

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 value of the expression below?

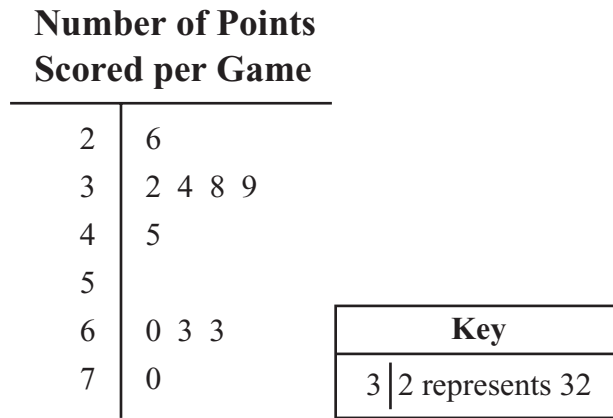
$$4(2^3 - 7) - 5^2$$

- A. -21
- B. -14
- C. 1
- D. 29

- 2 Which of the following is closest to the value of $\sqrt{140}$?

- A. 11
- B. 12
- C. 70
- D. 72

- 3 The number of points scored by the Springdale Hawks in each of their last ten basketball games is shown in the stem-and-leaf plot below.



What is the median number of points scored per game by the Hawks?

- A. 42
- B. 44
- C. 45
- D. 47

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

$$(3x - 2)(2x + 3)$$

- A. $5x^2 + 5x + 1$
- B. $5x^2 + 13x + 1$
- C. $6x^2 + 13x - 6$
- D. $6x^2 + 5x - 6$

- 5 What is the value of the expression below?

$$\frac{8 + 6 \cdot 4}{48 \div 6 - 4}$$

- A. $\frac{4}{3}$
- B. $\frac{7}{3}$
- C. 8
- D. 14

- 6 The table below shows a relationship between values of x and y .

x	1	2	3	4	5
y	3	6	11	18	27

Which of the following equations describes the relationship between x and y for the values in the table?

- A. $y = 3x$
- B. $y = 5x - 2$
- C. $y = x^2 + 2$
- D. $y = x^3$

- 7 Which of the following statements is true?

- A. $\pi = \sqrt{8}$
- B. $\pi > \sqrt{8}$
- C. $\pi = \sqrt{12}$
- D. $\pi > \sqrt{12}$

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

$$(5x + 6y - 3z) + (3x - 8y + z)$$

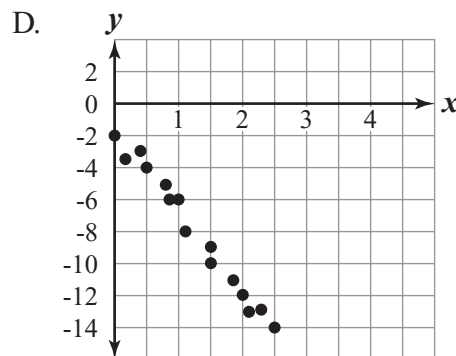
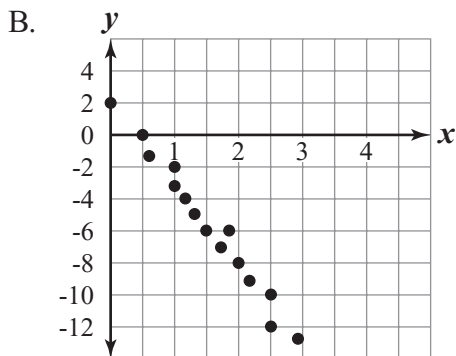
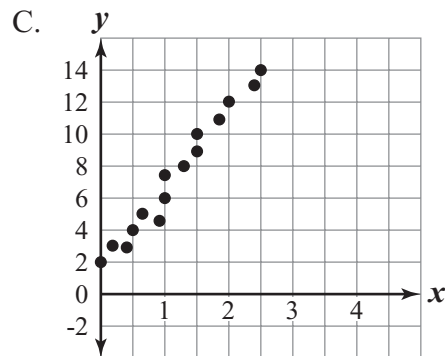
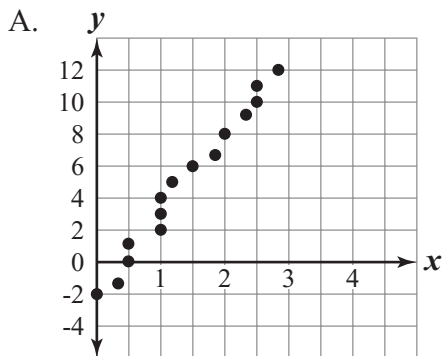
- A. $8x - 14y - 4z$
- B. $8x - 2y - 2z$
- C. $8x - 14y - 2z$
- D. $8x - 2y - 3z$

- 9 Which of the following is closest to the cube root of 150?

- A. 5
- B. 12
- C. 15
- D. 50

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

$$y = -5x + 2$$

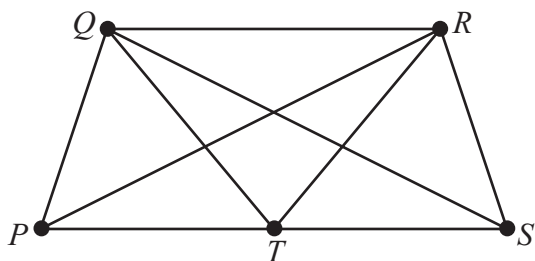


- 11 What are **all** the values of x that make the quadratic equation below true?

$$x^2 - 16 = 0$$

- A. $x = 4$
- B. $x = 8$
- C. $x = 4$ or $x = -4$
- D. $x = 8$ or $x = -8$

- 12 The line segments in the diagram below represent the paths through a rose garden.



If Roberta starts at point P and walks on each path exactly once, at what point will she finish?

- A. Q
- B. R
- C. S
- D. T

- 13 Which of the following shows the expression below in factored form?

$$x^2 + 2x - 8$$

- A. $(x - 2)(x + 4)$
- B. $(x + 2)(x - 4)$
- C. $(x - 1)(x + 8)$
- D. $(x + 1)(x - 8)$

- 14 What is the value of the expression below?

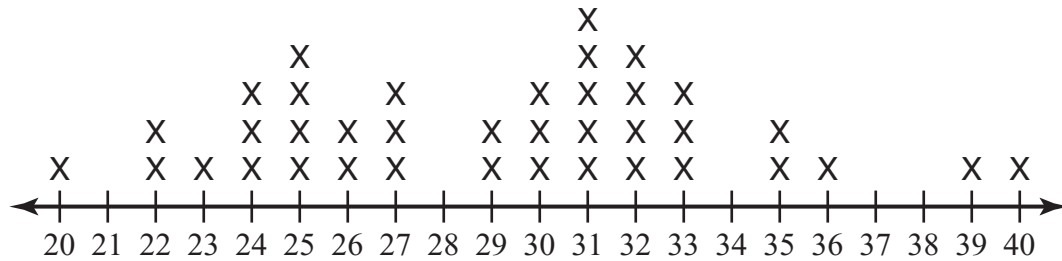
$$5|4 - 6| - (-3)$$

- A. -13
- B. -7
- C. 13
- D. 17

Question 15 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.

- 15** A “wheat penny” is a United States penny that has a picture of wheat on one side. These pennies were only produced from 1909 through 1958.

The members of a coin-collecting group counted the number of wheat pennies in each of their collections. The line plot below shows the number of wheat pennies in each member’s coin collection.



Number of Wheat Pennies in Each Member’s Coin Collection

What is the mode of the data in the line plot?

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 Dan made an accurate scale drawing of the front of a building.

- The width of the building in Dan's scale drawing is 5 inches.
- The height of the building in his scale drawing is 3 inches.

If the actual width of the building is 100 feet, what is the actual height, in feet, of the building?

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 Rodney is starting a horse-grooming business.

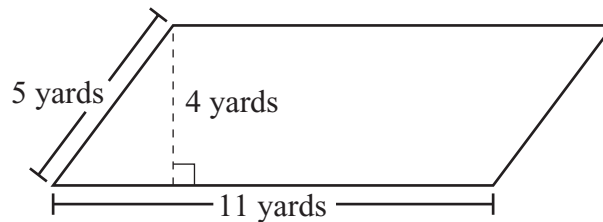
- His initial expense will be a one-time cost of \$200 for equipment.
- His earnings will be \$40 per horse groomed.

Rodney's profit will be equal to his earnings for all horses groomed minus his initial expense.

- What will be Rodney's profit if 15 horses are groomed? Show or explain how you got your answer.
- On the grid in your Student Answer Booklet, plot eight points with coordinates (x, y) , in which x and y are defined as follows:
 - x = the number of horses groomed (in whole numbers from 0 through 7)
 - y = Rodney's profit, in dollars, if x horses are groomedBe sure to label the x -axis and y -axis, indicate the scale on each axis, and include a title for your graph.
- Write an equation of the line that contains all of the points you plotted in part (b). Show or explain how you determined your equation.
- What is the **x -intercept** of the line represented by your equation in part (c)? Show or explain how you got your answer.
- Explain the meaning of the x -intercept you determined in part (d) in terms of the context of this problem.

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 Hannah's garden is in the shape of a parallelogram. A diagram representing her garden is shown below.



Hannah needs to know the area of the garden in order to buy the correct amount of fertilizer. Based on the dimensions in the diagram, what is the area, in square yards, of Hannah's garden?

- 19 Angelo placed 5 CDs into his CD player. There are 12 songs on each CD.

Angelo set his CD player to select songs in a random order. What is the probability that the first song the CD player selects will be the 4th song on the 3rd CD?

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

Liam and Tobet are going to walk in a fund-raising event to raise money for their school.

- Liam's mother promised to donate to the school \$4 per mile that Liam walks, plus an additional \$30.
 - Tobet's father promised to donate to the school \$6 per mile that Tobet walks, plus an additional \$20.
- a. If Liam walks 15 miles during the event, what is the total amount of money his mother will donate? Show or explain how you got your answer.
 - b. Write an equation that represents y , the total amount of money Liam's mother will donate if Liam walks x miles during the event.
 - c. Write an equation that represents y , the total amount of money Tobet's father will donate if Tobet walks x miles during the event.

After the event, Liam and Tobet compared their results. Liam had walked the same number of miles as Tobet. Liam's mother had donated the same amount of money as Tobet's father.

- d. Using your two equations from parts (b) and (c), determine the number of miles Liam and Tobet each walked during the event. Show or explain how you got your answer.
- e. Using your answer from part (d), determine the total amount of money Liam's mother and Tobet's father **each** donated. Show or explain how you got your answer.

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

- 21 The distance, d , in feet, that a dropped rock falls in t seconds can be estimated using the formula below.

$$d = 16t^2$$

Use the formula to answer the following questions.

- What is the distance, in feet, that a dropped rock will fall in 10 seconds? Show your work.
- What is the ratio of the **distance** a dropped rock will fall in 30 seconds as compared to the **distance** a dropped rock will fall in 10 seconds? Show your work.
- How many seconds will it take a dropped rock to fall 144 feet? Show your work.
- To the nearest tenth of a second, how many seconds will it take a dropped rock to fall 80 feet? Show your work.

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 Which of the following is closest to the circumference, in inches, of a circle that has a diameter of 12 inches?

- A. 18.84
- B. 37.68
- C. 75.36
- D. 113.04

- 23 The table below shows the numbers of days Mallory and her friends went skating last month.

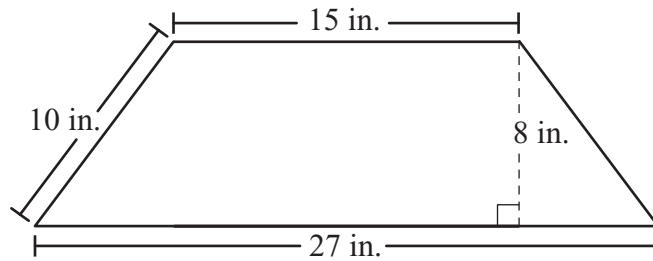
**Numbers of Days
of Skating**

Name	Number of Days
Angela	12
Chelsea	7
Latifa	11
Mallory	12

What are the mean and median for this set of data?

- A. mean = 10.5; median = 11.5
- B. mean = 10.5; median = 9
- C. mean = 12; median = 11.5
- D. mean = 12; median = 9

- 24 A trapezoid and its dimensions are shown below.



What is the area of the trapezoid?

- A. 60 sq. in.
B. 168 sq. in.
C. 210 sq. in.
D. 336 sq. in.
-
- 25 Julia spent 3 hours hiking 6 miles up a hill. She spent 2 hours hiking 8 miles down the hill on a different path. For Julia's completed hike up and down the hill, what was her average speed, in miles per hour?

- A. 2.0
B. 2.5
C. 2.8
D. 3.0

- 26 A total of 100 people bought all of the tickets that were available for a school raffle.

The frequency table below shows the number of people who bought each number of tickets listed. For example, 27 people bought 2 tickets each.

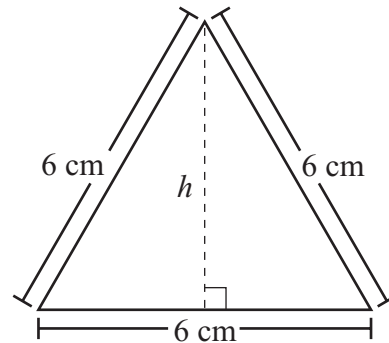
Number of People Buying Raffle Tickets

Number of Tickets Bought	1	2	3	4	6
Number of People	38	27	20	9	6

For these 100 people, what was the mean number of tickets bought per person?

- A. 1.24
- B. 2.24
- C. 2.50
- D. 3.20

- 27 An equilateral triangle and its side lengths are shown below.



What is h , the height of the equilateral triangle?

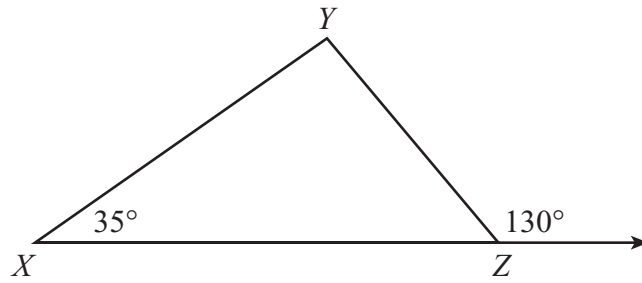
- A. 3 cm
- B. 4 cm
- C. $3\sqrt{3}$ cm
- D. $3\sqrt{5}$ cm

- 28 Two containers in the shape of right circular cylinders are equal in height. The radius of the larger container is 3 times the radius of the smaller container.

The volume of the larger container is how many times the volume of the smaller container?

- A. 3
- B. 6
- C. 9
- D. 27

- 29 Triangle XYZ and two angle measures are shown in the diagram below.



What is the measure of $\angle Y$?

- 30 The length of a rectangle is 1 inch more than 2 times its width. The area of the rectangle is 36 square inches.
- What is the **length** of the rectangle?
- A. 4 inches
 - B. 6 inches
 - C. 9 inches
 - D. 18 inches

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 table below shows the attendance at each of Eagle High School's home football games last season.

**Attendance at
Home Football Games**

Game	Attendance
1st	287
2nd	268
3rd	283
4th	283
5th	270
6th	70
7th	283
8th	275

- a. What is the range of the attendance for the 8 home football games last season? Show or explain how you got your answer.
- b. Determine each of the following measures of the attendance for the 8 games.
- mean
 - median
 - mode

Show or explain how you got each of your answers.

- c. If the attendance at the 6th game is not included in the data set, which measure (mean, median, or mode) has the **greatest** increase in value when compared to your answers in part (b)? 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 Niraj went on the following airplane flight:

- The flight was 5 hours long.
- The total distance of the flight was 640 miles.
- For the **first** part of the flight, the average speed of the airplane was 140 miles per hour.
- For the **second** part of the flight, the average speed of the airplane was 120 miles per hour.

Which of the following systems of equations can be used to find x , the number of hours in the first part of the flight, and y , the number of hours in the second part of the flight?

A. $x + y = 5$
 $120x + 140y = 640$

B. $x + y = 640$
 $120x + 140y = 5$

C. $x + y = 5$
 $140x + 120y = 640$

D. $x + y = 640$
 $140x + 120y = 5$

- 33 The girls' soccer coach scheduled practice for 10 days during soccer season. The table below shows the number of players who attended practice each day.

**Practice Attendance
Each Day**

Day	Number of Players
1	12
2	13
3	16
4	10
5	9
6	12
7	14
8	12
9	15
10	16

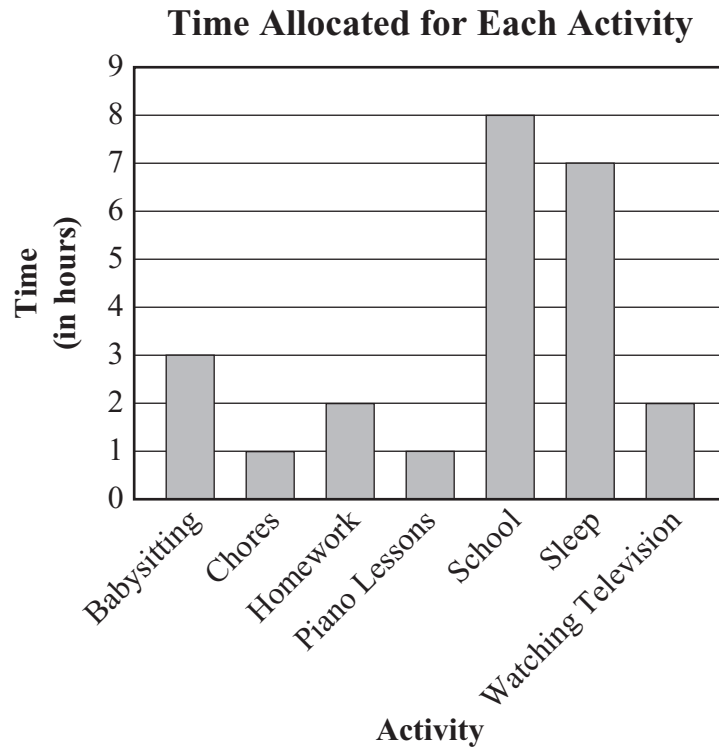
What is the range of the number of players who attended practice over the 10 days?

- A. 4
- B. 7
- C. 9
- D. 16

- 34 An artist carved a sphere out of stone. The radius of the sphere is 0.93 meter. Which of the following is closest to the volume of the sphere?

- A. 3.37 m^3
- B. 3.62 m^3
- C. 10.11 m^3
- D. 11.69 m^3

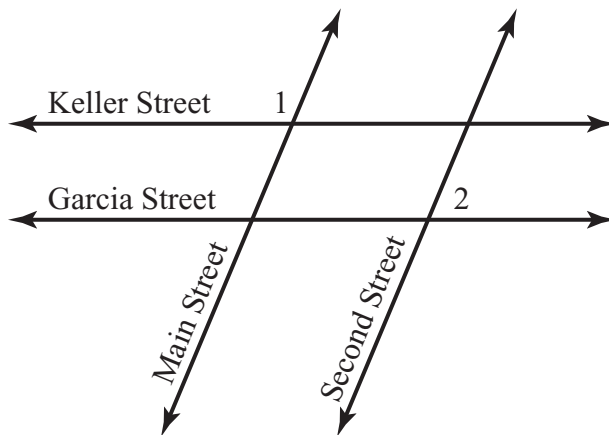
- 35 Justin drew the bar graph below to represent the time he allocated for each activity during one school day last week.



Based on the data in the graph, which of the following best represents the ratio of the time Justin allocated for homework to the time he allocated for school?

- A. $\frac{1}{4}$
- B. $\frac{5}{12}$
- C. 4
- D. 10

- 36 The lines in the diagram below represent four streets in Linda’s hometown.



Keller Street is parallel to Garcia Street, and Main Street is parallel to Second Street.

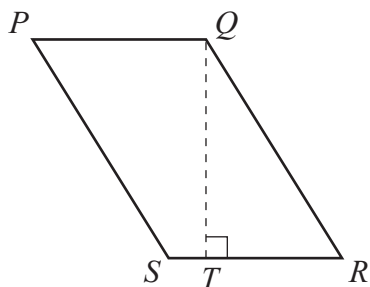
If $m\angle 1 = 95^\circ$, what is $m\angle 2$?

- A. 75°
- B. 85°
- C. 95°
- D. 105°

37 Which of the following describes the slope of a horizontal line on the coordinate plane?

- A. zero
- B. positive
- C. negative
- D. undefined

38 Parallelogram $PQRS$ is shown below.



Some of the dimensions of the parallelogram are as follows:

- $QR = 7$ cm
- $RS = 5$ cm
- $QT = 6.5$ cm

What is the area of the parallelogram?

- A. 24 cm^2
- B. 32.5 cm^2
- C. 35 cm^2
- D. 45.5 cm^2

39 Which of the following is the solution to the inequality below?

$$-4x - 7 < 5$$

- A. $x > -\frac{1}{2}$
- B. $x < -\frac{1}{2}$
- C. $x > -3$
- D. $x < -3$

40 Leroy will arrive at Gary's house at a time between 2 p.m. and 4 p.m. this afternoon. At 2 p.m., Gary will begin to watch a two-hour television program. There are 15 minutes of commercials scheduled to be shown during **each** hour of the program.

Assuming that Leroy's arrival time at Gary's house will be random, what is the probability that Leroy will arrive during a commercial?

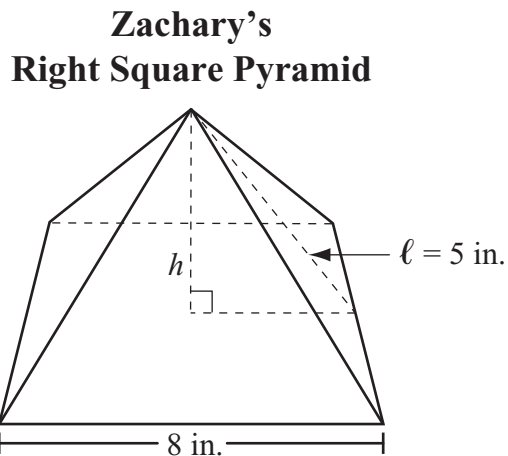
- A. $\frac{1}{3}$
- B. $\frac{1}{4}$
- C. $\frac{1}{8}$
- D. $\frac{1}{16}$

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.

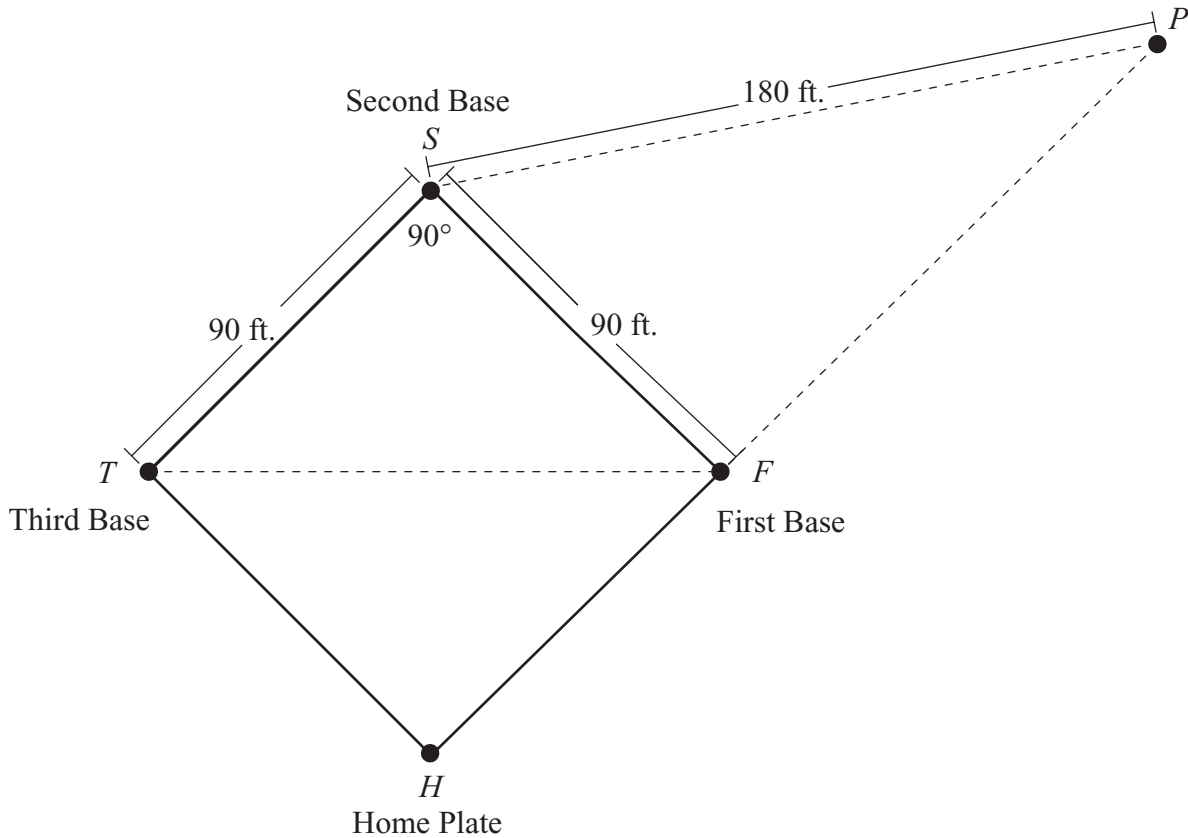
- 41 Zachary made a right square pyramid out of plaster for an art project. Each side of his pyramid's base measured 8 inches. The slant height, ℓ , of his pyramid measured 5 inches. A diagram of his pyramid is shown below.



- What is the area, in square inches, of the base of Zachary's pyramid? Show your work.
- What is the total surface area, in square inches, of Zachary's pyramid? Show your work.
- What is h , the height, in inches, of Zachary's pyramid? Show or explain how you got your answer.
- Using the height you determined in part (c), what is the volume, in cubic inches, of Zachary's pyramid? Show your work.

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

- 42 A diagram of part of a baseball field and some of its dimensions are shown below. Point F represents First Base, point S represents Second Base, point T represents Third Base, point H represents Home Plate, and point P represents another location on the baseball field.



The diagram has the following characteristics:

- Quadrilateral $FSTH$ is a square.
 - Point F lies on \overline{HP} .
 - Triangle FST is isosceles.
- a. What is the measure, in degrees, of $\angle TFS$? Show or explain how you got your answer.
 - b. What is the distance, in feet, between F and T ? Show or explain how you got your answer.

A player caught a ball at point P .

- c. What is the measure, in degrees, of $\angle P$? Show or explain how you got your answer.
- d. What is the length, in feet, of \overline{FP} ? Show or explain how you got your answer.

Grade 10 Mathematics
Spring 2007 Released Items:
Reporting Categories, Standards, and Correct Answers

Item No.	Page No.	Reporting Category	Standard	Correct Answer (MC/SA)*
1	381	<i>Number Sense and Operations</i>	10.N.2	A
2	381	<i>Number Sense and Operations</i>	10.N.3	B
3	382	<i>Data Analysis, Statistics, and Probability</i>	10.D.1	A
4	382	<i>Patterns, Relations, and Algebra</i>	10.P.3	D
5	382	<i>Number Sense and Operations</i>	10.N.2	C
6	383	<i>Patterns, Relations, and Algebra</i>	10.P.1	C
7	383	<i>Number Sense and Operations</i>	8.N.2	B
8	383	<i>Patterns, Relations, and Algebra</i>	10.P.3	B
9	383	<i>Number Sense and Operations</i>	10.N.3	A
10	384	<i>Data Analysis, Statistics, and Probability</i>	10.D.2	B
11	385	<i>Patterns, Relations, and Algebra</i>	10.P.5	C
12	385	<i>Geometry</i>	10.G.11	C
13	385	<i>Patterns, Relations, and Algebra</i>	10.P.4	A
14	385	<i>Number Sense and Operations</i>	10.N.2	C
15	386	<i>Data Analysis, Statistics, and Probability</i>	10.D.1	31
16	387	<i>Geometry</i>	10.G.4	60 feet
17	388	<i>Patterns, Relations, and Algebra</i>	10.P.2	
18	389	<i>Measurement</i>	10.M.1	44 square yards
19	389	<i>Data Analysis, Statistics, and Probability</i>	8.D.4	$\frac{1}{60}$ or equivalent
20	390	<i>Patterns, Relations, and Algebra</i>	10.P.8	
21	391	<i>Number Sense and Operations</i>	10.N.2	
22	392	<i>Measurement</i>	10.M.1	B
23	392	<i>Data Analysis, Statistics, and Probability</i>	10.D.1	A
24	393	<i>Measurement</i>	10.M.1	B
25	393	<i>Patterns, Relations, and Algebra</i>	10.P.7	C
26	394	<i>Data Analysis, Statistics, and Probability</i>	10.D.1	B
27	394	<i>Geometry</i>	10.G.6	C
28	394	<i>Measurement</i>	10.M.3	C
29	395	<i>Geometry</i>	10.G.5	D
30	395	<i>Patterns, Relations, and Algebra</i>	10.P.7	C
31	396	<i>Data Analysis, Statistics, and Probability</i>	10.D.1	
32	397	<i>Patterns, Relations, and Algebra</i>	10.P.8	C
33	398	<i>Data Analysis, Statistics, and Probability</i>	10.D.1	B
34	398	<i>Measurement</i>	10.M.2	A
35	399	<i>Data Analysis, Statistics, and Probability</i>	10.D.1	A
36	400	<i>Geometry</i>	10.G.3	B
37	401	<i>Patterns, Relations, and Algebra</i>	10.P.2	A
38	401	<i>Measurement</i>	10.M.1	B
39	401	<i>Patterns, Relations, and Algebra</i>	10.P.6	C
40	401	<i>Data Analysis, Statistics, and Probability</i>	8.D.4	B
41	402	<i>Measurement</i>	10.M.2	
42	403	<i>Geometry</i>	10.G.6	

* 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 Web site later this year.