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 Which of the following is equivalent to the expression below?

$$12(y + 89)$$

A. $12(89y)$

B. $(12 \cdot 89) + y$

C. $(12 \cdot y) + 89$

D. $(12 \cdot y) + (12 \cdot 89)$

2 Dev made a list of numbers, as shown in the box below.

$$4, \ 7, \ 9, \ 11, \ 13, \ 28$$
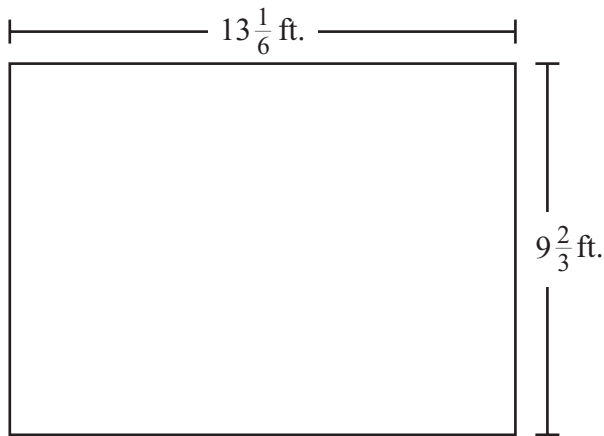
Pierre made a different list of numbers by multiplying each number from Dev's list by 2. What is the median of Pierre's list?

A. 18

B. 20

C. 22

D. 24

3 Points $(-2, 4)$ and $(-1, 1)$ lie on the same line. Which of the following equations represents the line?

A. $y - 1 = -\frac{1}{3}(x + 1)$

B. $y - 1 = -3(x + 1)$

C. $y - 1 = -\frac{1}{3}(x - 1)$

D. $y - 1 = -3(x - 1)$

4 A contractor will use tiles to cover the floor represented by the rectangle below.

$13\frac{1}{6}$ ft.

$9\frac{2}{3}$ ft.

Each tile covers one square foot and costs $2.49.

Which of the following is closest to the total cost of the tiles needed to cover the entire floor?

A. $100

B. $234

C. $250

D. $320

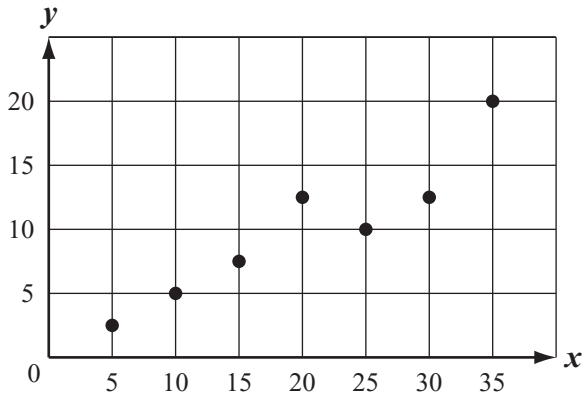**5** What is the value of the expression below?

$$240 \div 2^3 \cdot 10 - 20$$

A. 10

B. 40

C. 280

D. 380

6 What are the solutions of the equation below?

$$5x(x + 8) = 0$$

A. $x = -5; \quad x = -8$

B. $x = 0; \quad x = -8$

C. $x = 0; \quad x = 8$

D. $x = 5; \quad x = 8$

7 Which of the following is closest to the slope of the line of best fit for the scatterplot below?

A. $\frac{1}{2}$

B. $-\frac{1}{2}$

C. $\frac{2}{1}$

D. $-\frac{2}{1}$

8 What is the solution of the system of equations below?

$$3x + 2y = 5$$
$$2x + y = 2$$

A. $x = 2;\quad y = -2$

B. $x = -2;\quad y = 6$

C. $x = 1;\quad y = 1$

D. $x = -1;\quad y = 4$

9 Which of the following is closest to $\sqrt{50}$?

A. 6.4

B. 6.8

C. 7.1

D. 7.5

10 Manuel typed a total of 2974 words in 51 minutes.

Which of the following is closest to the number of words he typed per minute?

A. 20

B. 40

C. 60

D. 100

11 The table below shows a linear relationship between the values of x and y.

x	y
2	7
0	3
−2	−1
−4	−5

Which of the following equations represents the relationship shown in the table?

A. $y = 2x + 3$

B. $y = 7x - 4$

C. $y = x + 3$

D. $y = x - 1$

12 What is the value of the expression below?

$$\sqrt[3]{8^2}$$

A. $\frac{64}{3}$

B. 8

C. $\frac{16}{3}$

D. 4

13 A ball is rolled off a ledge that is 100 meters above the ground. The height of the ball, in meters, can be calculated by using the formula below.

$$\text{height} = 100 - \frac{1}{2}(9.8)t^2$$

In the formula, t is the total elapsed time, in seconds, since the ball was rolled off the ledge.

What is the height of the ball after 3 seconds?

A. 29.4 meters

B. 44.1 meters

C. 55.9 meters

D. 70.6 meters

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

$$6x - 3 - 4x + 8$$

A. $6x + 1$

B. $3x + 4$

C. $2x + 5$

D. $10x + 11$

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   Line *g* is shown on the graph below.
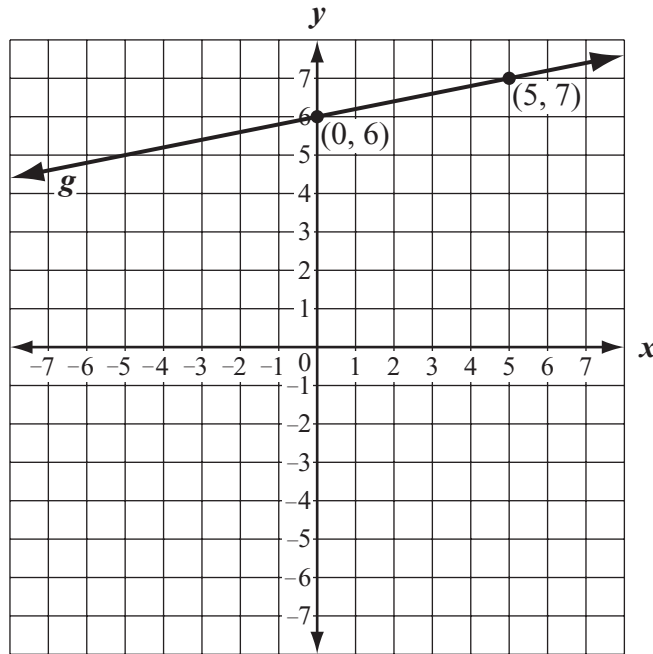
What is the slope of line *g*?

16   What value of *b* makes the equation below true?

$$\frac{5}{3}b = 1$$

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 Line *n* is represented by the equation below.

$$y = \frac{4}{3}x + 4$$

a. What is the slope of line *n*? Show or explain how you got your answer.

b. What is the *y*-intercept of line *n*? Show or explain how you got your answer.

c. What is the *x*-intercept of line *n*? Show or explain how you got your answer.

A coordinate plane is shown below. Copy the axes and the labels of the coordinate plane exactly as shown onto the grid in your Student Answer Booklet.
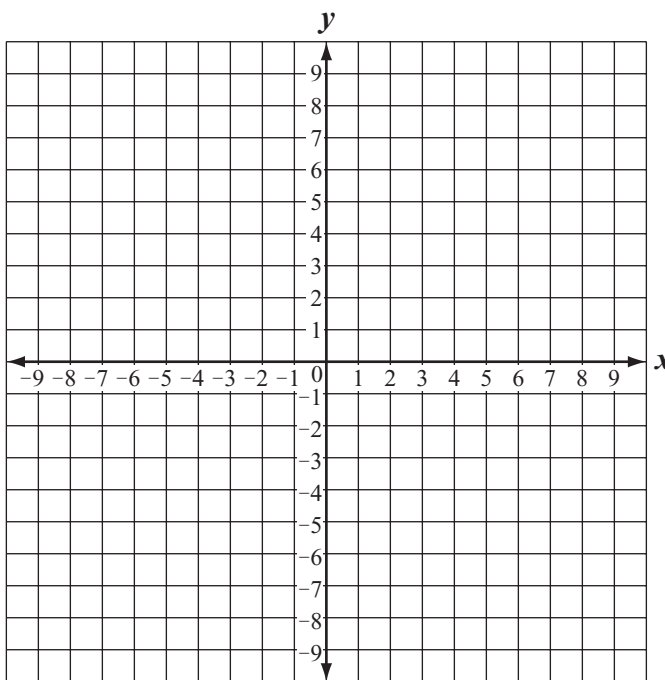
d. On the coordinate plane you copied into your Student Answer Booklet, graph line *n*.

e. Write an equation of the line that has the same ***x*-intercept** as line *n* and a slope of -2. Show or explain how you got your answer.

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 the value of the expression below?

$$\left(\sqrt{5}\right)^4$$

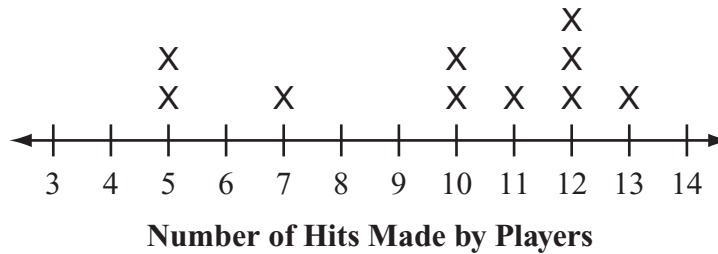**19**   What is the value of x that makes the equation below true?

$$x - 20 = -3(x - 4)$$

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 line plot below shows the number of hits made by each of 10 players on a baseball team during batting practice.

```
                                           X
              X                   X        X
              X         X         X  X  X  X
       ◄──┼───┼───┼───┼───┼───┼───┼───┼───┼───┼───┼───┼──►
          3   4   5   6   7   8   9   10  11  12  13  14
```

Number of Hits Made by Players

a. What was the mode of the numbers of hits made by the players? Show or explain how you got your answer.

b. What was the median number of hits made by the players? Show or explain how you got your answer.

c. What was the mean number of hits made by the players? Show or explain how you got your answer.

Two additional players arrived at practice. The number of hits made by each additional player was included in the line plot with the following results:

- The median number of hits increased.
- The mode of the numbers of hits remained the same.

d. What could be the number of hits made by **each** of the two additional players? Show or explain how you got your answer.

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

21   Kim and Sean are playing a mathematics card game for extra credit. Each card in the game has an expression written on it. Kim's first card is shown below.

$$\frac{3 + 2}{6 - 1}$$

a. What is the value of the expression on Kim's first card? Show or explain how you got your answer.

Sean's first card is shown below.

$$-6 - \left|3 - (-8)\right|$$

b. What is the value of the expression on Sean's first card? Show or explain how you got your answer.

For Kim to earn extra credit from the game, she must select a second card that has an expression with a value that is exactly twice the value of the expression on her first card.

c. Which of the following cards shows an expression with a value that is exactly twice the value of the expression on Kim's card? Show or explain how you got your answer.

$$\left|-5 - (-3)\right| \qquad\qquad \left|-5 - 3\right|$$

Sean's second card is shown below.

$$-10 + 10 - 20$$

For Sean to earn extra credit from the game, he **must** insert one set of absolute value bars in the expression so that the value of the expression is a negative integer.

d. If Sean inserts the set of absolute value bars correctly, what is one possible value of the expression on Sean's second card? Show or explain how you got your answer.

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.
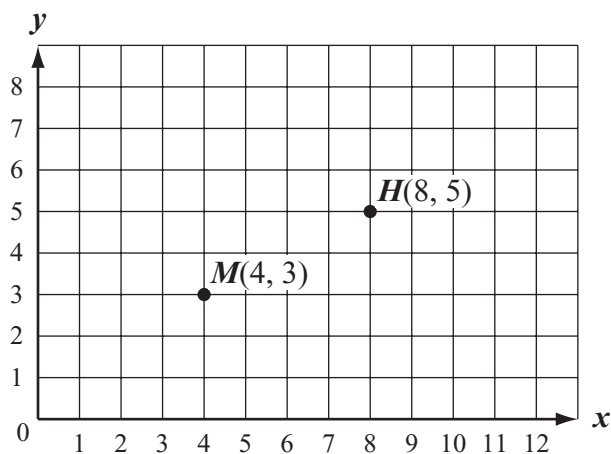
22 A powdered drink mix container is in the shape of a right circular cylinder. The dimensions of the container are shown below.
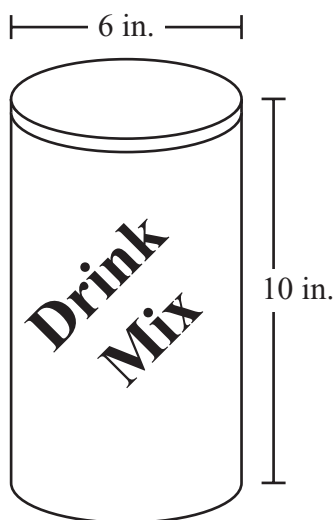
Which of the following is closest to the volume of the container?

A.   188 cubic inches

B.   283 cubic inches

C.   471 cubic inches

D. 1131 cubic inches
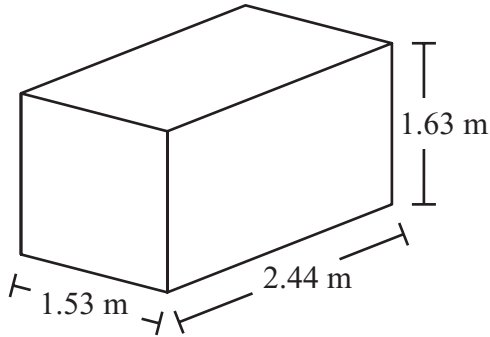
23 Points *M* and *H* are shown on the coordinate grid below.

Point *M* is the midpoint of $\overline{GH}$. What are the coordinates of point *G*?

A. (0, 1)

B. (2, 1)

C. (4, 2)

D. (12, 7)

24 A shipping container is in the shape of a rectangular prism. The dimensions of the shipping container are shown in the diagram below.
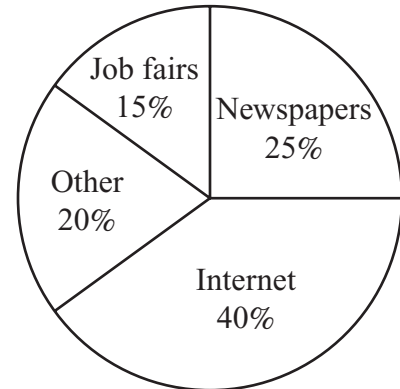

Which of the following is closest to the total surface area of the container?

A.   6.09 m²

B. 10.20 m²

C. 12.94 m²

D. 20.41 m²

25 Gina surveyed a group of people about what search method each used most often to find a job. The circle graph below represents their answers to her survey.
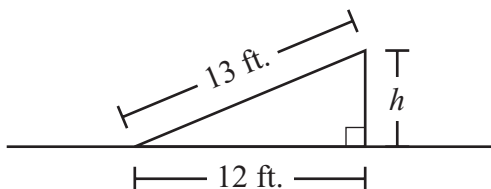
**Job Search Methods
Used Most Often**

There were 32 people who answered that they used the Internet most often. What was the total number of people that Gina surveyed?

A.   40

B.   80

C.   92

D. 128

26 The diagram below represents a ramp and some of its dimensions.

What is the height, h, of the ramp?

A. 1 ft.

B. 5 ft.

C. 8 ft.

D. 25 ft.
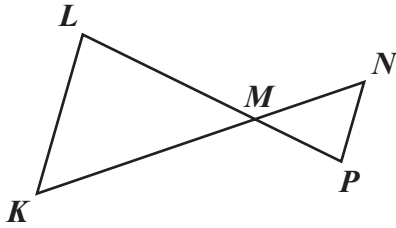
27 The first five terms in a quadratic pattern are shown below.

-0.4, -1.6, -3.6, -6.4, -10.0, . . .

What is the next term in the pattern?
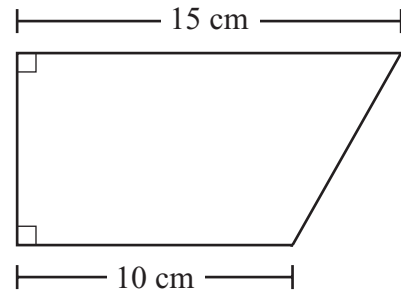
A. -11.2

B. -13.6

C. -14.4

D. -16.4

28 In the diagram below, $\triangle LMK \sim \triangle PMN$.

Based on the relationship between the triangles, which of the following proportions is true?

A. $\dfrac{LM}{PM} = \dfrac{KL}{NP}$

B. $\dfrac{LM}{PM} = \dfrac{NP}{KL}$

C. $\dfrac{MK}{MP} = \dfrac{KL}{NP}$

D. $\dfrac{MK}{MP} = \dfrac{NP}{KL}$

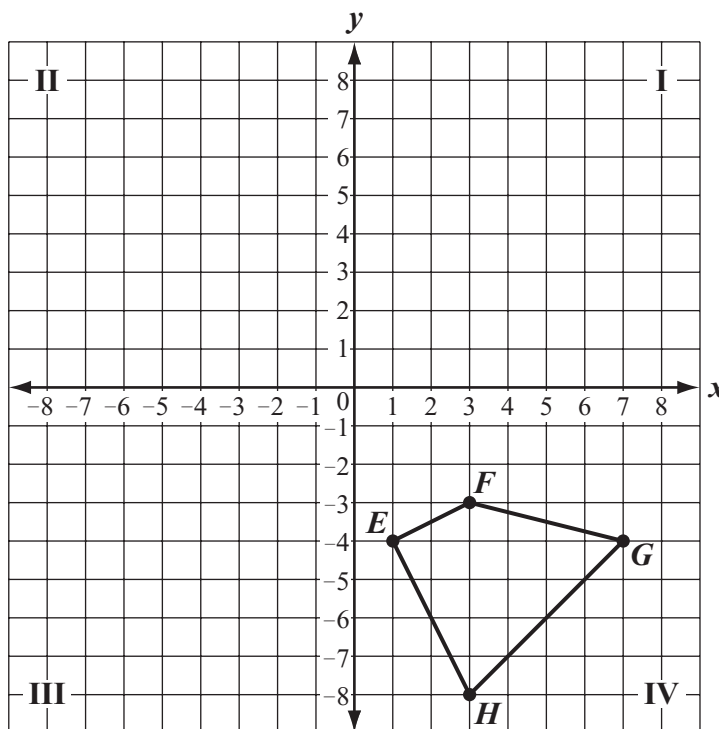**29** A trapezoid and some of its dimensions are shown below.

The area of the trapezoid is 100 square centimeters.

What is the height of the trapezoid?

A. 2 cm

B. 4 cm

C. 8 cm

D. 10 cm

30 Quadrilateral *EFGH* is shown on the coordinate grid below.

The quadrilateral will be reflected over the *y*-axis. The **reflected** image will then be translated 2 units left and 7 units up. In which of the following quadrants will the final reflected and translated image lie?

A. I and II

B. II and III

C. II and IV

D. III and IV

Question 31 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 31 in the space provided in your Student Answer Booklet.

31 The ages, in years, of the 11 reporters who work at a newspaper are listed below.

> 28, 45, 61, 40, 55, 58, 33, 27, 35, 33, 46

a. In your Student Answer Booklet, make a stem-and-leaf plot of the reporters' ages. Be sure to include a title and a key for your plot.

b. What is the range of the ages, in years, of the reporters? Show or explain how you got your answer.

c. What is the median age, in years, of the reporters? Show or explain how you got your answer.

The newspaper hired a new reporter. When the age of the new reporter was included in the stem-and-leaf plot, the range increased by 4 years.

d. What is one possible **median** age that could result from including the new reporter's age in the stem-and-leaf plot? Show or explain how you got your answer.

Mark your answers to multiple-choice questions 32 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.

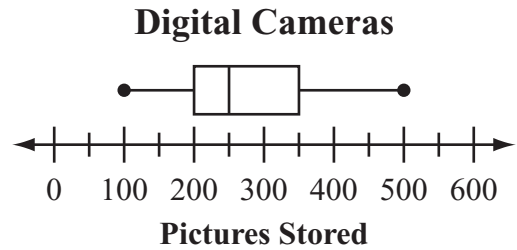**32** An angle is inscribed in a circle, as shown below.
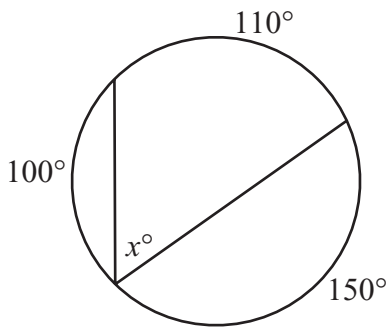
The degree measures of three arcs are shown in the diagram.

What is the value of x?

A. 55

B. 70

C. 75

D. 110

33 The box-and-whisker plot below shows the numbers of pictures that can be stored on different digital cameras.

Digital Cameras

Pictures Stored
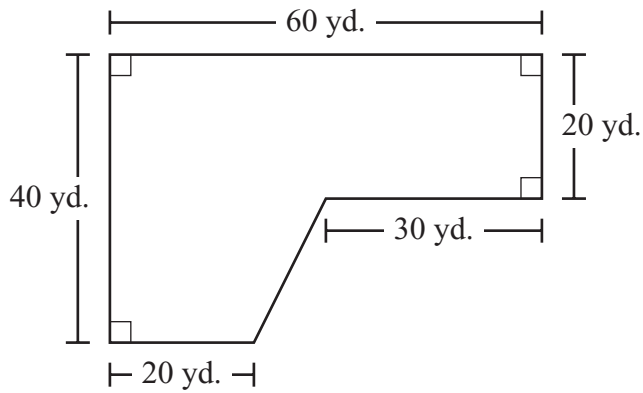
What is the median number of pictures that can be stored?

A. 250

B. 300

C. 350

D. 400

34 Some of the dimensions of a driveway are shown in the diagram below.

What is the area of the driveway?

A. 1600 sq. yd.

B. 1700 sq. yd.

C. 2200 sq. yd.

D. 2400 sq. yd.

35 A painting job can be completed in 12 hours by 3 professional painters. The same job can be completed in 6 hours by 6 professional painters. All professional painters paint at the same rate.

What is the total amount of time it would take 9 professional painters to complete the same painting job?
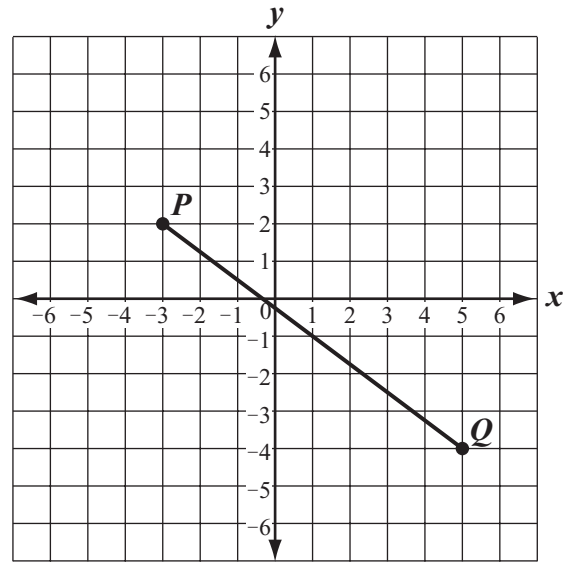
A. 2 hours

B. 4 hours

C. 5 hours

D. 8 hours

36 A circular dinner plate has a radius $\frac{3}{2}$ times the radius of a circular salad plate.

The area of the dinner plate is how many times the area of the salad plate?

A. $\frac{3}{2}$

B. $\frac{9}{4}$

C. $\frac{3}{1}$

D. $\frac{9}{2}$

37 Which of the following could **not** be the exact number of right angles in a quadrilateral?
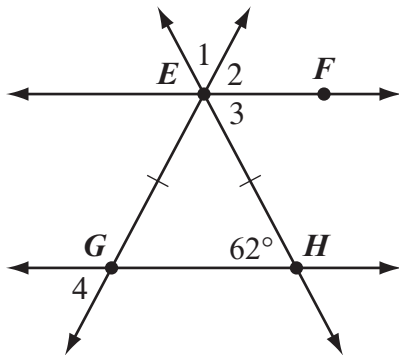
A. 1

B. 2

C. 3

D. 4

38 Point P and point Q are shown on the coordinate grid below.

Which of the following best represents the length of $\overline{PQ}$?
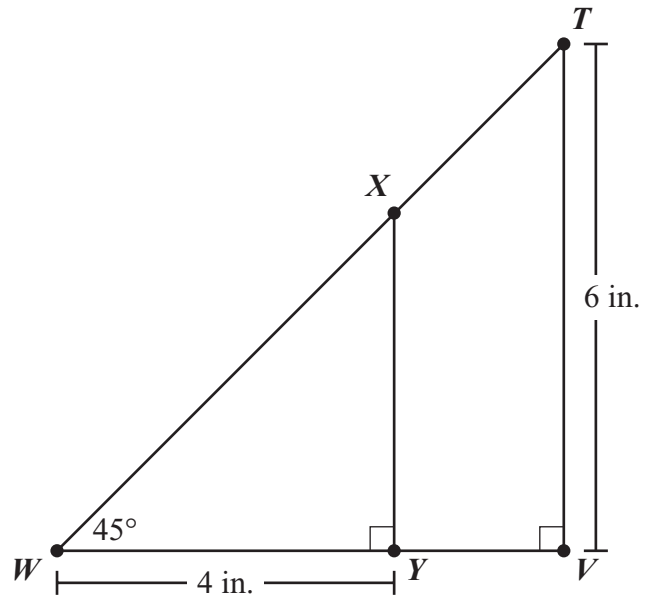
A. 5 units

B. 6 units

C. 10 units

D. 14 units

39 In the diagram below, $\overleftrightarrow{EF} \parallel \overleftrightarrow{GH}$ and $\overline{EG} \cong \overline{EH}$.

Based on the angle measure in the diagram, which of the following angles does **not** have a measure of 62°?

A. $\angle 1$

B. $\angle 2$

C. $\angle 3$

D. $\angle 4$

40 In the diagram below, $\triangle TWV \sim \triangle XWY$.

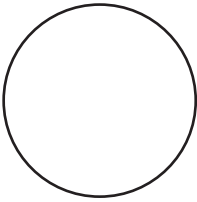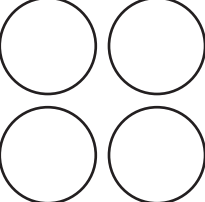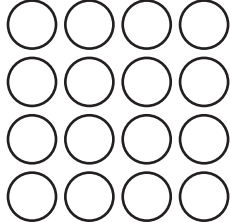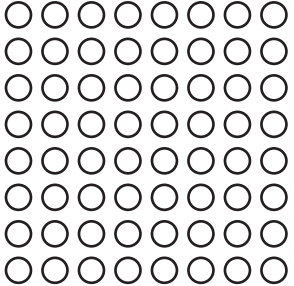Based on the dimensions shown, what is the length of $\overline{TX}$?

A. $2\sqrt{2}$ inches

B. $4\sqrt{2}$ inches

C. $6\sqrt{2}$ inches

D. $10\sqrt{2}$ inches

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 figures composed of circles. The number of circles in each figure and the diameter of each circle in each figure follow a pattern, as shown.

	Figure 1	Figure 2	Figure 3	Figure 4
Number of Circles	1	4	16	64
Diameter of Each Circle (in inches)	1	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$

a. What is the number of circles in figure 5? Show or explain how you got your answer.

b. What is the diameter, in inches, of each circle in figure 5? Show or explain how you got your answer.

c. What is the ratio of the number of circles in figure 6 to the number of circles in figure 7? Show or explain how you got your answer.

d. Write an algebraic expression that could be used to determine the number of circles in figure n.

e. Write an algebraic expression that could be used to determine the diameter, in inches, of each circle in figure n.

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

42 A monument in the shape of a right square pyramid is located in a park. The park is in the shape of a rectangle. The measurements of the monument and the park are shown in the diagram below.
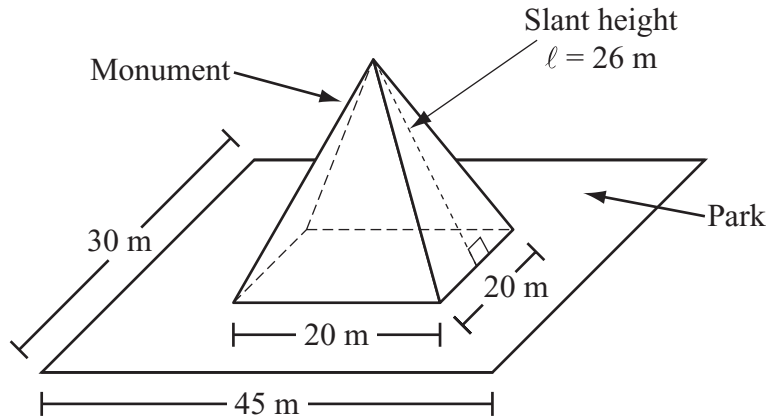
a. What is the area, in square meters, of the base of the monument? Show or explain how you got your answer.

b. What is the area, in square meters, of the park, **not** including the base of the monument? Show or explain how you got your answer.

c. What is the lateral surface area, in square meters, of the monument? Show or explain how you got your answer.

The height of the monument is 24 meters.

d. What is the volume, in cubic meters, of the monument? Show or explain how you got your answer.

Grade 10 Mathematics
Spring 2012 Released Items:
Reporting Categories, Standards, and Correct Answers*

Item No.	Page No.	Reporting Category	Standard	Correct Answer (MC/SA)*
1	251	*Number Sense and Operations*	10.N.1	D
2	251	*Data Analysis, Statistics, and Probability*	10.D.1	B
3	252	*Patterns, Relations, and Algebra*	10.P.2	B
4	252	*Number Sense and Operations*	10.N.4	D
5	252	*Number Sense and Operations*	10.N.2	C
6	252	*Patterns, Relations, and Algebra*	10.P.5	B
7	253	*Data Analysis, Statistics, and Probability*	10.D.2	A
8	253	*Patterns, Relations, and Algebra*	10.P.8	D
9	253	*Number Sense and Operations*	10.N.3	C
10	253	*Number Sense and Operations*	10.N.4	C
11	254	*Patterns, Relations, and Algebra*	10.P.1	A
12	254	*Number Sense and Operations*	10.N.1	D
13	254	*Patterns, Relations, and Algebra*	10.P.7	C
14	254	*Patterns, Relations, and Algebra*	10.P.4	C
15	255	*Patterns, Relations, and Algebra*	10.P.2	$\frac{1}{5}$
16	255	*Number Sense and Operations*	10.N.1	$\frac{3}{5}$
17	256	*Patterns, Relations, and Algebra*	10.P.2	
18	257	*Number Sense and Operations*	10.N.1	25
19	257	*Patterns, Relations, and Algebra*	10.P.6	$x = 8$
20	258	*Data Analysis, Statistics, and Probability*	10.D.1	
21	259	*Number Sense and Operations*	10.N.2	
22	260	*Measurement*	10.M.2	B
23	260	*Geometry*	10.G.7	A
24	261	*Measurement*	10.M.2	D
25	261	*Data Analysis, Statistics, and Probability*	10.D.1	B
26	262	*Geometry*	10.G.5	B
27	262	*Patterns, Relations, and Algebra*	10.P.1	C
28	263	*Geometry*	10.G.4	A
29	263	*Measurement*	10.M.1	C
30	264	*Geometry*	10.G.9	B
31	265	*Data Analysis, Statistics, and Probability*	10.D.1	
32	266	*Geometry*	10.G.3	A
33	266	*Data Analysis, Statistics, and Probability*	10.D.1	A
34	267	*Measurement*	10.M.1	B
35	267	*Patterns, Relations, and Algebra*	10.P.7	B
36	268	*Measurement*	10.M.3	B
37	268	*Geometry*	10.G.1	C
38	268	*Geometry*	10.G.5	C
39	269	*Geometry*	10.G.3	A
40	269	*Geometry*	10.G.6	A
41	270	*Patterns, Relations, and Algebra*	10.P.1	
42	271	*Measurement*	10.M.2	

* 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.