
XII. Mathematics, Grade 6

Grade 6 Mathematics Test

The spring 2011 grade 6 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 5–6 learning standards appear in parentheses.

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

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 6 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 6 Mathematics test was provided with a plastic ruler and a grade 6 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 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

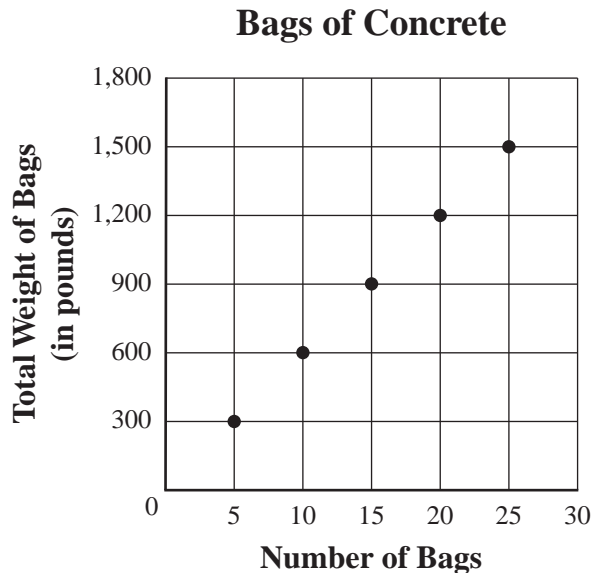
You may use your reference sheet and MCAS ruler during this session.
You may *not* use a calculator during this session.



DIRECTIONS

This session contains seven multiple-choice questions, 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 Bruce is moving bags of concrete. Each bag weighs the same amount. The graph below shows the relationship between different numbers of bags and the total weight, in pounds, of the bags.



Bruce will move a total of 100 bags. Based on the graph, what is the total weight of 100 bags of concrete?

- A. 1,800 pounds
- B. 6,000 pounds
- C. 15,000 pounds
- D. 30,000 pounds

- 2 Ariel recorded the number of e-mails she received each day for 7 days. The results are listed below.

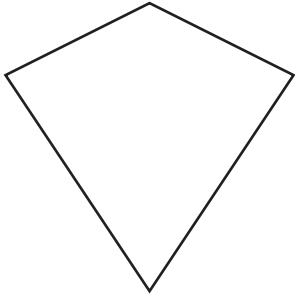
15, 17, 17, 19, 24, 24, 24

What is the mode of the numbers of e-mails Ariel received for the 7 days?

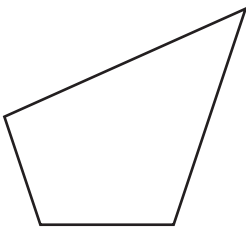
- A. 17
- B. 19
- C. 20
- D. 24

3 Leah made a garden in the shape of a trapezoid. Which of the following figures is a trapezoid?

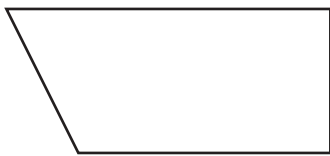
A.



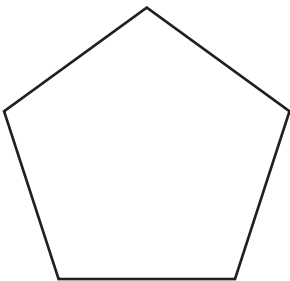
B.



C.

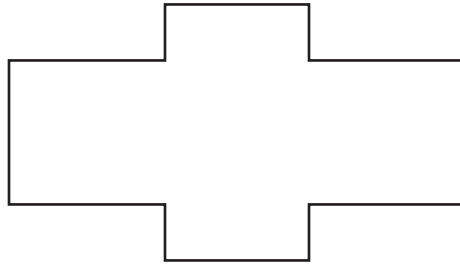


D.



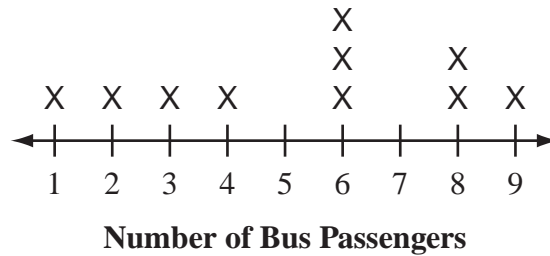
Questions 4 and 5 are short-answer questions. Write your answers to these questions in the boxes provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.

- 4 Otto drew the shape shown below in his notebook.



What is the total number of lines of symmetry that Otto’s shape has?

- 5 Mr. Nunez drives a bus. The line plot below shows the number of passengers that were on his bus for each of the last 10 trips he made.



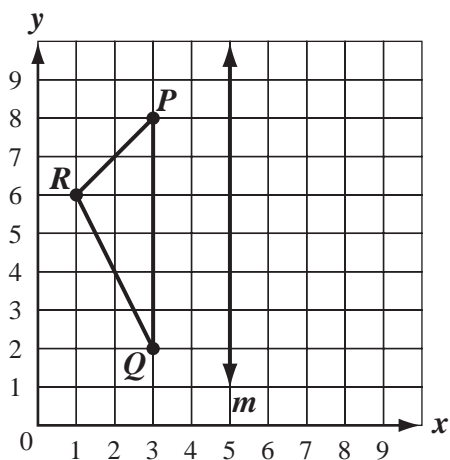
For what fraction of the trips did Mr. Nunez have **fewer than** 4 passengers on his bus?

Mark your answers to multiple-choice questions 6 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.

6 Of the 75 teachers at a school, 15 teach mathematics. What percent of the teachers at the school teach mathematics?

- A. 2%
- B. 5%
- C. 15%
- D. 20%

7 Sherry drew $\triangle PQR$ and line m , as shown on the grid below.



Sherry will reflect $\triangle PQR$ over line m . What will be the coordinates of the image of point R after $\triangle PQR$ is reflected over line m ?

- A. (5, 6)
- B. (6, 9)
- C. (7, 6)
- D. (9, 6)

8 The table below shows the low temperatures each day for four days.

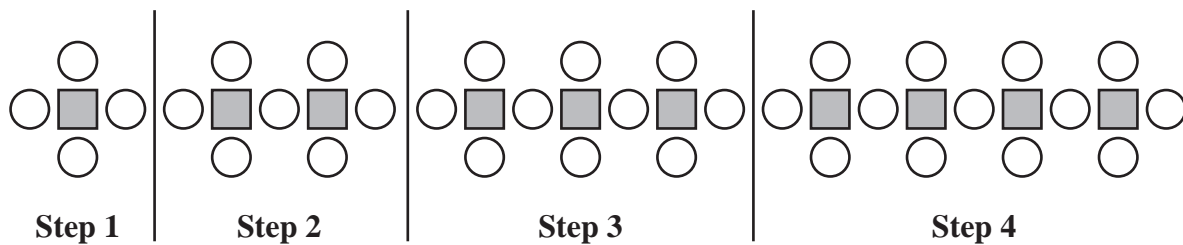
Low Temperatures

Day	Temperature (degrees Fahrenheit)
Monday	-4
Tuesday	1
Wednesday	3
Thursday	-2

Which of the following shows these temperatures in order from least to greatest?

- A. 1, -2, 3, -4
- B. -2, -4, 1, 3
- C. -4, 3, -2, 1
- D. -4, -2, 1, 3

- 9 Don made a pattern using circles and squares. The first four steps of his pattern are shown below.



If Don continues his pattern, what is the total number of circles he will need to make Step 10?

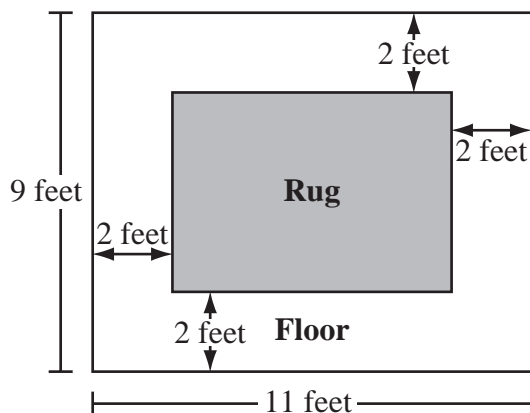
- A. 30
- B. 31
- C. 38
- D. 40

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 Kelsey has a rug in the center of her bedroom floor. Both the floor and the rug are in the shape of a rectangle. The rug, the floor, and some of their dimensions are shown in the diagram below.



- What is the area, in square feet, of the entire floor? Show or explain how you got your answer.
- What is the **perimeter**, in feet, of the **rug**? Show or explain how you got your answer.
- What is the area, in square feet, of the part of the floor that is **not** covered by the rug? Show or explain how you got your answer.

Mathematics

SESSION 2

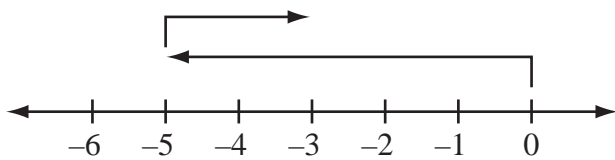
You may use your reference sheet and MCAS ruler during this session.
You may **not** use a calculator during this session.



DIRECTIONS

This session contains 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 Which of the following equations is modeled on the number line below?



- A. $0 + (-5) + (-3) = -3$
- B. $0 + 3 + (-2) = -5$
- C. $0 + (-3) + 2 = -5$
- D. $0 + (-5) + 2 = -3$

- 12 The stem-and-leaf plot below shows the time, in minutes, of each phone call Terrell made last month.

Phone Calls (in minutes)

0	2 2 5 8 9
1	0 0 4 7 7 9
2	2 3 8 8 8
3	1 4 6
4	2
5	5
6	1 2 2 3 7 7
7	3
8	4 8

Key

3 | 1 represents 31

What is the total number of Terrell's phone calls that lasted more than 65 minutes?

- A. 3
- B. 4
- C. 5
- D. 6

- 13 Ann Marie wants to buy a vase and some flowers.

- The vase costs \$12.
- Each flower costs \$2.

Which of the following expressions represents the cost, in dollars, of the vase and f flowers?

- A. $12 + 2 + f$
- B. $12 \times 2 + f$
- C. $12 + 2 \times f$
- D. $12 \times 2 \times f$

- 14 A cafeteria served lunch to 287 students. Each lunch cost \$2.05.

Which of the following is closest to the total cost of the lunches served by the cafeteria?

- A. \$500
- B. \$600
- C. \$675
- D. \$750

- 15 Julius has a bag with some marbles in it. The marbles are all the same size and shape.

- There are 6 red marbles.
- There are 8 white marbles.
- There are 12 blue marbles.

Julius will take a marble from the bag without looking.

What is the probability that Julius will take **either** a red marble **or** a white marble?

- A. $\frac{6}{26}$
- B. $\frac{8}{18}$
- C. $\frac{14}{12}$
- D. $\frac{14}{26}$

Question 16 is a short-answer question. Write your answer to this question in the box provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.

- 16 Write a number that has the digit 1 in the **hundreds** place and the digit 3 in the **hundredths** place.

Question 17 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 17 in the space provided in your Student Answer Booklet.

17 Paige, Rosie, and Cheryl **each** spent exactly \$9.00 at the same snack bar.

- Paige bought 3 bags of peanuts.
 - Rosie bought 2 bags of peanuts and 2 pretzels.
 - Cheryl bought 1 bag of peanuts, 1 pretzel, and 1 milk shake.
- a. What is the cost, in dollars, of 1 bag of peanuts? Show or explain how you got your answer.
 - b. What is the cost, in dollars, of 1 pretzel? Show or explain how you got your answer.
 - c. What is the total number of pretzels that can be bought for the cost of 1 milk shake? Show or explain how you got your answer.

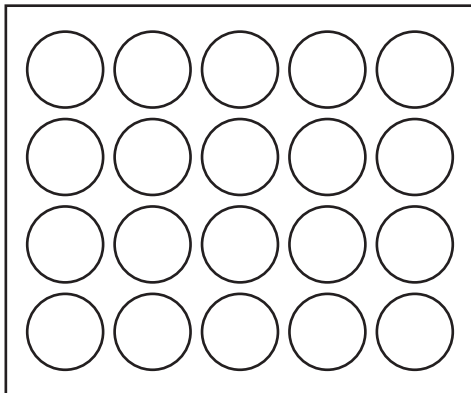
Mark your answers to multiple-choice questions 18 through 21 in the spaces provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.

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

$$10^9$$

- A. 10,000,000
- B. 100,000,000
- C. 1,000,000,000
- D. 10,000,000,000

- 19 Arthur drew an array of circles, as shown below.



Arthur will shade $\frac{7}{10}$ of the circles in his array. What is the total number of circles that Arthur will shade in the array?

- A. 7
- B. 10
- C. 14
- D. 17

- 20 What is the value of the expression below when $\square = 5$?

$$8 + 3(\square)$$

- A. 55
- B. 43
- C. 23
- D. 16

- 21 What is the value of the expression below?

$$2\frac{1}{4} \times 3\frac{1}{3}$$

- A. $7\frac{1}{2}$
- B. $6\frac{1}{12}$
- C. $5\frac{7}{12}$
- D. $1\frac{13}{27}$



PERIMETER FORMULAS

perimeter = distance around

square $P = 4s$

rectangle $P = 2b + 2h$

OR

$P = 2l + 2w$

triangle $P = a + b + c$

AREA FORMULAS

square $A = s \times s$

rectangle $A = bh$

OR

$A = lw$

parallelogram $A = bh$

triangle $A = \frac{1}{2}bh$

circle $A = \pi r^2$

VOLUME FORMULAS

rectangular prism $V = lwh$

cube $V = s \times s \times s$

(s = length of an edge)

CIRCLE FORMULAS

$C = 2\pi r$

OR

$C = \pi d$

$A = \pi r^2$

Grade 6 Mathematics
Spring 2011 Released Items:
Reporting Categories, Standards, and Correct Answers*

Item No.	Page No.	Reporting Category	Standard	Correct Answer (MC/SA)*
1	191	<i>Patterns, Relations, and Algebra</i>	6.P.6	B
2	191	<i>Data Analysis, Statistics, and Probability</i>	6.D.1	D
3	192	<i>Geometry</i>	6.G.1	C
4	193	<i>Geometry</i>	6.G.7	2
5	193	<i>Data Analysis, Statistics, and Probability</i>	6.D.2	$\frac{3}{10}$
6	194	<i>Number Sense and Operations</i>	6.N.9	D
7	194	<i>Geometry</i>	6.G.6	D
8	194	<i>Number Sense and Operations</i>	6.N.7	D
9	195	<i>Patterns, Relations, and Algebra</i>	6.P.1	B
10	196	<i>Measurement</i>	6.M.1	
11	197	<i>Number Sense and Operations</i>	6.N.10	D
12	197	<i>Data Analysis, Statistics, and Probability</i>	6.D.2	C
13	198	<i>Patterns, Relations, and Algebra</i>	6.P.4	C
14	198	<i>Number Sense and Operations</i>	6.N.16	B
15	198	<i>Data Analysis, Statistics, and Probability</i>	6.D.4	D
16	199	<i>Number Sense and Operations</i>	6.N.2	Any number with a 1 in the hundreds place and a 3 in the hundredths place
17	200	<i>Patterns, Relations, and Algebra</i>	6.P.5	
18	201	<i>Number Sense and Operations</i>	6.N.1	C
19	201	<i>Number Sense and Operations</i>	6.N.4	C
20	201	<i>Number Sense and Operations</i>	6.N.11	C
21	201	<i>Number Sense and Operations</i>	6.N.14	A

* 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 6 Mathematics
Spring 2011 Unreleased Common Items:
Reporting Categories and Standards

Item No.	Reporting Category	Standard
22	<i>Number Sense and Operations</i>	6.N.13
23	<i>Geometry</i>	6.G.8
24	<i>Number Sense and Operations</i>	6.N.3
25	<i>Patterns, Relations, and Algebra</i>	6.P.3
26	<i>Patterns, Relations, and Algebra</i>	6.P.7
27	<i>Number Sense and Operations</i>	6.N.15
28	<i>Number Sense and Operations</i>	6.N.8
29	<i>Patterns, Relations, and Algebra</i>	6.P.4
30	<i>Number Sense and Operations</i>	6.N.6
31	<i>Patterns, Relations, and Algebra</i>	6.P.5
32	<i>Geometry</i>	6.G.2
33	<i>Patterns, Relations, and Algebra</i>	6.P.1
34	<i>Measurement</i>	6.M.5
35	<i>Number Sense and Operations</i>	6.N.5
36	<i>Geometry</i>	6.G.9
37	<i>Patterns, Relations, and Algebra</i>	6.P.6
38	<i>Measurement</i>	6.M.7
39	<i>Patterns, Relations, and Algebra</i>	6.P.2
40	<i>Geometry</i>	6.G.3
41	<i>Measurement</i>	6.M.2
42	<i>Data Analysis, Statistics, and Probability</i>	6.D.3