XI. Mathematics, Grade 5

Grade 5 Mathematics Test

The spring 2010 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 *Mathematics Curriculum 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 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

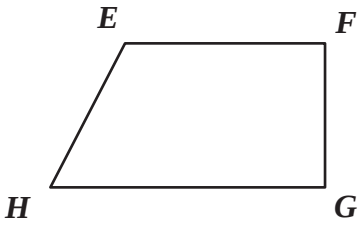
Session 1

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 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.

1 Elsa drew the quadrilateral shown below.



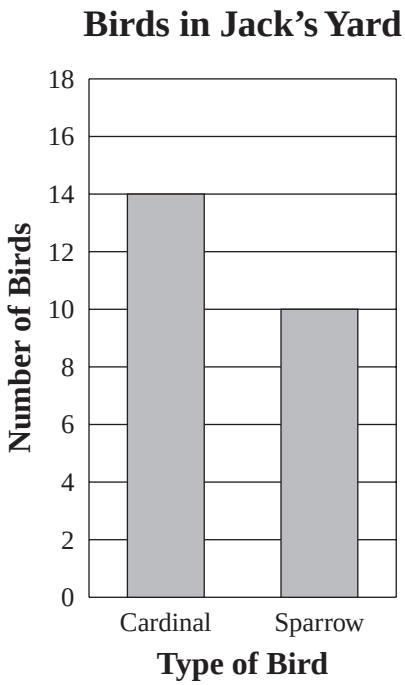
Which angle appears to be acute?

A. angle *E*
B. angle *F*
C. angle *G*
D. angle *H*

2 Which of the following is a common factor of 24 and 32?

A. 3
B. 4
C. 12
D. 16

3 Jack counted the numbers of cardinals and sparrows he saw in his yard during one week. His results are displayed in the bar graph below.



What fraction of the birds were sparrows?

A. $\frac{10}{24}$

B. $\frac{10}{14}$

C. $\frac{14}{24}$

D. $\frac{14}{10}$

4 Daryl drank 4 bottles of water one day. Each bottle held 500 milliliters of water.

What was the total number of liters of water Daryl drank during that day?

A. 1 liter

B. 2 liters

C. 125 liters

D. 2000 liters

Questions 5 and 6 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.

5 Laila measured her pulse, in beats per minute, 7 times during one day. Her results are listed below.

52, 68, 75, 98, 64, 75, 72

What is the range, in beats per minute, of Laila's pulse measurements?

6 Marcus wants to make pudding. The table on the back of the pudding box is shown below.

Servings	Pudding Mix	Milk
2	$\frac{1}{4}$ cup	1 cup
4	$\frac{1}{2}$ cup	2 cups
6	$\frac{3}{4}$ cup	3 cups

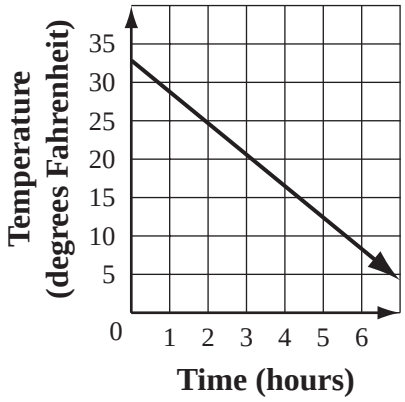
Marcus wants to make 16 servings of pudding.

Based on the table, what is the total number of cups of **pudding mix** that he should use?

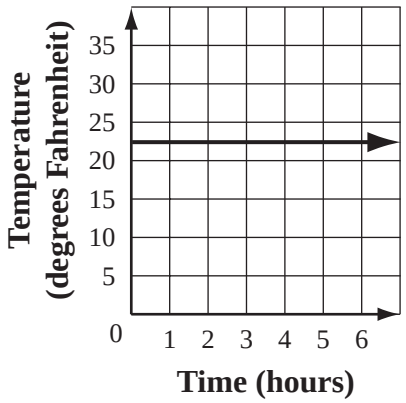
Mark your answers to multiple-choice questions 7 through 10 in the spaces provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.

7 Which of the following graphs shows temperature decreasing over time?

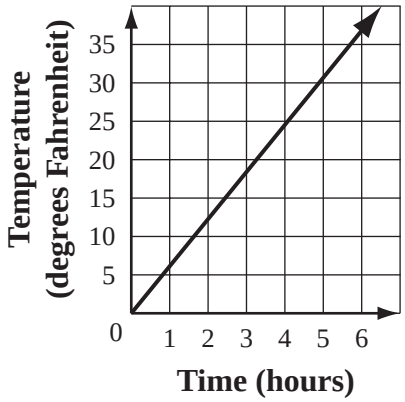
A.



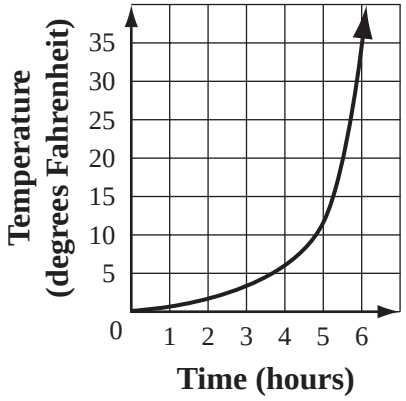
C.



B.

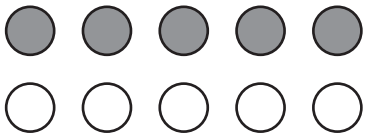


D.



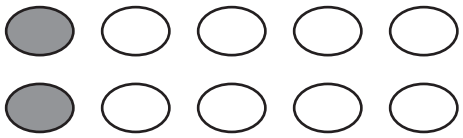
8 Mario shaded $\frac{1}{5}$ of the shapes in a group.

Which of the following could be Mario's group?

A. 

B. 

C. 

D. 

9 Geri has a set of 9 cards numbered 1 through 9. The backs of the cards are blank. She puts the cards face-down so only the backs can be seen. Geri asks Simon to pick 1 card.

Which of the following describes the probability that Simon will pick a card with an odd number?

A. He is more likely to pick a card with an odd number than with an even number.

B. He is equally likely to pick a card with an odd number or an even number.

C. He is unlikely to pick a card with an odd number.

D. He is certain to pick a card with an odd number.

10 The expression below can be used to calculate the total cost of $\square$ adult tickets and $\triangle$ child tickets to a movie.

$$(\square \times 9.00) + (\triangle \times 7.50)$$

What is the total cost, in dollars, of 12 adult tickets and 10 child tickets?

A. $16.50

B. $38.50

C. $173.00

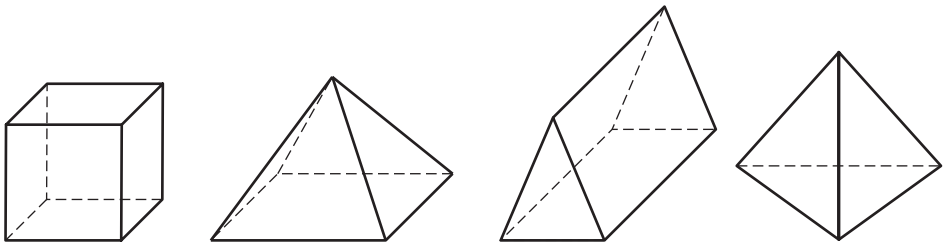
D. $183.00

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 Felipe is studying three-dimensional shapes. His teacher gives him the four shapes shown below to sort into groups.



Cube **Square pyramid** **Triangular prism** **Triangular pyramid**

a. Group A contains shapes that have **exactly** 5 faces. Which shapes should Felipe sort into group A? Show or explain how you got your answer.

b. Group B contains shapes that have **fewer than** 10 edges. Which shapes should Felipe sort into group B? Show or explain how you got your answer.

c. Felipe's teacher gives him another pyramid. It has a base with 6 edges. What is the total number of edges of this pyramid? Show or explain how you got your answer.

Mathematics

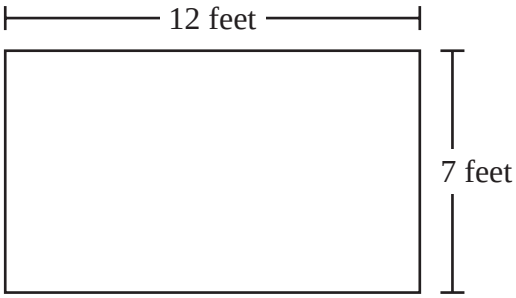
SESSION 2

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 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.

12 Ms. Lindquist bought a rug with the dimensions shown below.



What is the area of the rug?

A. 19 square feet

B. 38 square feet

C. 42 square feet

D. 84 square feet

13 Which of the following is equivalent to the expression below?

$$35,720 + 0$$

A. $35,720 + 490 \times 490$

B. $35,720 + 490 \div 490$

C. $35,720 + 490 + 490$

D. $35,720 + 490 - 490$

14 Ron recorded the number of laps he ran each day for 5 days, as shown below.

2, 7, 8, 8, 5

What is the mean (average) number of laps that Ron ran each day for the 5 days?

A. 5

B. 6

C. 7

D. 8

15 Which of the following has the same value as the expression below?

$$8 \times (7 - 2)$$

A. 8×5

B. 8×9

C. $56 - 2$

D. $56 - 40$

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 answer in this test booklet. You may do your figuring in the test booklet.

16 Jordan has a machine part that is thirty-two thousandths of an inch thick.

What is thirty-two thousandths written as a decimal?

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 A coach is collecting a fee from each player on her soccer team. She collects the same amount of money from each player. The amount of money she collected over four days from some of the players is shown in the table below.

Soccer Fees Collected

Day	Number of Players	Amount Collected
Monday	4	$ 88
Tuesday	7	$154
Wednesday	6	$132
Thursday	3	$ 66
Friday	2	?

a. On Friday, the coach will collect fees from 2 more players. What is the total amount of money the coach will collect from the 2 players? Show or explain how you got your answer.

b. Use words or symbols to write or describe a rule that can be used to calculate the amount of money the coach will collect from p players.

c. After every player on her team has paid the fee, the coach will have collected a total of $550. What is the total number of players on the soccer team? 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 Melissa worked on a subtraction problem. When she rounded each number to the nearest whole number, the difference of the two numbers was 8.

Which of the following could be Melissa's subtraction problem?

A. 24.89 − 16.16
B. 24.89 − 16.38
C. 24.89 − 17.16
D. 24.89 − 17.68

19 Which of the following is equivalent to the expression below?

$$5\frac{1}{4} - 2\frac{1}{2}$$

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

20 The table below shows the distances four balls rolled off a ramp.

Distances Balls Rolled

Ball	Distance (in meters)
1	10.2
2	10.8
3	10.15
4	10.23

Which of the following shows the distances in order from **greatest to least**?

A. 10.8, 10.23, 10.2, 10.15
B. 10.8, 10.2, 10.23, 10.15
C. 10.15, 10.2, 10.23, 10.8
D. 10.23, 10.15, 10.8, 10.2

21 The total weight of a shipment of 15 boxes was 2250 pounds. Each box had the same weight. How much did 1 box weigh?

A. 150 pounds
B. 160 pounds
C. 170 pounds
D. 180 pounds

Massachusetts Department of
ELEMENTARY & SECONDARY
EDUCATION

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)

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)

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)

Grade 5 Mathematics
Spring 2010 Released Items:
Reporting Categories, Standards, and Correct Answers*

Item No.	Page No.	Reporting Category	Standard	Correct Answer (MC/SA)*
1	166	*Measurement*	5.M.2	D
2	166	*Number Sense and Operations*	5.N.8	B
3	167	*Data Analysis, Statistics, and Probability*	5.D.2	A
4	167	*Measurement*	5.M.3	B
5	168	*Data Analysis, Statistics, and Probability*	5.D.1	46
6	168	*Patterns, Relations, and Algebra*	5.P.5	2 cups
7	169	*Patterns, Relations, and Algebra*	5.P.6	A
8	170	*Number Sense and Operations*	5.N.4	D
9	170	*Data Analysis, Statistics, and Probability*	5.D.3	A
10	170	*Patterns, Relations, and Algebra*	5.P.2	D
11	171	*Geometry*	5.G.2	
12	172	*Measurement*	5.M.1	D
13	172	*Number Sense and Operations*	5.N.11	D
14	173	*Data Analysis, Statistics, and Probability*	5.D.1	B
15	173	*Number Sense and Operations*	5.N.10	A
16	174	*Number Sense and Operations*	5.N.2	0.032
17	175	*Patterns, Relations, and Algebra*	5.P.4	
18	176	*Number Sense and Operations*	5.N.14	C
19	176	*Number Sense and Operations*	5.N.13	B
20	176	*Number Sense and Operations*	5.N.7	A
21	176	*Number Sense and Operations*	5.N.12	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 5 Mathematics
Spring 2010 Unreleased Common Items:
Reporting Categories and Standards

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