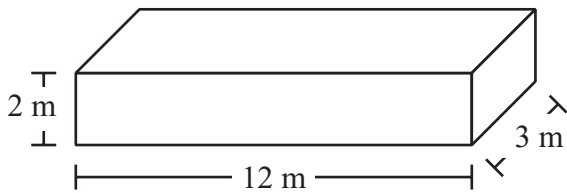
You may **not** use a calculator during this session.



### DIRECTIONS

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

- 1 A box in the shape of a rectangular prism has the dimensions shown below.



What is the volume of the box?

- 2 Which of the following inequalities is true?
- A.  $0.37 < 0.3$
  - B.  $0.3 > 0.298$
  - C.  $0.298 < 0.2$
  - D.  $0.2 > 0.37$

- 3 Cement is shipped in bags. Each bag weighs 80 pounds. A construction worker needs 1,250 pounds of cement to complete a job.

What is the total number of bags of cement that should be shipped for the construction worker to complete the job?

- A. 14
- B. 15
- C. 16
- D. 17

- 4 Nathan is making two different number patterns: Pattern X and Pattern Y. The rules for the patterns are shown below.

**Pattern X**

Add 5.

**Pattern Y**

Multiply by 2.

Which of the following tables shows the first four terms of Nathan's Pattern X and Pattern Y?

A.

Term	Pattern X	Pattern Y
1	2	3
2	5	6
3	10	12
4	15	24

C.

Term	Pattern X	Pattern Y
1	2	3
2	7	5
3	12	7
4	17	9

B.

Term	Pattern X	Pattern Y
1	2	3
2	10	6
3	50	12
4	250	24

D.

Term	Pattern X	Pattern Y
1	2	3
2	7	6
3	12	12
4	17	24

- 5 Steve has 3 cups of peanuts. He splits the 3 cups of peanuts into  $\frac{1}{3}$ -cup servings. What is the total number of  $\frac{1}{3}$ -cup servings of peanuts Steve has?
- A. 1
  - B. 3
  - C. 6
  - D. 9
- 6 Which of the following statements about quadrilaterals is **not** true?
- A. Every square is also a rectangle.
  - B. Every trapezoid is also a rectangle.
  - C. Every rhombus is also a parallelogram.
  - D. Every rectangle is also a parallelogram.

Questions 7 and 8 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.

- 7 The value of the 7 in 27,459 is how many times the value of the 7 in 40,735?
- 8 Judy spent  $\frac{1}{2}$  of her savings on a bicycle and  $\frac{2}{5}$  of her savings on a helmet. What is the total fraction of her savings that Judy spent on a bicycle **and** a helmet?

Question 9 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 9 in the space provided in your Student Answer Booklet.

- 9 Carolina is twice as old as her brother Diego will be in 3 years. Diego is 4 years old now. The expression below shows how to find Carolina's age, in years.

$$2 \times (4 + 3)$$

- a. What is Carolina's age, in years? Show or explain how you got your answer.

Carolina's sister, Marisol, is three times as old as Diego was 2 years ago.

- b. Write an expression using numbers and operations to represent Marisol's age, in years.
- c. What is Marisol's age, in years? Show or explain how you got your answer.

The expression below represents the difference, in years, between the ages of Carolina's father and her mother.

$$(15 \times 3) - [(10 \times 4) - 2]$$

- d. What is the difference, in years, between the ages of Carolina's father and her mother? Show or explain how you got your answer.

Mark your answers to multiple-choice questions 10 and 11 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.

- 10** A scale rounds the weights of objects to the nearest tenth of a pound. What is 53.864 pounds rounded to the nearest tenth of a pound?
- A. 53.8 pounds
  - B. 53.9 pounds
  - C. 53.86 pounds
  - D. 53.87 pounds
- 11** Silvia filled a watering can with 3.48 liters of water. She used 40 milliliters to water her cactus plant and 150 milliliters to water her rose plant. What is the total amount of water remaining in the watering can?
- A. 158 milliliters
  - B. 329 milliliters
  - C. 1,580 milliliters
  - D. 3,290 milliliters



Question 12 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 12 in the space provided in your Student Answer Booklet.

**12** Kara is painting flowerpots. She uses  $\frac{1}{3}$  cup of paint for each flowerpot.

- a. How many cups of paint does Kara use for 2 flowerpots? Show or explain how you got your answer.
- b. How many cups of paint does Kara use for 12 flowerpots? Show or explain how you got your answer.

After the flowerpots dry, Kara plants seeds in them. She uses  $1\frac{3}{4}$  cups of soil to fill each flowerpot.

- c. How many cups of soil does Kara use to fill 12 flowerpots? Show or explain how you got your answer.

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

- 13 Ms. Montano asked her students to solve the equation shown in the box below.

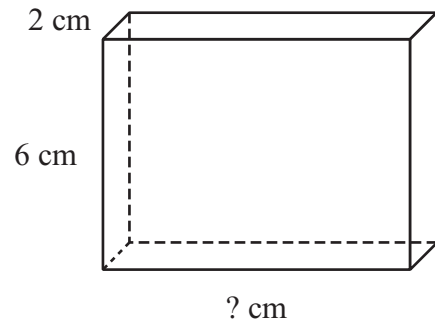
$$\frac{6}{7} + \frac{5}{6} = n$$

Which of the following is **closest** to the value of  $n$ ?

- A.  $\frac{1}{4}$
- B.  $\frac{3}{4}$
- C.  $1\frac{1}{2}$
- D.  $5\frac{1}{2}$

- 14 A rectangular prism is shown below.

- The volume is 96 cubic centimeters.
- The height is 6 centimeters.
- The width is 2 centimeters.

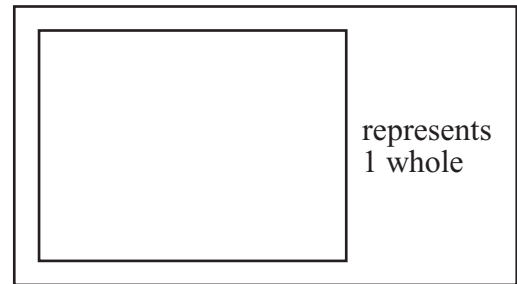
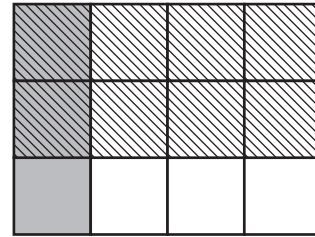


What is the length of the rectangular prism?

- A. 6 cm
- B. 8 cm
- C. 12 cm
- D. 32 cm

- 15 The ordered pair (4, 7) gives the location of a point on the coordinate plane. What is the first step to take in locating the point?
- A. Starting at the origin, move 4 units to the right.
  - B. Starting at the origin, move 4 units to the left.
  - C. Starting at the origin, move 4 units up.
  - D. Starting at the origin, move 4 units down.

- 16 The model below can be used to find the product of  $\frac{2}{3} \times \frac{1}{4}$ .



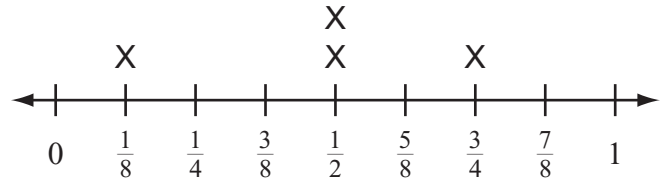
What is the product of  $\frac{2}{3} \times \frac{1}{4}$ ?

- A.  $\frac{2}{9}$
- B.  $\frac{3}{9}$
- C.  $\frac{2}{12}$
- D.  $\frac{9}{12}$

17 Which of the following expressions has a product that contains 6 zeros?

- A.  $6 \times 10^4$
- B.  $8.3 \times 10^5$
- C.  $2.4 \times 10^6$
- D.  $41 \times 10^6$

18 Hunter is using different lengths of wire for a science project. The line plot below shows the length, in meters, of each wire he will use.



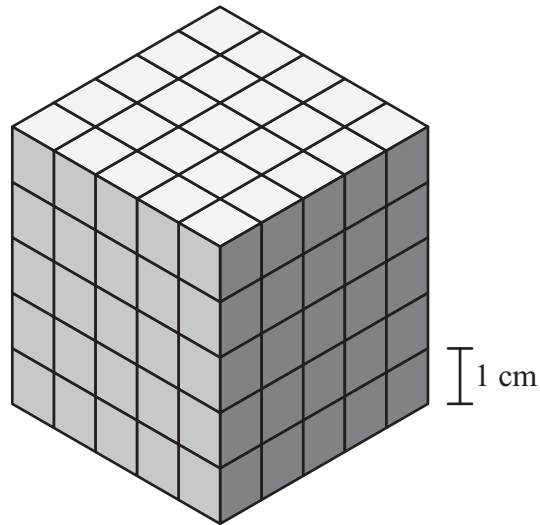
Length of Wire (in meters)

Which of the following is the total length, in meters, of wire Hunter is using for the project?

- A.  $\frac{1}{2}$
- B.  $\frac{5}{8}$
- C.  $1\frac{3}{8}$
- D.  $1\frac{7}{8}$

Question 19 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.

- 19 Tom used 1-centimeter blocks to build a cube, as shown below.



What is the volume, in cubic centimeters, of the cube Tom built?

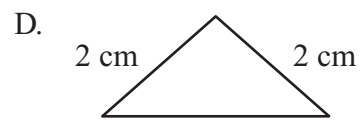
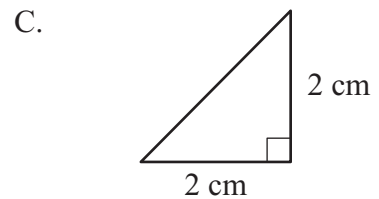
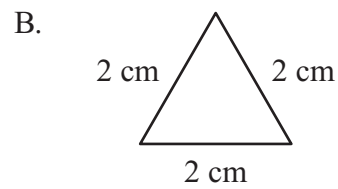
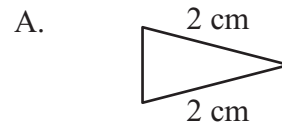
Mark your answers to multiple-choice questions 20 and 21 in the spaces provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.

- 20 Verndale had a total of 40.5 inches of rain this year. This year's total was 2.62 inches greater than last year's total.

What was the total amount of rain that Verndale had last year?

- A. 1.43 inches
- B. 2.63 inches
- C. 37.88 inches
- D. 38.12 inches

- 21 Matt drew an obtuse isosceles triangle. Which of the following could be Matt's triangle?



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

Item No.	Page No.	Reporting Category	Standard	Correct Answer (MC/SA)*
1	171	<i>Measurement and Data</i>	MD.5	C
2	171	<i>Number and Operations in Base Ten</i>	NBT.3	B
3	171	<i>Number and Operations in Base Ten</i>	NBT.6	C
4	172	<i>Operations and Algebraic Thinking</i>	OA.3	D
5	173	<i>Number and Operations-Fractions</i>	NF.7	D
6	173	<i>Geometry</i>	G.3	B
7	174	<i>Number and Operations in Base Ten</i>	NBT.1	10
8	174	<i>Number and Operations-Fractions</i>	NF.2	$\frac{9}{10}$
9	175	<i>Operations and Algebraic Thinking</i>	OA.1	
10	176	<i>Number and Operations in Base Ten</i>	NBT.4	B
11	176	<i>Measurement and Data</i>	MD.1	D
12	177	<i>Number and Operations-Fractions</i>	NF.4	
13	178	<i>Number and Operations-Fractions</i>	NF.2	C
14	178	<i>Measurement and Data</i>	MD.5	B
15	179	<i>Geometry</i>	G.1	A
16	179	<i>Number and Operations-Fractions</i>	NF.4	C
17	180	<i>Number and Operations in Base Ten</i>	NBT.2	D
18	180	<i>Measurement and Data</i>	MD.2	D
19	181	<i>Measurement and Data</i>	MD.4	125 cubic centimeters
20	182	<i>Number and Operations in Base Ten</i>	NBT.7	C
21	182	<i>Geometry</i>	G.4	D

\* 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 2015 Unreleased Common Items:**  
**Reporting Categories and Standards**

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