
XI. Mathematics, Grade 5

Grade 5 Mathematics Test

The spring 2009 grade 5 MCAS Mathematics test was based on learning standards in the Massachusetts *Mathematics Curriculum Framework* (2000). The *Framework* identifies five major content strands, listed below. Specific learning standards for grade 5 are found in the *Supplement to the Massachusetts Mathematics Curriculum Framework* (2004). Page numbers for the grades 5–6 *Framework* learning standards and for the grade 5 *Supplement* standards appear in parentheses.

- Number Sense and Operations (*Framework*, pages 25–26; *Supplement*, pages 7–8)
- Patterns, Relations, and Algebra (*Framework*, page 34; *Supplement*, page 8)
- Geometry (*Framework*, page 42; *Supplement*, page 9)
- Measurement (*Framework*, page 50; *Supplement*, pages 9–10)
- Data Analysis, Statistics, and Probability (*Framework*, page 58; *Supplement*, page 10)

The *Mathematics Curriculum Framework* and *Supplement* are 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 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 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 reference sheet and MCAS ruler during this session.
You may **not** use a calculator during this session.



DIRECTIONS

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

- 1 Which of the following is equivalent to the expression below?

$$10 \times 10 \times 10 \times 10 \times 10$$

- A. 10×4
- B. 10×5
- C. 10^4
- D. 10^5

- 2 Anna is having a pizza party.

- Anna will order 2 pizzas for every 5 people at her party.
- There will be 20 people at Anna's party.

What is the total number of pizzas that Anna will order?

- A. 7
- B. 8
- C. 10
- D. 20

- 3 Which of the following numbers is a multiple of 3?

- A. 145
- B. 158
- C. 205
- D. 216

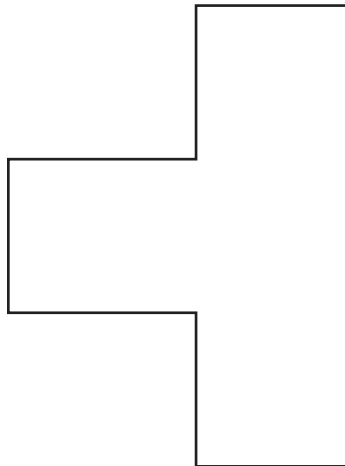
- 4 Fran pays \$0.25 for each copy she makes. The number of copies she makes can be represented by n .

Which of the following expressions represents the amount, in dollars, that Fran will pay to make n copies?

- A. $n \div 0.25$
- B. $n + 0.25$
- C. $0.25 \div n$
- D. $0.25 \times n$

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 Elian drew the figure shown below.



What is the total number of lines of symmetry in Elian's figure?

Mark your answers to multiple-choice questions 6 and 7 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 of the following is equivalent to the expression below?

$$(2 \times 1) + (7 \times 0.1) + (5 \times 0.001)$$

- A. 2.705
- B. 2.750
- C. 20.75
- D. 27.50

- 7 The table below shows the number of minutes James swam each day for 5 days.

Minutes James Swam

Day	Number of Minutes
Monday	20
Tuesday	25
Wednesday	14
Thursday	25
Friday	11

What is the **mean** (average) number of minutes James swam per day for the 5 days?

- A. 11
- B. 19
- C. 20
- D. 25

Mathematics

SESSION 2

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

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



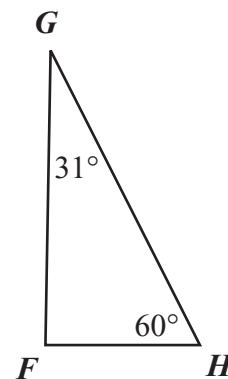
DIRECTIONS

This session contains seven 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.

- 8 Helen is 62 inches tall. Which of the following is another way to represent 62 inches?

- A. 5 feet
- B. 5 feet 2 inches
- C. 5 feet 6 inches
- D. 6 feet 2 inches

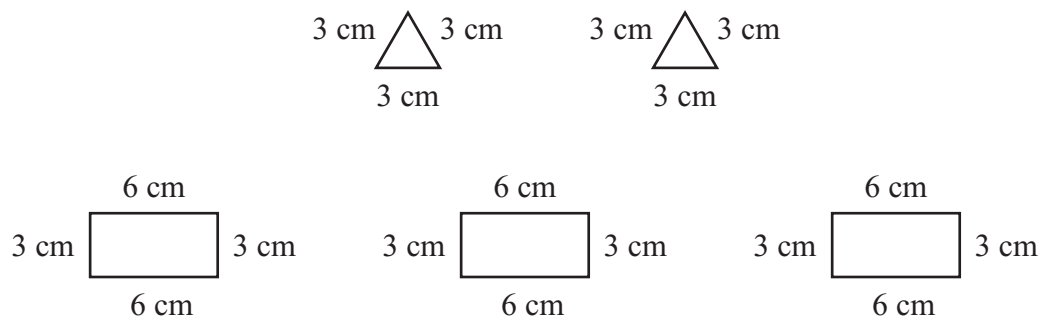
- 9 Triangle FGH and two of its angle measures are shown below.



What is the measure of angle F ?

- A. 29°
- B. 89°
- C. 90°
- D. 91°

- 10 Miguel constructed a three-dimensional shape that has five faces. The five faces he used are shown below.



Which of the following could be the three-dimensional shape Miguel constructed?

- A. rectangular pyramid
- B. triangular pyramid
- C. rectangular prism
- D. triangular prism

Question 11 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 11 in the space provided in your Student Answer Booklet.

- 11 Teresa put tiles marked with the letters of her name into a bag. The back of each tile is blank. The tiles are shown below.



Without looking into the bag, Teresa will pick a tile.

- a. What is the probability that Teresa will pick a tile with the letter T on it? Show or explain how you got your answer.
- b. What is the probability that Teresa will pick a tile with a vowel (A, E, I, O, U) on it? Show or explain how you got your answer.

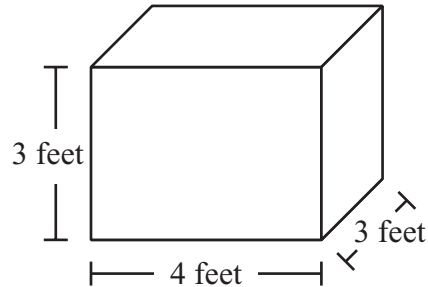
Suppose Teresa first picked a tile with a vowel on it. Now Teresa will pick a second tile.

- She will **not** put the first tile back into the bag.
 - She will not look into the bag while picking the second tile.
- c. What is the probability that Teresa will pick another tile with a vowel on it? Show or explain how you got your answer.

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 Malik will make a carving from a block of ice. The block of ice is in the shape of a rectangular prism.

The dimensions of the block of ice are shown in the diagram below.



What is the volume, in cubic feet, of the block of ice?

Question 13 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 13 in the space provided in your Student Answer Booklet.

13 Ms. Hendricks asked her students how they get to school each day. She collected their answers and determined the following results.

- Half of her students take the bus.
 - $\frac{1}{5}$ of her students walk.
 - The rest of her students ride with their parents.
- a. What percent of the students take the bus?
 - b. What percent of the students walk? Explain how you know that your answer is correct.
 - c. What percent of the students ride with their parents? Show or explain how you got your answer.

Mark your answers to multiple-choice questions 14 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.

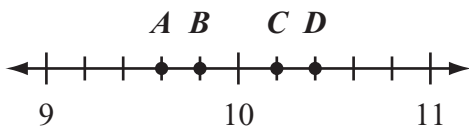
14 Diego put green (G) and yellow (Y) beads on a string in a repeating pattern.

- He used the rule GGGY for his pattern.
- Diego put exactly 5 yellow beads on the string.
- The last bead that he put on the string was a yellow bead.

What is the total number of beads that Diego put on the string?

- A. 15
- B. 16
- C. 20
- D. 25

15 Which point on the number line below best represents the location of 10.2?



- A. point *A*
- B. point *B*
- C. point *C*
- D. point *D*

16 Omar wrote a number pattern.

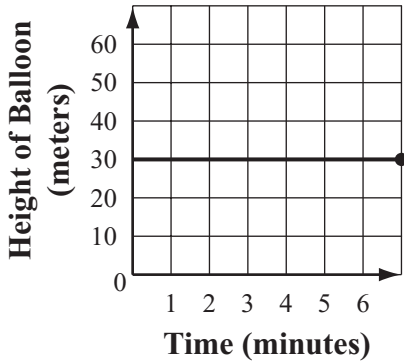
- The first number in his pattern was 2.
- He used the rule “multiply the previous number by 3” to get the next number.

What was the **fourth** number in Omar’s number pattern?

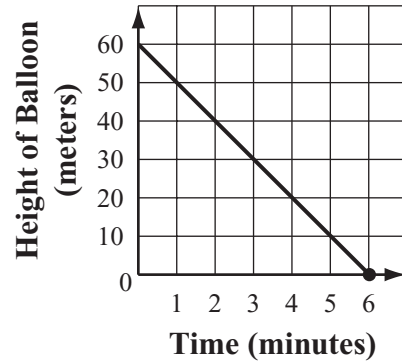
- A. 12
- B. 18
- C. 36
- D. 54

- 17 A hot air balloon lifted off the ground and rose straight up at a constant speed. Which of the following graphs best represents the height of the hot air balloon above the ground over time?

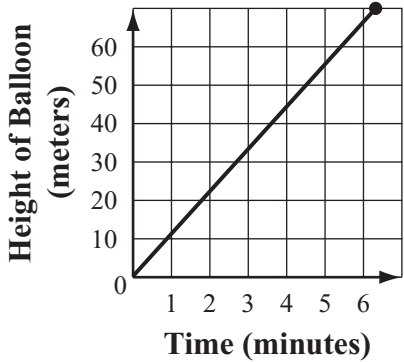
A. Hot Air Balloon Height over Time



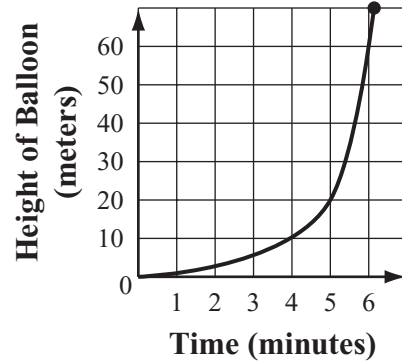
C. Hot Air Balloon Height over Time



B. Hot Air Balloon Height over Time



D. Hot Air Balloon Height over Time





Massachusetts Comprehensive Assessment System Grade 5 Mathematics Reference Sheet

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 2009 Released Items:
Reporting Categories, Standards, and Correct Answers*

Item No.	Page No.	Reporting Category	Standard	Correct Answer (MC/SA)*
1	161	<i>Number Sense and Operations</i>	5.N.1	D
2	161	<i>Patterns, Relations, and Algebra</i>	5.P.5	B
3	161	<i>Number Sense and Operations</i>	5.N.8	D
4	161	<i>Patterns, Relations, and Algebra</i>	5.P.4	D
5	162	<i>Geometry</i>	5.G.6	1
6	163	<i>Number Sense and Operations</i>	5.N.3	A
7	163	<i>Data Analysis, Statistics, and Probability</i>	5.D.1	B
8	164	<i>Measurement</i>	5.M.3	B
9	164	<i>Measurement</i>	5.M.5	B
10	165	<i>Geometry</i>	5.G.2	D
11	166	<i>Data Analysis, Statistics, and Probability</i>	5.D.3	
12	167	<i>Measurement</i>	5.M.4	36 cubic feet
13	168	<i>Number Sense and Operations</i>	5.N.5	
14	169	<i>Patterns, Relations, and Algebra</i>	5.P.1	C
15	169	<i>Number Sense and Operations</i>	5.N.6	C
16	169	<i>Patterns, Relations, and Algebra</i>	5.P.1	D
17	170	<i>Patterns, Relations, and Algebra</i>	5.P.6	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.