

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 What is the median of the data set below?

30, 37, 19, 42, 33, 37

- A. 31
- B. 33
- C. 35
- D. 37

- 2 What is the value of the expression below?

$$2(5 - 3 \cdot 4)$$

- A. -14
- B. -2
- C. 14
- D. 16

- 3 The approximate lengths of two major rivers are listed below.

- Nile River: 2.2×10^7 feet
- Snake River: 5.5×10^6 feet

Based on these lengths, the length of the Nile River is how many times the length of the Snake River?

- A. 0.4
- B. 2.5
- C. 4
- D. 25

- 4 Allen surveyed the 18 students in his class about the number of DVDs each of them rented last week. The table below shows how many students rented each number of DVDs. For example, 10 students rented 1 DVD each.

Number of Students Renting Each Number of DVDs

Number of DVDs Rented	Number of Students
1	10
3	6
4	2

What is the mean number of DVDs rented per student?

- A. 1
 - B. 2
 - C. 3
 - D. 6
- 5 A sphere has a volume of $\frac{500}{3}\pi$ cubic centimeters. What is the total surface area, in square centimeters, of the sphere?
- A. 25π
 - B. 40π
 - C. 100π
 - D. 400π

- 6 During an event on Saturday, 29,089 seats in a sports arena were occupied. The arena has a total of 39,598 seats.

Which of the following estimates is closest to the fraction of seats that were occupied during the event on Saturday?

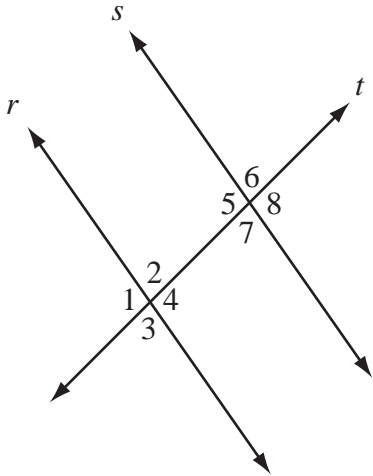
- A. $\frac{1}{10}$
- B. $\frac{1}{2}$
- C. $\frac{2}{3}$
- D. $\frac{3}{4}$

- 7 What is the value of the expression below?

$$-7 \left| 2^4 - 10 \right| + 3$$

- A. -53
- B. -39
- C. 17
- D. 45

- 8 Parallel lines r and s are cut by transversal t , as shown in the diagram below.



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

- A. $m\angle 1 + m\angle 5 = 180^\circ$
- B. $m\angle 2 + m\angle 8 = 180^\circ$
- C. $m\angle 1 = m\angle 7$
- D. $m\angle 3 = m\angle 8$

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

$$\sqrt{6} + \sqrt{6}$$

- A. $2\sqrt{6}$
- B. $\sqrt{12}$
- C. 6
- D. 12

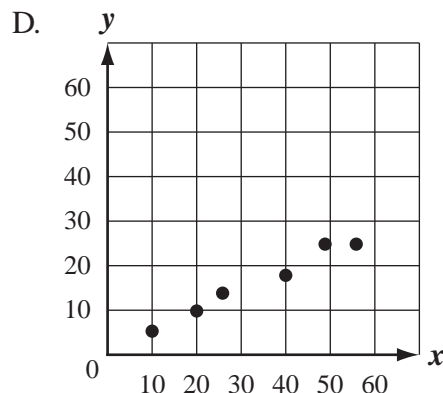
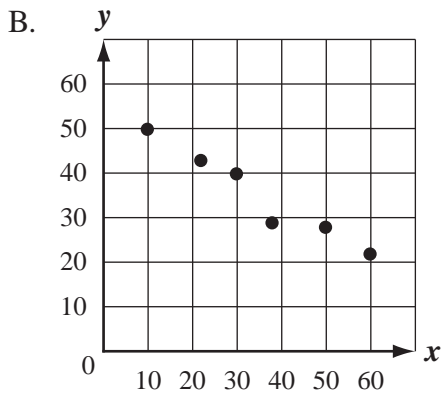
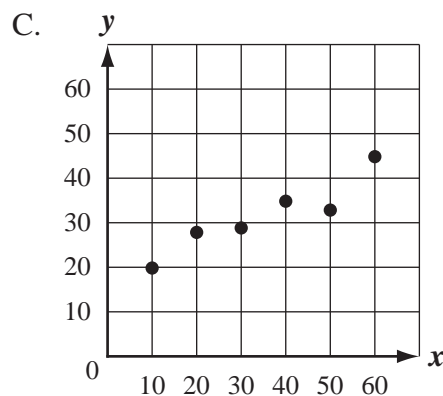
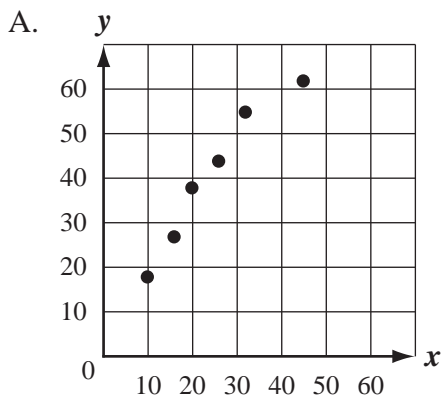
- 10 What are the solutions of the equation below?

$$p^2 + 5 = 6p$$

- A. 1 and 5
- B. 2 and 3
- C. -1 and -5
- D. -2 and -3

- 11 Which of the following scatterplots is most likely to have a line of best fit represented by the equation below?

$$y = \frac{1}{2}x$$

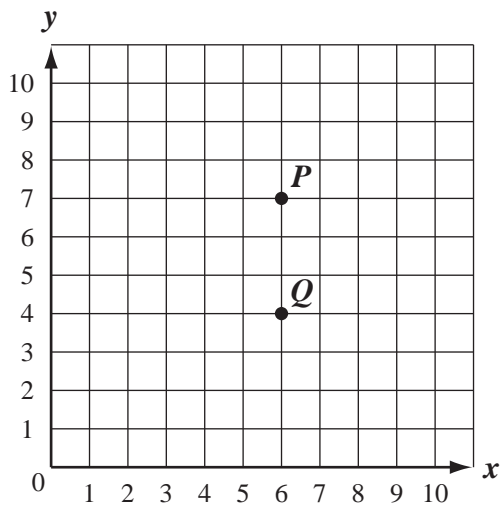


- 12 A monthly phone bill consists of a fixed monthly fee of \$19 and a charge of \$0.25 per minute of use.

Which of the following equations can be used to determine the total monthly bill, t , for m minutes of use?

- A. $t = 0.25m + 19$
- B. $t = 0.25m - 19$
- C. $t = 19m + 0.25$
- D. $t = 19m - 0.25$

- 13 Point $P(6, 7)$ and point $Q(6, 4)$ are plotted on the coordinate grid below.



Point P is rotated 180° clockwise about point Q . What are the coordinates of the image of point P after this rotation?

- A. (3, 4)
- B. (6, 1)
- C. (6, 10)
- D. (9, 4)

- 14 Which of the following equations does **not** have a real number solution?

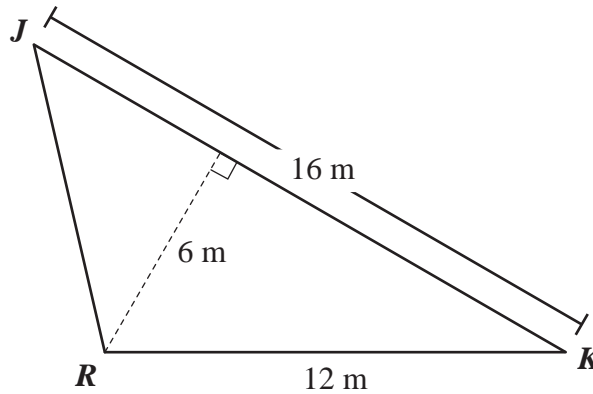
- A. $n + 1 = n$
- B. $n \cdot 1 = n$
- C. $n + 0 = n$
- D. $n - 0 = n$

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 x in the solution of the system of equations below?

$$\begin{aligned} 8x - y &= 20 \\ y &= 3x \end{aligned}$$

- 16 Yoshi is designing a monument that has a triangular base. He drew $\triangle JKR$ to represent the base of the monument, as shown in the diagram below.



Based on the measurements in the diagram, what is the area, in square meters, of $\triangle JKR$?

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.

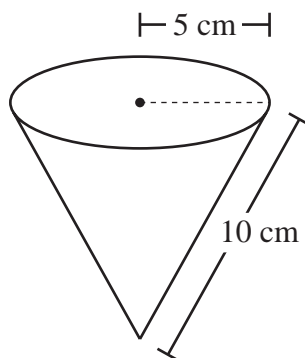
- 17 When Nuri buys an item from a catalog, the total amount he pays is made up of the following three amounts of money:
- the price of the item
 - sales tax of 5% of the price of the item
 - a fixed shipping fee that is always the same regardless of the cost or size of the order

Nuri bought a game with a price of \$100 from the catalog.

- a. What was the sales tax, in dollars, that Nuri paid on the game? Show or explain how you got your answer.
- b. The total amount, including the sales tax and the shipping fee, that Nuri paid for the game was \$120. What was the shipping fee, in dollars? Show or explain how you got your answer.
- c. Nuri bought an item with a price of \$400 from the catalog. What is the total amount he paid, in dollars, including the sales tax and the shipping fee? Show or explain how you got your answer.
- d. Write an equation that expresses the relationship between y , the total amount paid for an item from the catalog including the sales tax and shipping fee, and x , the price of the item. Show or explain how you got your equation.

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 The diagram below shows a right circular cone with a radius of 5 centimeters and a slant height of 10 centimeters.



What is the lateral surface area, in square centimeters, of the cone? (You may leave your answer in terms of π .)

- 19 What is the value of the expression below?

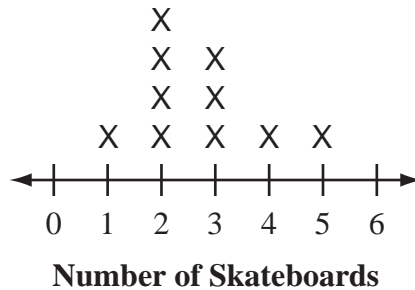
$$4 + 2(5 + 1)$$

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 skateboards owned by each of the 10 members of the Skateboard Club.



- a. What is the range of the numbers of skateboards owned by the Skateboard Club members? Show or explain how you got your answer.
- b. What is the mode of the numbers of skateboards owned by the Skateboard Club members? Show or explain how you got your answer.
- c. What is the mean number of skateboards owned by the Skateboard Club members? Show or explain how you got your answer.
- d. What is the median number of skateboards owned by the Skateboard Club members? Show or explain how you got your answer.

Two people became new members of the Skateboard Club. However, the **median** number of skateboards owned by the 12 club members did not change.

- e. What could be the number of skateboards each of the two new club members owns? Explain your reasoning.

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

- 21 Gloria manages an apartment building. The building has only two sizes of apartments: small and large. The table below shows the rental income per month for each apartment size.

Apartment Rental Income

Apartment Size	Rental Income per Month
small	\$ 800
large	\$1200

- a. What is the total rental income for one month when 3 small apartments and 4 large apartments are rented? Show or explain how you got your answer.

For parts (b), (c), and (d), define x and y as follows:

- x = the number of small apartments in the building
 - y = the number of large apartments in the building
- b. Last month all the apartments in the building were rented. The total rental income for the month was \$17,600. Write an equation in terms of x and y that represents this information.
- c. The total number of small apartments and large apartments is 18. Write an equation in terms of x and y that represents this information.
- d. Using the information in parts (b) and (c), determine the following:
- the number of small apartments in the building
 - the number of large apartments in the building

Show or explain how you got each of your answers.

Mathematics

SESSION 2

You may use your reference sheet during this session.

You may use a calculator during this session.

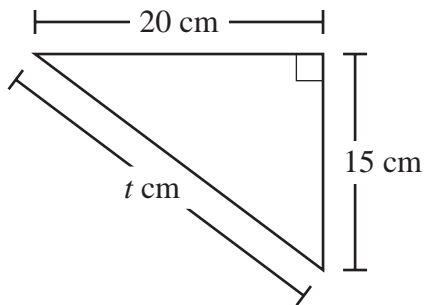


DIRECTIONS

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 The diagram below shows a triangle and some of its dimensions.



What is the value of t ?

- A. 25
- B. 30
- C. 35
- D. 40

- 23 Jane played in 12 basketball games.

- For her first 8 games, the mean number of points she scored per game was 11.
- For her last 4 games, the mean number of points she scored per game was 15.

What was the total number of points Jane scored in all 12 games?

- A. 148
- B. 156
- C. 228
- D. 312

- 24 What is the y -intercept of the line represented by the equation below?

$$10x + 5y = 20$$

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

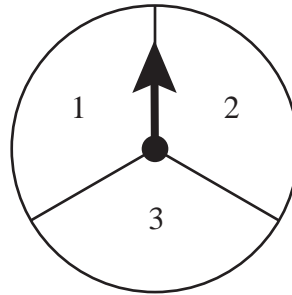
- 25 Joshua is designing a rectangular mirror.

- He let w = the width, in inches, of the mirror.
- The length of the mirror will be 6 inches more than the width.
- The perimeter of the mirror will be less than 96 inches and greater than 76 inches.

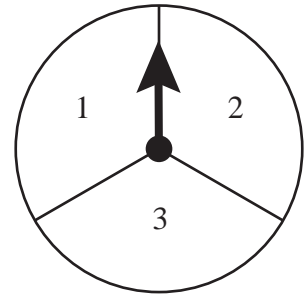
Which of the following inequalities shows the possible widths, in inches, of the mirror?

- A. $13 < w < 18$
- B. $16 < w < 21$
- C. $19 < w < 24$
- D. $35 < w < 45$

- 26 Spinners P and Q shown below are divided into congruent sections.



Spinner P



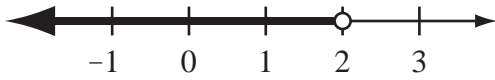
Spinner Q

The arrow on each spinner will be spun once. The number in the section where the arrow stops on Spinner P will be added to the number in the section where the arrow stops on Spinner Q.

What is the probability that the sum of the two numbers will be 5?

- A. $\frac{1}{9}$
- B. $\frac{2}{9}$
- C. $\frac{1}{3}$
- D. $\frac{2}{3}$

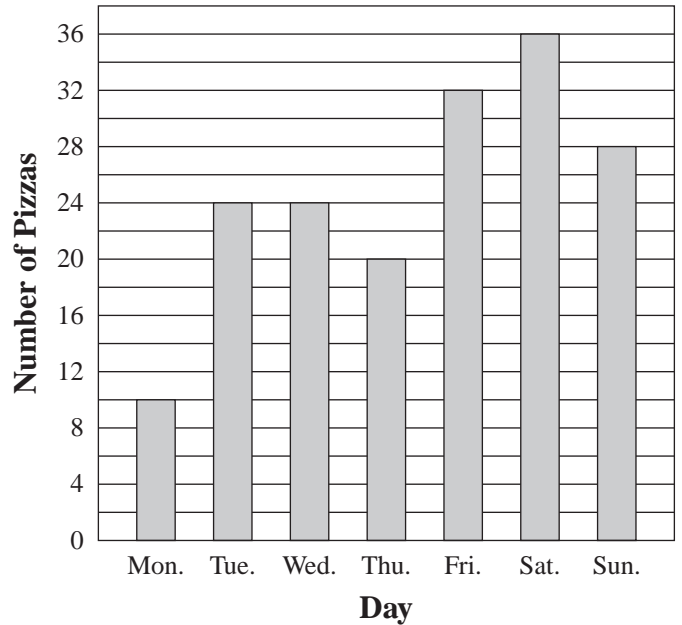
- 27 Which of the following inequalities is graphed on the number line below?



- A. $x < 2$
 - B. $x \leq 2$
 - C. $x > 2$
 - D. $x \geq 2$
- 28 Sarah walked at a speed of 3 miles per hour. Beneta rode her bicycle at a speed of 9 miles per hour. They both traveled the same distance, but it took Sarah 4 more hours than it took Beneta. How many hours did it take Beneta?
- A. 2
 - B. 3
 - C. 4
 - D. 6
- 29 A circle has a diameter of 18 feet. Which of the following is closest to the circumference of the circle?
- A. 28.3 feet
 - B. 56.5 feet
 - C. 113.1 feet
 - D. 254.5 feet

- 30 The bar graph below shows the number of pizzas a restaurant delivered each day during one week.

Pizzas Delivered One Week



What is the range of the numbers of pizzas delivered during the week?

- A. 18
- B. 20
- C. 24
- D. 26

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 Adriana recently bought a new car and is keeping track of the miles she drives and the gas she uses.

- a. One week Adriana drove 258 miles and used 6.2 gallons of gas. For that week, what was the average number of miles she drove per gallon of gas used? Show or explain how you got your answer.
- b. When she goes on vacation, Adriana expects to drive 630 miles. She also expects to drive an average of 45 miles per gallon of gas used. How much gas, in gallons, should she expect to use on her vacation? Show or explain how you got your answer.

Adriana's car has displays that show both speed and gas mileage, as defined below:

- Speed is the number of miles per hour at which the car is traveling.
 - Gas mileage is the number of miles traveled per gallon of gas used.
- c. On her drive to work one day, Adriana looked at her car's displays.
 - Her speed was 30 miles per hour.
 - Her gas mileage was 40 miles per gallon.

At these rates, how many gallons of gas would she use in **one hour**? Show or explain how you got your answer.

- d. The gas tank in Adriana's car holds 18 gallons of gas when it is full. Based on the same speed and gas mileage as in part (c), how many hours could Adriana drive using one entire tankful of gas? 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 The table below shows the number of points Dmitri earned playing a game on each of the first 5 days of the week.

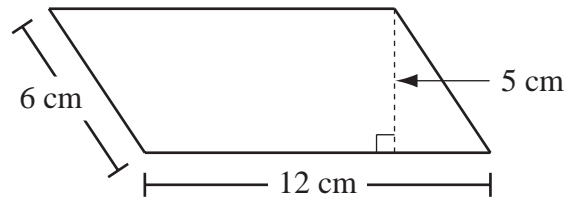
Game Points Earned

Day	Number of Points Earned
Monday	800
Tuesday	1200
Wednesday	1500
Thursday	1000
Friday	1600
Saturday	?

What is the number of points Dmitri must earn on Saturday so that his mean number of points over the 6 days is exactly 1250?

- A. 1020
- B. 1220
- C. 1300
- D. 1400

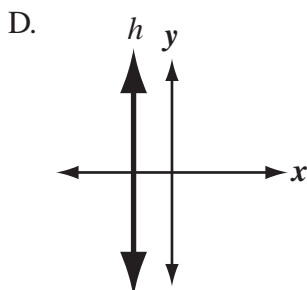
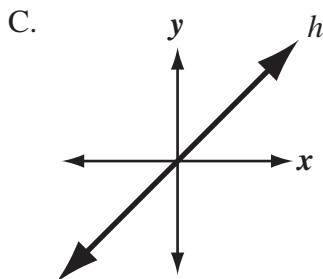
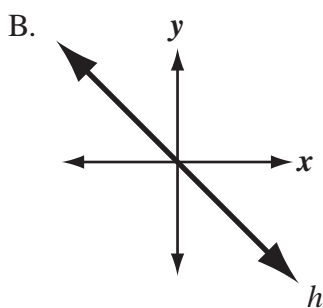
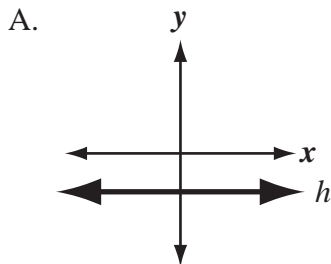
- 33 The diagram below shows a parallelogram and its dimensions.



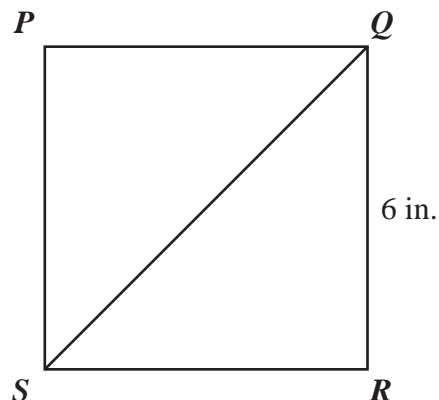
What is the area of the parallelogram?

- A. 30 cm^2
- B. 36 cm^2
- C. 60 cm^2
- D. 72 cm^2

- 34 In which of the following graphs does line h best represent a line with an undefined slope?



- 35 Gail drew square $PQRS$ shown below.



What is the length, in inches, of \overline{SQ} ?

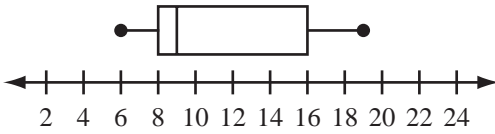
- A. $6\sqrt{2}$
 B. 9
 C. $6\sqrt{3}$
 D. 12
- 36 A technician earns \$75 per hour working on computers. She has monthly business expenses of \$800. Her profit is the difference between her monthly earnings and her monthly business expenses.
- Which of the following inequalities can be used to find the number of hours, x , the technician will have to work on computers in a month to make a profit of more than \$2000?
- A. $800 - 75x < 2000$
 B. $75x - 800 < 2000$
 C. $800 - 75x > 2000$
 D. $75x - 800 > 2000$

37 A community center offers classes for students.

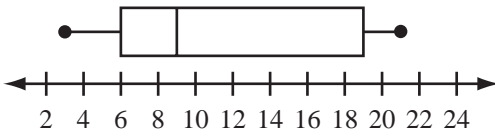
- The range of the number of students in each class is 13.
- The median number of students in each class is 9.

Which of the following box-and-whisker plots could represent the numbers of students in the classes?

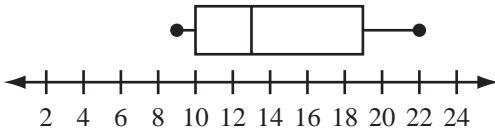
A. **Numbers of Students in Classes**



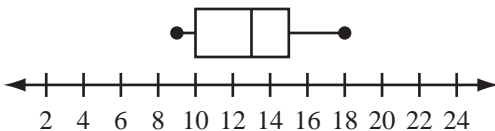
B. **Numbers of Students in Classes**



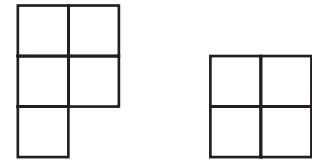
C. **Numbers of Students in Classes**



D. **Numbers of Students in Classes**

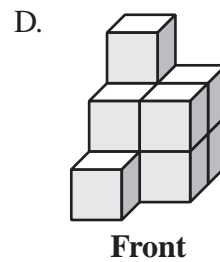
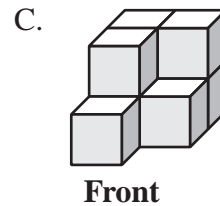
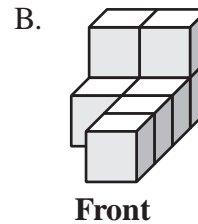
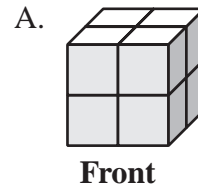


38 The diagrams below show the top view and the front view of a solid object.



Top view Front view

Which of the following could be a diagram of the solid object?



- 39 Jan sets up tables and chairs for meetings. When she sets up 12 tables, she places 6 chairs at each table. Jan always sets up the same total number of chairs.
- When she sets up 8 tables, what is the number of chairs that she places at each table?
- A. 4
 - B. 9
 - C. 10
 - D. 16

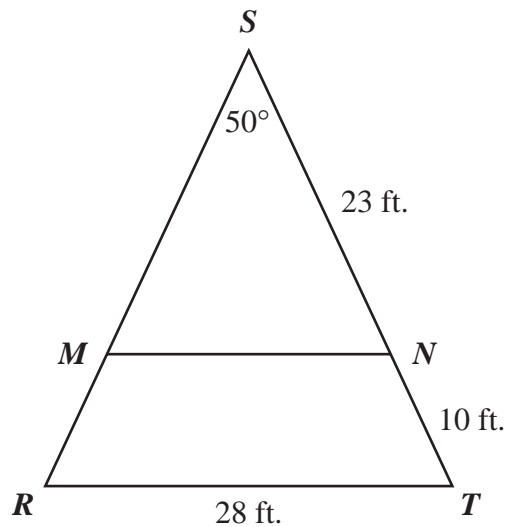
- 40 Marcos has two cubes of different sizes. The length of each edge of the larger cube is 2 times the length of each edge of the smaller cube.
- The volume of the larger cube is how many times the volume of the smaller cube?
- A. 4
 - B. 6
 - C. 8
 - D. 16

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.

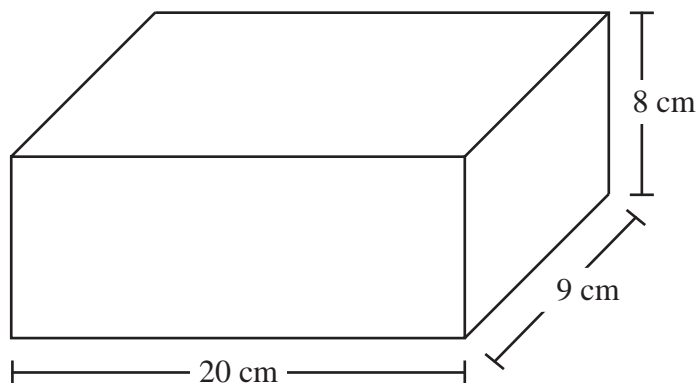
41 The diagram below shows $\triangle RST$.



- $\triangle RST$ is an isosceles triangle with congruent sides \overline{RS} and \overline{ST} .
 - Point M lies on \overline{RS} , and point N lies on \overline{ST} .
 - \overline{MN} is parallel to \overline{RT} .
 - The length of \overline{SN} is 23 feet, and the length of \overline{NT} is 10 feet.
- What is the length of \overline{RS} ? Show or explain how you got your answer.
 - What is $m\angle T$? Show or explain how you got your answer.
 - What is $m\angle MNS$? Show or explain how you got your answer.
 - Explain why $\triangle MNS$ is similar to $\triangle RTS$.
 - What is the length of \overline{MN} ? Show or explain how you got your answer.

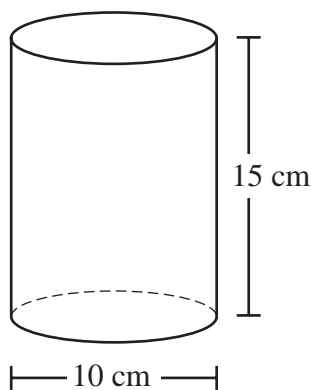
Write your answer to question 42 in the space provided in your Student Answer Booklet.

- 42 Paloma bought a block of wax in the shape of a right rectangular prism. The diagram below shows the block and its dimensions.



- a. What is the volume, in cubic centimeters, of the block of wax? Show your work.

Paloma melted the block of wax to make candles. The first candle she made is in the shape of a right circular cylinder. The diagram below represents the candle and its dimensions.



- b. What is the volume, in cubic centimeters, of the first candle? Show your work.
- c. Paloma wanted to make a second candle in the shape of a right square pyramid with a side length of 10 centimeters and a height of 12 centimeters. Show that she does **not** have enough remaining wax to make this candle.
- d. Paloma decided instead to make the second candle in the shape of a right square pyramid with a side length of 8 centimeters. If she uses **all** the remaining wax, what will be the height, in centimeters, of the candle? Show your work.

Grade 10 Mathematics
Spring 2010 Released Items:
Reporting Categories, Standards, and Correct Answers*

Item No.	Page No.	Reporting Category	Standard	Correct Answer (MC/SA)*
1	233	<i>Data Analysis, Statistics, and Probability</i>	10.D.1	C
2	233	<i>Number Sense and Operations</i>	10.N.2	A
3	233	<i>Number Sense and Operations</i>	10.N.2	C
4	234	<i>Data Analysis, Statistics, and Probability</i>	10.D.1	B
5	234	<i>Measurement</i>	10.M.2	C
6	234	<i>Number Sense and Operations</i>	10.N.4	D
7	234	<i>Number Sense and Operations</i>	10.N.2	B
8	235	<i>Geometry</i>	10.G.3	B
9	235	<i>Number Sense and Operations</i>	10.N.2	A
10	235	<i>Patterns, Relations, and Algebra</i>	10.P.5	A
11	236	<i>Data Analysis, Statistics, and Probability</i>	10.D.2	D
12	237	<i>Patterns, Relations, and Algebra</i>	10.P.7	A
13	237	<i>Geometry</i>	10.G.9	B
14	237	<i>Number Sense and Operations</i>	10.N.1	A
15	238	<i>Patterns, Relations, and Algebra</i>	10.P.8	$x = 4$
16	238	<i>Measurement</i>	10.M.1	48 square meters
17	239	<i>Patterns, Relations, and Algebra</i>	10.P.7	
18	240	<i>Measurement</i>	10.M.2	50π square centimeters
19	240	<i>Number Sense and Operations</i>	10.N.2	16
20	241	<i>Data Analysis, Statistics, and Probability</i>	10.D.1	
21	242	<i>Patterns, Relations, and Algebra</i>	10.P.8	
22	243	<i>Geometry</i>	10.G.5	A
23	243	<i>Data Analysis, Statistics, and Probability</i>	10.D.1	A
24	244	<i>Patterns, Relations, and Algebra</i>	10.P.2	D
25	244	<i>Patterns, Relations, and Algebra</i>	10.P.6	B
26	244	<i>Data Analysis, Statistics, and Probability</i>	8.D.4	B
27	245	<i>Patterns, Relations, and Algebra</i>	10.P.6	A
28	245	<i>Patterns, Relations, and Algebra</i>	10.P.8	A
29	245	<i>Measurement</i>	10.M.1	B
30	245	<i>Data Analysis, Statistics, and Probability</i>	10.D.1	D
31	246	<i>Number Sense and Operations</i>	8.N.3	
32	247	<i>Data Analysis, Statistics, and Probability</i>	10.D.1	D
33	247	<i>Measurement</i>	10.M.1	C
34	248	<i>Patterns, Relations, and Algebra</i>	10.P.2	D
35	248	<i>Geometry</i>	10.G.6	A
36	248	<i>Patterns, Relations, and Algebra</i>	10.P.6	D
37	249	<i>Data Analysis, Statistics, and Probability</i>	10.D.1	A
38	249	<i>Geometry</i>	10.G.10	C
39	250	<i>Patterns, Relations, and Algebra</i>	10.P.7	B
40	250	<i>Measurement</i>	10.M.3	C
41	251	<i>Geometry</i>	10.G.4	
42	252	<i>Measurement</i>	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.