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## XV. Mathematics, Grade 10

## Grade 10 Mathematics Test

The spring 2016 grade 10 Mathematics test was based on standards in the 2011 *Massachusetts Curriculum Framework for Mathematics* that match content in the grade 9–10 standards from the 2000 *Massachusetts Mathematics Curriculum Framework*. The standards in the 2011 *Framework* on the grade 10 test are organized under the five major conceptual categories listed below.

- Number and Quantity
- Algebra
- Functions
- Geometry
- Statistics and Probability

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). More information and a list of standards assessable on the spring 2016 test are available at [www.doe.mass.edu/mcas/transition/?section=math10](http://www.doe.mass.edu/mcas/transition/?section=math10).

Mathematics test results for grade 10 are reported under four MCAS reporting categories, which are based on the five *Framework* conceptual categories listed above.

The table at the conclusion of this chapter indicates each item’s reporting category, the 2011 *Framework* standard it assesses, and the 2000 *Framework* standard it assesses. The correct answers for multiple-choice and short-answer items are also displayed in the table.

### Test Sessions

The grade 10 Mathematics test included two separate test sessions, which were administered on consecutive days. Each session included multiple-choice and open-response items. Session 1 also included short-answer items.

### Reference Materials and Tools

Each student taking the grade 10 Mathematics test was provided with a grade 10 Mathematics Reference Sheet. A copy of the reference sheet follows the final question in this chapter.

During Session 2, each student had sole access to a calculator with at least four functions and a square root key. Calculator use was not allowed during Session 1.

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 other reference tools or materials were allowed.

# Grade 10 Mathematics

## SESSION 1

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



### DIRECTIONS

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

- 1 A cube has a volume of 725 cubic centimeters. Which of the following is closest to the length of each edge of the cube?

- A. 7 centimeters
- B. 8 centimeters
- C. 9 centimeters
- D. 10 centimeters

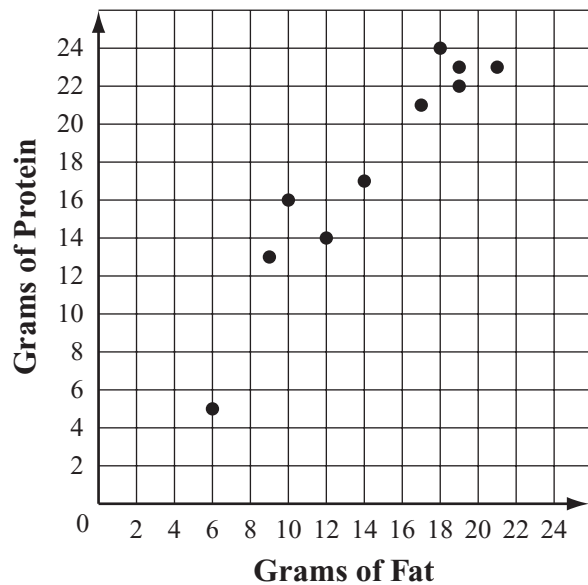
- 2 Which of the following is equivalent to the expression below?

$$(3m^2 + 4) + (8m^2 - 5m)$$

- A.  $11m^2 - 5m + 4$
- B.  $7m^2 + 13m + 4$
- C.  $11m^2 - m$
- D.  $7m^2 + 3m$

- 3 The scatterplot below shows the relationship between the grams of fat and the grams of protein in the sandwiches sold at a deli.

**Fat and Protein in Deli Sandwiches**



Based on the line of best fit for the scatterplot, which of the following is closest to the expected number of grams of fat in a deli sandwich that has 10 grams of **protein**?

- A. 2 grams
- B. 8 grams
- C. 13 grams
- D. 16 grams

- 4 Which values of  $x$  and  $y$  make the system of equations below true?

$$2x - y = -1$$

$$3x - y = -3$$

- A.  $x = -4$ ;  $y = -7$   
B.  $x = -2$ ;  $y = -3$   
C.  $x = 2$ ;  $y = 5$   
D.  $x = 4$ ;  $y = 15$
- 5 Which of the following is equivalent to the expression below?

$$-3(x - 2)$$

- A.  $-3x - 2$   
B.  $-3x + 2$   
C.  $-3x - 6$   
D.  $-3x + 6$

- 6 A total of 29,183 votes were cast in an election. The winning candidate in the election received 61.3% of the votes. Which of the following is closest to the number of votes received by the winning candidate?

- A. 21,000  
B. 18,000  
C. 15,000  
D. 9,000

- 7 The sum of the lengths of any two sides of a triangle must be greater than the length of the remaining side.

The lengths of two sides of a triangle are 8 inches and 13 inches. Which of the following represents  $x$ , the possible length in inches of the remaining side of the triangle?

- A.  $5 < x < 21$   
B.  $5 \leq x \leq 21$   
C.  $x < 5$  or  $x > 21$   
D.  $x \leq 5$  or  $x \geq 21$

- 8 What is the value of the expression below?

$$80 \div (6 + (3 - 5) \cdot 2)$$

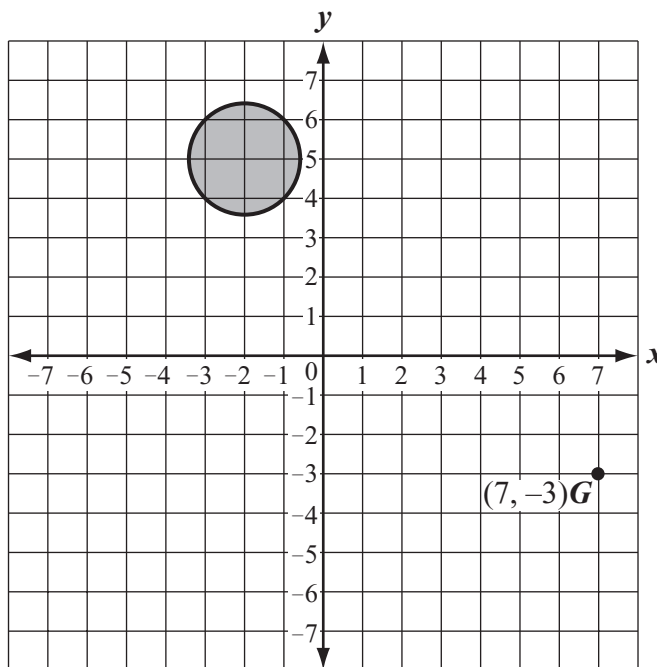
- A. -8
- B. -5
- C. 10
- D. 40

- 9 The height of right circular cylinder P is twice the height of right circular cylinder Q. The radii of the cylinders are of equal length.

What number times the volume of cylinder Q is equal to the volume of cylinder P?

- A. 2
- B. 4
- C. 6
- D. 8

- 10 Point G is shown on the coordinate grid below.



Point H is located in the shaded region of the grid. Which of the following could be the midpoint of  $\overline{GH}$ ?

- A. (1,1)
- B. (2,0)
- C. (3,1)
- D. (4,0)

- 11 Which of the following is closest to the value of the expression below?

$$3.14(7.9)^2$$

- A. 150
- B. 200
- C. 250
- D. 300

- 12 Which of the following expressions has a value of 0?

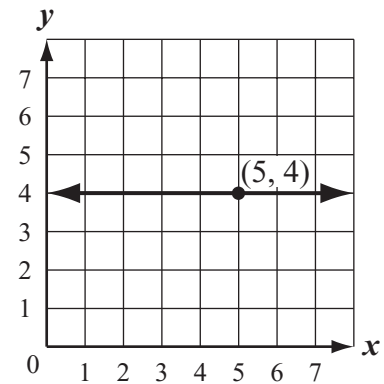
- A.  $(2 - 3) - (2 - 3)$
- B.  $(2 - 3) - |2 - 3|$
- C.  $(2 - 3) + (-3 + 2)$
- D.  $|2 - 3| - (-3 + 2)$

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

$$25 - 9x^2$$

- A.  $(5 + 3x)(5 - 3x)$
- B.  $(5 - 3x)(5 - 3x)$
- C.  $(3x + 5)(3x - 5)$
- D.  $(3x - 5)(3x - 5)$

- 14 A line passes through the point (5, 4) on a coordinate grid, as shown below.



Which of the following represents an equation of the line?

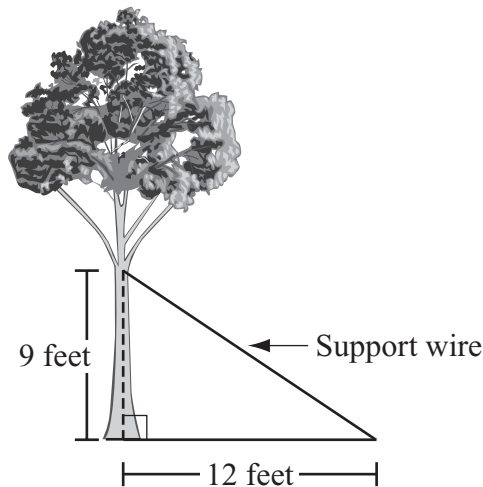
- A.  $x = 4$
- B.  $y = 4$
- C.  $x = 5$
- D.  $y = 5$

Questions 15 and 16 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.

- 15 What is the value of the expression below?

$$(\sqrt{64})^2$$

- 16 A support wire is attached to a tree at a height of 9 feet. The wire is anchored to the ground, as shown in the diagram below.



Based on the dimensions in the diagram, what is the length, in feet, of the support wire?

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 Monelle started an arithmetic sequence. The first four terms of her sequence are shown below.

$$13, 9, 5, 1, \dots$$

- What is the common difference for Monelle's sequence? Show or explain how you got your answer.
- What is the **sixth** term of Monelle's sequence? Show or explain how you got your answer.

Nevin started a geometric sequence. The first four terms of his sequence are shown below.

$$162, 54, 18, 6, \dots$$

- What is the **sixth** term of Nevin's sequence? Show or explain how you got your answer.
- Write an expression that represents the  $n$ th term of Nevin's sequence.

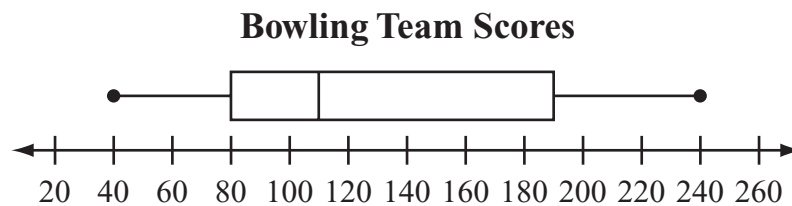


Questions 18 and 19 are short-answer questions. Write your answers to these questions in the boxes provided in your Student Answer Booklet. Do not write your answers in this test booklet. You may do your figuring in the test booklet.

- 18 What is **one** solution of the quadratic equation below?

$$x^2 + 3x - 10 = 0$$

- 19 The box-and-whisker plot below shows the distribution of scores for the members of a bowling team.



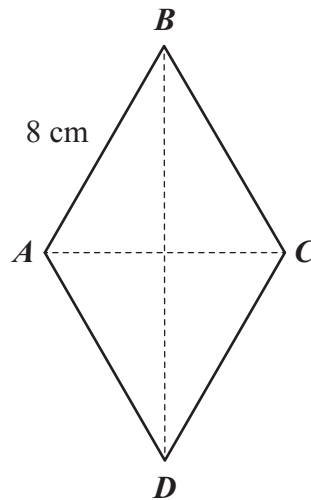
Jimmy’s score is in the bottom 25% of the scores, but he does not have the lowest score. What is one possible value for Jimmy’s score?

Questions 20 and 21 are open-response questions.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF EACH 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 20 in the space provided in your Student Answer Booklet.

- 20 The diagram below shows rhombus  $ABCD$  with a side length of 8 centimeters.



- a. What is the perimeter, in centimeters, of rhombus  $ABCD$ ? Show or explain how you got your answer.

The measure of  $\angle ABC$  is  $60^\circ$ .

- b. What is the length, in centimeters, of diagonal  $\overline{AC}$ ? Show or explain how you got your answer.
- c. What is the length, in centimeters, of diagonal  $\overline{BD}$ ? Show or explain how you got your answer.
- d. What is the area, in square centimeters, of rhombus  $ABCD$ ? Show or explain how you got your answer.

Write your answer to question 21 in the space provided in your Student Answer Booklet.

- 21 Vivian and William are approximating the values of square roots and cube roots.
- Vivian approximated the value of  $\sqrt{15}$ . What is the value of  $\sqrt{15}$  to the nearest **whole number**? Show or explain how you got your answer.
  - William approximated the value of  $\sqrt[3]{30}$ . What is the value of  $\sqrt[3]{30}$  to the nearest whole number? Show or explain how you got your answer.

Vivian approximated the value of  $\sqrt{35}$  to be 5.8. William found a closer approximation to the value of  $\sqrt{35}$  than Vivian did.

- What could be the approximation that William found? Show or explain how you got your answer.

Vivian approximated the value of  $\sqrt[3]{1010}$  to be 10.0. William claimed that 10.1 is a closer approximation to the value of  $\sqrt[3]{1010}$  than Vivian's approximation.

- Whose approximation, Vivian's or William's, is closer to the value of  $\sqrt[3]{1010}$ ? Explain your reasoning.

# Grade 10 Mathematics

## SESSION 2

You may use your reference sheet during this session.

You may use a calculator during this session.

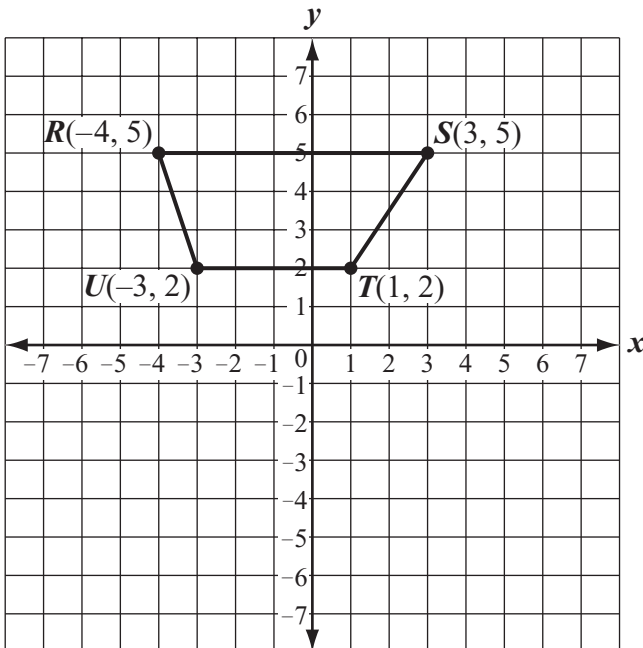


### DIRECTIONS

This session contains eighteen multiple-choice questions and three open-response questions.

Mark your answers to these questions in the spaces provided in your Student Answer Booklet.

- 22 Trapezoid  $RSTU$  is shown on the coordinate grid below.



Trapezoid  $RSTU$  will be reflected over the  $x$ -axis to create trapezoid  $R'S'T'U'$ . What will be the coordinates of point  $R'$ , the image of point  $R$  after the reflection?

- A.  $(4, 5)$
- B.  $(4, -5)$
- C.  $(-4, 5)$
- D.  $(-4, -5)$

- 23 Wyatt owns a food truck. He offers a selection of 8 types of sandwiches and 4 types of tacos.

- He will increase his selection of sandwiches by 1 per month.
- He will increase his selection of tacos by 2 per month.

In how many months will Wyatt offer an equal number of sandwich and taco selections?

- A. 2 months
- B. 4 months
- C. 8 months
- D. 12 months

- 24 A geometric sequence with its first term missing is shown below.

$$?, 2, 8, 32, \dots$$

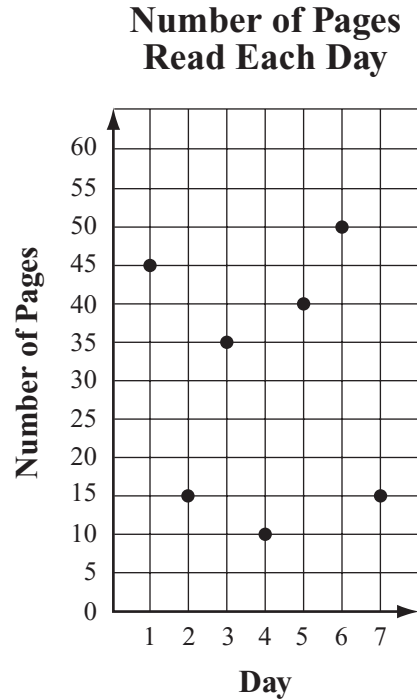
What is the first term in the sequence?

- A. 0
  - B.  $\frac{1}{4}$
  - C.  $\frac{1}{2}$
  - D. 1
- 25 The core of a baseball is in the shape of a sphere. The diameter of the core is 2.06 centimeters.

Which of the following is closest to the volume of the core?

- A. 2.57 cubic centimeters
- B. 4.58 cubic centimeters
- C. 12.94 cubic centimeters
- D. 36.62 cubic centimeters

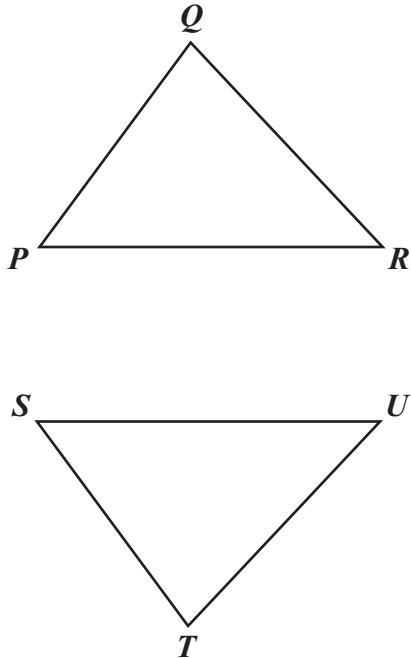
- 26 The scatterplot below shows the number of pages Tamisha read each day last week.



Based on the scatterplot, what is the median number of pages Tamisha read for the days last week?

- A. 10
- B. 15
- C. 30
- D. 35

- 27 In the diagram below,  $\triangle PQR \cong \triangle STU$ .



Which of the following equations **must** be true?

- A.  $QR = TU$
- B.  $m\angle P = m\angle U$
- C.  $QP + PR = TU + US$
- D.  $m\angle P + m\angle Q = m\angle U + m\angle T$

- 28 Nancy, Bryan, and Jamie combined their money to purchase a laptop. Together they paid a total of \$490 for the laptop, including tax.

- Nancy paid \$50 more than Bryan paid.
- Bryan paid twice as much as Jamie paid.

How much did Nancy pay?

- A. \$108
- B. \$176
- C. \$226
- D. \$295

- 29 Grace wants to estimate the percentage of students at her school who like yogurt. She will survey a random sample of 30 students from the school's population of 500 students.

Which of the following actions would best improve the validity of Grace's estimate?

- A. increase the sample size
- B. increase the population
- C. decrease the sample size
- D. decrease the population

- 30 The areas of some bodies of water in Massachusetts are shown in the table below.

**Massachusetts Bodies of Water**

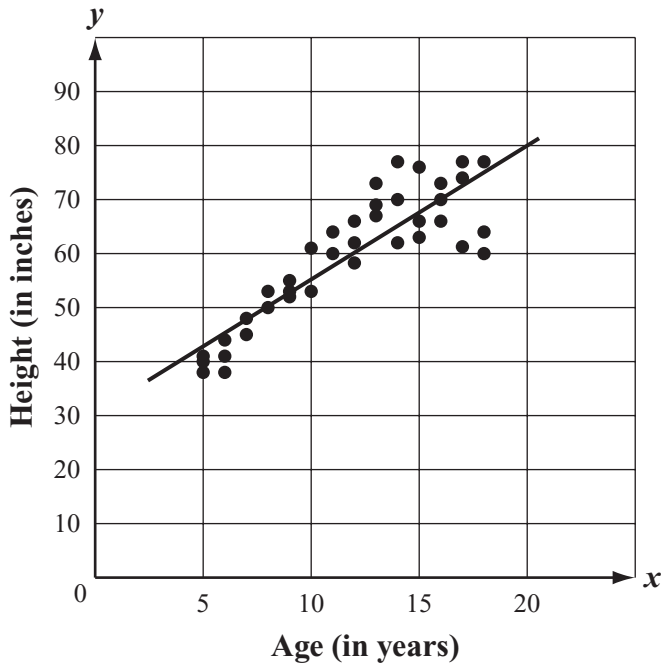
Body of Water	Area (in acres)
Silver Lake	70
Neponset Reservoir	300
Whitehall Reservoir	575
Greenwood Lake	110
Kingsbury Pond	

The mean area of the 5 bodies of water is 214 acres. What is the area, in acres, of Kingsbury Pond?

- A. 254  
 B. 50  
 C. 43  
 D. 15
- 31 A flying disc in the shape of a circle has a circumference of  $8\pi$  inches. What is the radius of the flying disc?
- A. 4 inches  
 B. 8 inches  
 C. 16 inches  
 D. 64 inches

- 32 Jake measured the dimensions of a rectangular picture frame to the nearest inch. He found that the height was 16 inches and the width was 10 inches. Based on Jake’s measurements, which of the following statements could be true?
- A. The actual width of the picture frame is 9.4 inches.  
 B. The actual height of the picture frame is 16.5 inches.  
 C. The actual perimeter of the picture frame is 50 inches.  
 D. The actual area of the picture frame is 175 square inches.

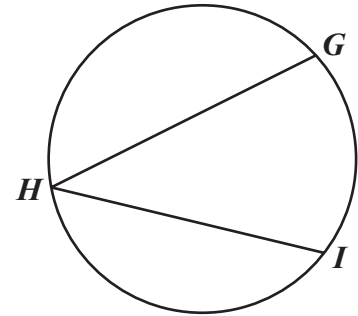
- 33 A doctor randomly selected patients from different age groups. He compared the relationship between  $x$ , the age in years, and  $y$ , the height in inches, for each patient. The scatterplot below shows the doctor's data.



Phillip is a 15-year-old patient who has a height of 75.75 inches. Based on the line of best fit for the scatterplot, what is the approximate difference of Phillip's height and the expected height for a 15-year-old patient?

- A. 2 inches
- B. 8 inches
- C. 12 inches
- D. 18 inches

- 34 The diagram below shows  $\angle GHI$  inscribed in a circle.



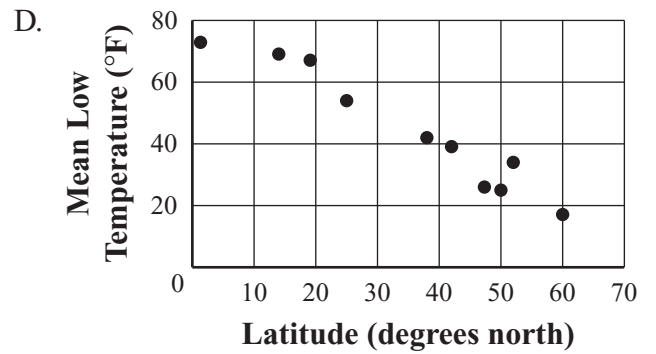
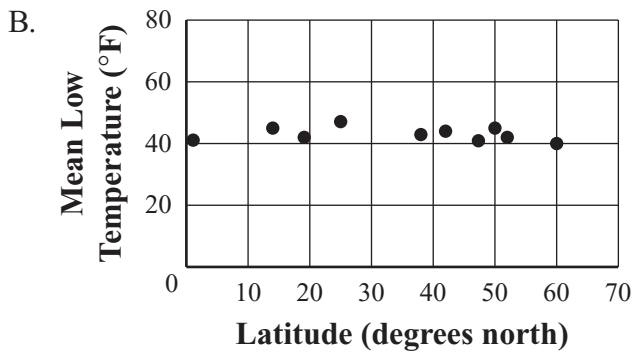
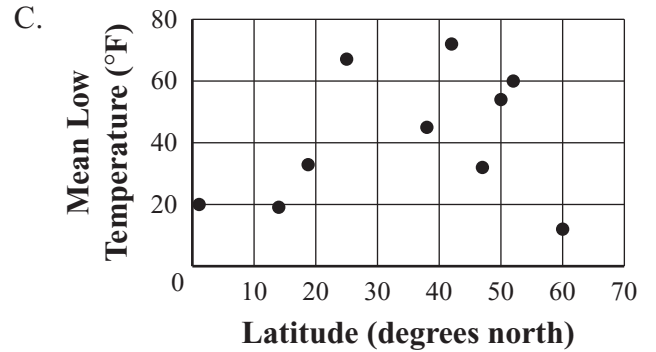
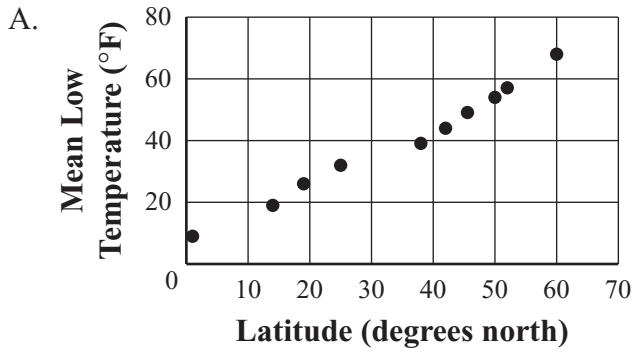
The measure of  $\widehat{GI}$  is  $80^\circ$ . What is the measure of  $\angle GHI$ ?

- A.  $40^\circ$
- B.  $80^\circ$
- C.  $120^\circ$
- D.  $160^\circ$



- 35 Silvia made a scatterplot to compare the mean low temperatures, in degrees Fahrenheit, and the latitudes, in degrees north, of some cities during January. She approximated that the line of best fit for the scatterplot has a slope of  $-1$ .

Which of the following could be the scatterplot Silvia made?



Question 36 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 36 in the space provided in your Student Answer Booklet.

**36** A construction contractor received two deliveries of building supplies from a lumberyard. The two deliveries included 10 boxes of nails, which cost a total of \$110.

a. Write and solve an equation to determine  $n$ , the cost in dollars of one box of nails.

The table below shows the numbers of sheets of plywood, trim boards, and boxes of nails delivered, and the total cost of each delivery.

	<b>Sheets of Plywood</b>	<b>Trim Boards</b>	<b>Boxes of Nails</b>	<b>Total Cost (\$)</b>
<b>First Delivery</b>	6	40	5	609
<b>Second Delivery</b>	8	20	5	527

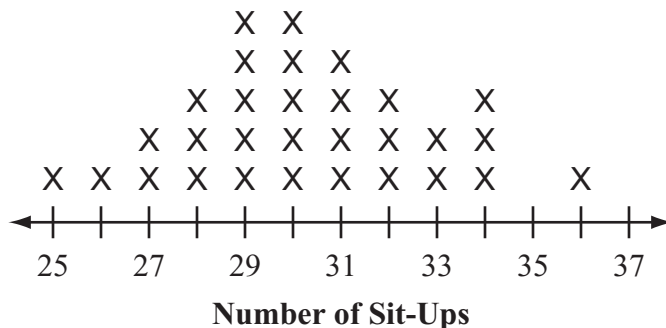
- b. Using your answer from part (a) and the information from the table, create a system of equations that can be used to determine  $x$ , the cost in dollars of one sheet of plywood, and  $y$ , the cost in dollars of one trim board.
- c. Determine the cost in dollars of one sheet of plywood and the cost in dollars of one trim board. Show or explain how you got your answer.

The contractor has an additional \$200 to spend. She tells her assistant to order at least 5 trim boards and as many sheets of plywood as possible with this money.

d. What is the maximum number of sheets of plywood that the assistant could order following the contractor’s instructions? Show or explain how you got your answer.

Mark your answers to multiple-choice questions 37 through 40 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.

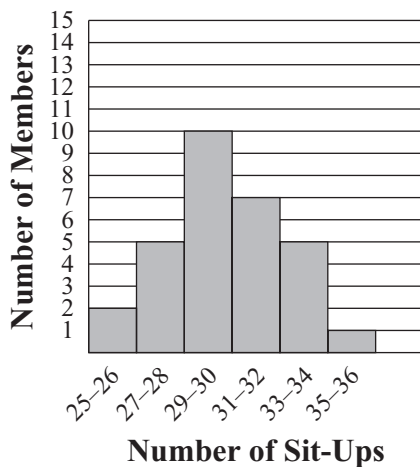
- 37 Members of a gym recorded the number of sit-ups they did in one minute. The results are shown in the line plot below.



Which of the following histograms best represents the data?

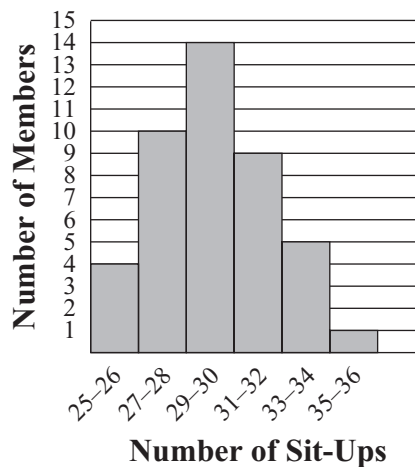
A.

Sit-Ups



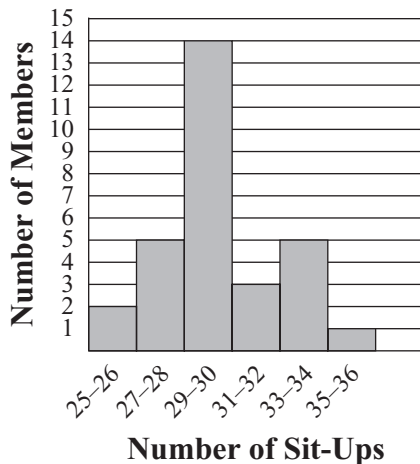
C.

Sit-Ups



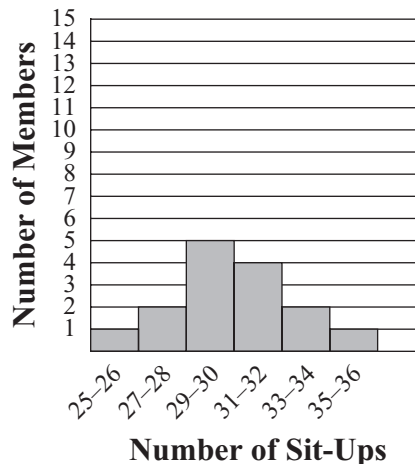
B.

Sit-Ups

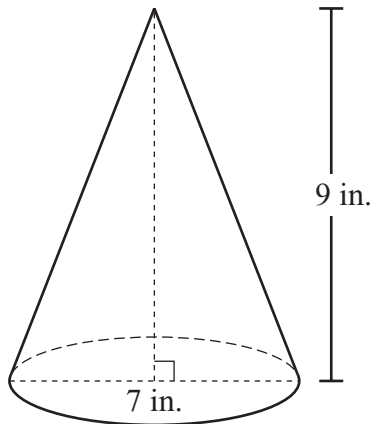


D.

Sit-Ups



- 38 A right circular cone and its dimensions are shown in the diagram below.



Which of the following is closest to the volume of the cone?

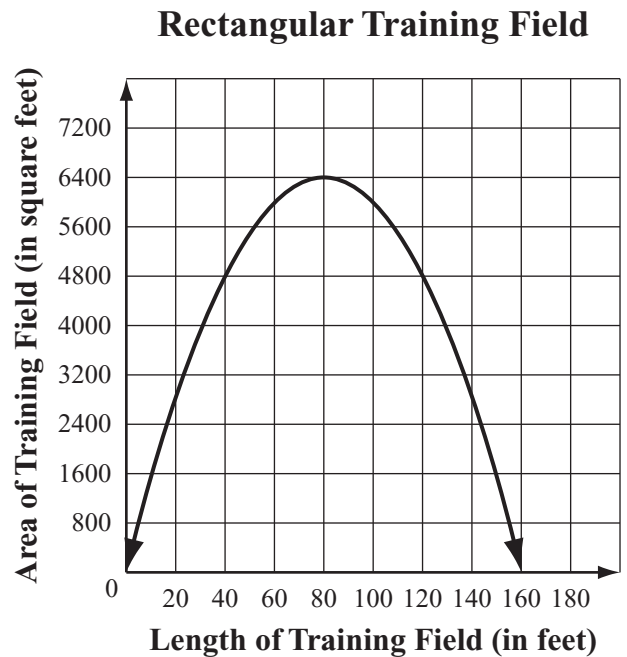
- A. 66 in.<sup>3</sup>
- B. 115 in.<sup>3</sup>
- C. 132 in.<sup>3</sup>
- D. 462 in.<sup>3</sup>

- 39 For all positive values of  $x$ , what is the multiplicative inverse of the expression below?

$$2x$$

- A. 1
- B.  $-2x$
- C.  $-\frac{1}{2x}$
- D.  $\frac{1}{2x}$

- 40 A dog trainer will use 320 feet of fence to create a rectangular training field. The graph below displays the relationship between the length, in feet, of the training field and the area, in square feet, of the training field.



What is the length of the rectangular training field that has the greatest area?

- A. 40 feet
- B. 80 feet
- C. 160 feet
- D. 180 feet

Questions 41 and 42 are open-response questions.

- **BE SURE TO ANSWER AND LABEL ALL PARTS OF EACH 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 41 in the space provided in your Student Answer Booklet.

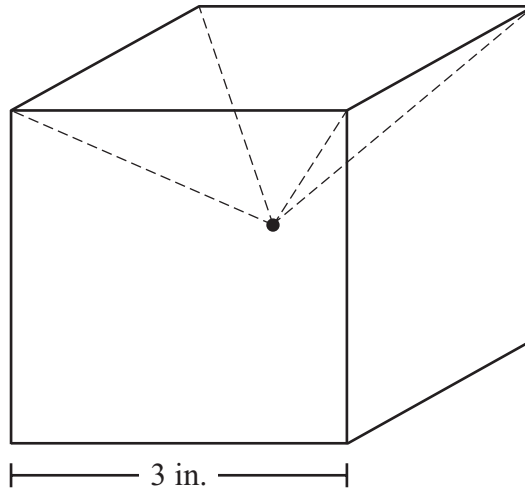
- 41 The table below shows the distribution of eye color and hair color for the 60 students in a chorus.

		Hair Color			
		Black	Blond	Brown	Red
Eye Color	Brown	7	3	10	2
	Blue	5	6	6	2
	Green	4	3	3	3
	Hazel	1	2	1	2

- How many students in the chorus have brown hair? Show or explain how you got your answer.
- What fraction of the students with blond hair have hazel eyes? Show or explain how you got your answer.
- What **percentage** of all the students have both green eyes **and** red hair? Show or explain how you got your answer.
- What percentage of all the students have green eyes **or** red hair? Show or explain how you got your answer.

Write your answer to question 42 in the space provided in your Student Answer Booklet.

- 42 A wooden cube with an edge length of 3 inches is composed of six congruent right square pyramids. The cube and one of the pyramids is shown in the diagram below.



- What is the volume, in cubic inches, of the entire cube? Show or explain how you got your answer.
- What is the volume, in cubic inches, of one of the six pyramids? Show or explain how you got your answer.
- What is the total surface area, in square inches, of the cube? Show or explain how you got your answer.
- What is the total surface area, to the nearest square inch, of one of the six pyramids? Show or explain how you got your answer.

**AREA FORMULAS**

square .....  $A = s^2$

rectangle .....  $A = bh$

parallelogram .....  $A = bh$

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

trapezoid .....  $A = \frac{1}{2}h(b_1 + b_2)$

circle .....  $A = \pi r^2$

**LATERAL SURFACE AREA FORMULAS**

right rectangular prism .....  $LA = 2(hw) + 2(lh)$

right circular cylinder .....  $LA = 2\pi rh$

right circular cone .....  $LA = \pi r\ell$   
( $\ell$  = slant height)

right square pyramid .....  $LA = 2s\ell$   
( $\ell$  = slant height)

**TOTAL SURFACE AREA FORMULAS**

cube .....  $SA = 6s^2$

right rectangular prism .....  $SA = 2(lw) + 2(hw) + 2(lh)$

sphere .....  $SA = 4\pi r^2$

right circular cylinder .....  $SA = 2\pi r^2 + 2\pi rh$

right circular cone .....  $SA = \pi r^2 + \pi r\ell$   
( $\ell$  = slant height)

right square pyramid .....  $SA = s^2 + 2s\ell$   
( $\ell$  = slant height)

**VOLUME FORMULAS**

cube .....  $V = s^3$   
( $s$  = length of an edge)

right rectangular prism .....  $V = lwh$

OR

$V = Bh$   
( $B$  = area of a base)

sphere .....  $V = \frac{4}{3}\pi r^3$

right circular cylinder .....  $V = \pi r^2 h$

right circular cone .....  $V = \frac{1}{3}\pi r^2 h$

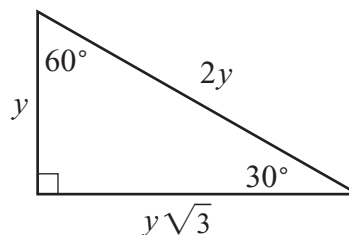
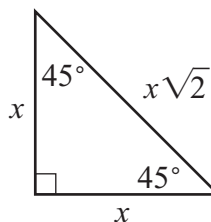
right square pyramid .....  $V = \frac{1}{3}s^2 h$

**CIRCLE FORMULAS**

$C = 2\pi r$

$A = \pi r^2$

**SPECIAL RIGHT TRIANGLES**



**Grade 10 Mathematics**  
**Spring 2016 Released Items:**  
**Reporting Categories, Standards, and Correct Answers**

Item No.	Page No.	Reporting Category <sup>1</sup>	Standard <sup>1</sup>	Correct Answer <sup>2</sup> (MC/SA)	2000 Standard <sup>3</sup>
1	241	<i>Number and Quantity</i>	8.NS.2	C	10.N.3
2	241	<i>Algebra and Functions</i>	A-APR.1	A	10.P.3
3	241	<i>Statistics and Probability</i>	S-ID.6	B	10.D.2
4	242	<i>Algebra and Functions</i>	A-REI.6	B	10.P.8
5	242	<i>Number and Quantity</i>	7.EE.3	D	10.N.1
6	242	<i>Number and Quantity</i>	7.EE.3	B	10.N.4
7	242	<i>Algebra and Functions</i>	A-CED.3	A	10.P.6
8	243	<i>Number and Quantity</i>	7.NS.3	D	10.N.2
9	243	<i>Geometry</i>	G-GMD.3	A	10.M.3
10	243	<i>Geometry</i>	G-GPE.6	C	10.G.7
11	244	<i>Number and Quantity</i>	7.EE.3	B	10.N.4
12	244	<i>Number and Quantity</i>	7.NS.3	A	10.N.2
13	244	<i>Algebra and Functions</i>	A-SSE.2	A	10.P.4
14	244	<i>Algebra and Functions</i>	F-IF.8	B	10.P.2
15	245	<i>Number and Quantity</i>	N-RN.2	64	10.N.1
16	245	<i>Geometry</i>	G-SRT.8	15 feet	10.G.5
17	246	<i>Algebra and Functions</i>	F-BF.2		10.P.1
18	247	<i>Algebra and Functions</i>	A-REI.4	-5 or 2	10.P.5
19	247	<i>Statistics and Probability</i>	S-ID.1	Any value greater than 40 and less than or equal to 80.	10.D.1
20	248	<i>Geometry</i>	G-SRT.6		10.G.6
21	249	<i>Number and Quantity</i>	8.NS.2		10.N.3
22	250	<i>Geometry</i>	G-CO.2	D	10.G.9
23	250	<i>Algebra and Functions</i>	A-CED.1	B	10.P.7
24	251	<i>Algebra and Functions</i>	F-BF.2	C	10.P.1
25	251	<i>Geometry</i>	G-GMD.3	B	10.M.2
26	251	<i>Statistics and Probability</i>	S-ID.6	D	10.D.1
27	252	<i>Geometry</i>	G-SRT.5	A	10.G.4
28	252	<i>Algebra and Functions</i>	A-REI.6	C	10.P.8
29	252	<i>Statistics and Probability</i>	7.SP.1	A	10.D.3
30	253	<i>Statistics and Probability</i>	6.SP.5	D	10.D.1
31	253	<i>Geometry</i>	7.G.4	A	10.M.1
32	253	<i>Number and Quantity</i>	N-Q.3	C	10.M.4
33	254	<i>Statistics and Probability</i>	S-ID.6	B	10.D.2
34	254	<i>Geometry</i>	G-C.2	A	10.G.3
35	255	<i>Statistics and Probability</i>	S-ID.6	D	10.D.2
36	256	<i>Algebra and Functions</i>	A-CED.3		10.P.8
37	257	<i>Statistics and Probability</i>	S-ID.1	A	10.D.1
38	258	<i>Geometry</i>	G-GMD.3	B	10.M.2
39	258	<i>Number and Quantity</i>	7.NS.3	D	10.N.1
40	258	<i>Algebra and Functions</i>	F-IF.4	B	10.P.7
41	259	<i>Statistics and Probability</i>	S-ID.5		10.D.1
42	260	<i>Geometry</i>	G-GMD.3		10.M.2

<sup>1</sup> The Reporting Category and Standard columns refer to the current (2011) *Massachusetts Curriculum Framework for Mathematics*. More information about reporting categories for Mathematics is available on the Department's website at [www.doe.mass.edu/mcas/tdd/math.html?section=testdesign](http://www.doe.mass.edu/mcas/tdd/math.html?section=testdesign).

<sup>2</sup> 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.

<sup>3</sup> The Department is providing the standard from the previous (2000) curriculum framework for Mathematics for reference purposes.