

PART 2 — MATHEMATICS

Suggested Time — 90 Minutes

57 QUESTIONS

IMPORTANT NOTES

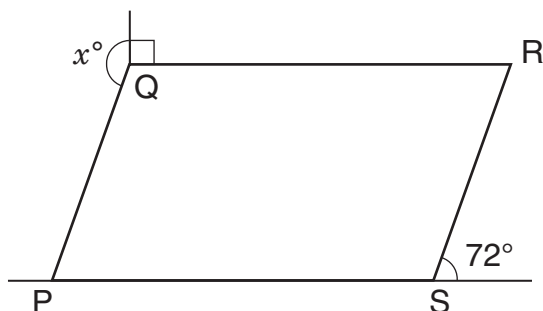
- (1) Formulas and definitions of mathematical terms and symbols are **not** provided.
- (2) Diagrams other than graphs are **not** necessarily drawn to scale. Do not assume any relationship in a diagram unless it is specifically stated or can be figured out from the information given.
- (3) Assume that a diagram is in one plane unless the problem specifically states that it is not.
- (4) Graphs are drawn to scale. Unless stated otherwise, you can assume relationships according to appearance. For example, (on a graph) lines that appear to be parallel can be assumed to be parallel; likewise for concurrent lines, straight lines, collinear points, right angles, etc.
- (5) Reduce all fractions to lowest terms.

GRID-IN PROBLEMS

QUESTIONS 58–62

DIRECTIONS: Solve each problem. On the answer sheet, write your answer in the boxes at the top of the grid. Start on the left side of each grid. Print only one number or symbol in each box. **DO NOT LEAVE A BOX BLANK IN THE MIDDLE OF AN ANSWER.** Under each box, fill in the circle that matches the number or symbol you wrote above. **DO NOT FILL IN A CIRCLE UNDER AN UNUSED BOX.**

58.



In the figure above, PQRS is a parallelogram.
What is the value of x ?

59. The owner of a tree farm plants pine trees and oak trees in a ratio of 8:3. How many oak trees are planted if 264 pine trees are planted?

60. For what value of w is $4w = 2w - 8$?

-
- 61.** A survey asked students what pets they have. Based on the results, the following statements are all true.

- 20 students have cats.
- 23 students have dogs.
- 3 students have both dogs and cats.
- 5 students have no dogs or cats.

How many students were surveyed?

- 62.** The sum of two consecutive integers is -15 . If 1 is added to the smaller integer and 2 is subtracted from the larger integer, what is the **product** of the two resulting integers?

MULTIPLE CHOICE PROBLEMS

QUESTIONS 63–114

DIRECTIONS: Solve each problem. Select the **best** answer from the choices given. Mark the letter of your answer on the answer sheet. You can do your figuring in the test booklet or on paper provided by the proctor. **DO NOT MAKE ANY MARKS ON YOUR ANSWER SHEET OTHER THAN FILLING IN YOUR ANSWER CHOICES.**

63. The set of possible values of m is $\{5, 7, 9\}$. What is the set of possible values of k if $2k = m + 3$?

A. $\{3, 4, 5\}$
B. $\{4, 5, 6\}$
C. $\{8, 10, 12\}$
D. $\{10, 14, 18\}$

64. One bottle contains 500 milliliters of juice. How many **liters** of juice are there in 24 of these bottles?

E. 12 L
F. 120 L
G. 1,200 L
H. 12,000 L

65. In a certain school, course grades range from 0 to 100. Adrianna took 4 courses and her average course grade was 90. Roberto took 5 courses. If both students have the same sum of course grades, what was Roberto's average?

A. 72
B. 80
C. 90
D. 92

66. Jenny starts a game with twice as many marbles as Keiko. Jenny gives Keiko 5 marbles, but she still has 10 more than Keiko. How many marbles did Jenny have to start with?

E. 25
F. 30
G. 35
H. 40

67. In a scale diagram, 0.125 inch represents 125 feet. How many inches represent 1 foot?

A. 0.001 in.
B. 0.01 in.
C. 0.1 in.
D. 0.12 in.

68.

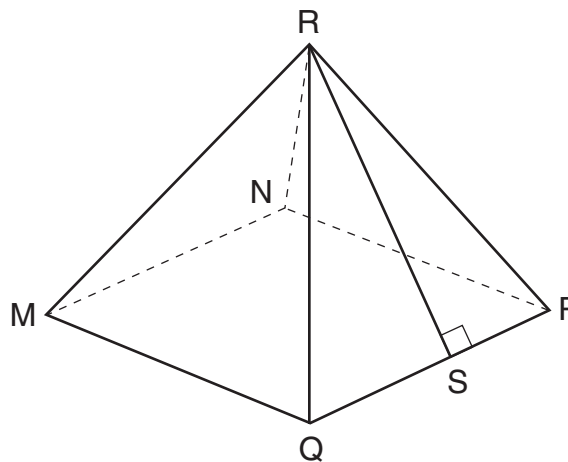
PEOPLE PER VEHICLE AT CHECKPOINT

Number of People in Vehicle	Percent of Vehicles
1	40%
2	35%
3	15%
4	7%
5 or more	3%

A researcher recorded the number of people in each vehicle that passed through a checkpoint. The table above shows the percent distribution for the 420 vehicles that passed through the checkpoint yesterday morning. How many of the 420 vehicles contained **at least** 3 people?

- E. 42
- F. 63
- G. 105
- H. 315

69.



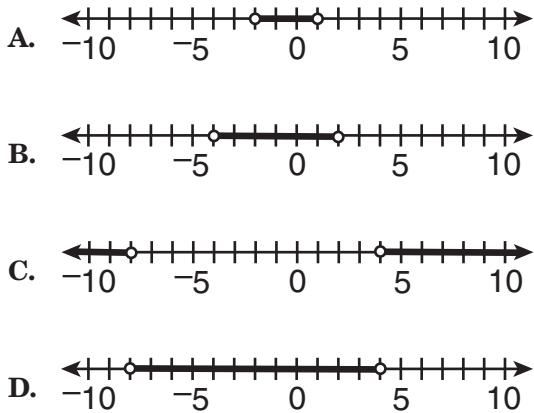
In the pyramid above, each triangular face has the same area, and the base $MNPQ$ is a square that measures 8 centimeters on each side. If the length of $\overline{RS} = 6$ centimeters, what is the surface area of the pyramid **excluding** the base?

- A. 48 sq cm
- B. 96 sq cm
- C. 128 sq cm
- D. 160 sq cm

70. The perimeter of a rectangle is 510 centimeters. The ratio of the length to the width is 3:2. What are the dimensions of this rectangle?

- E. 150 cm by 105 cm
- F. 153 cm by 102 cm
- G. 158 cm by 97 cm
- H. 165 cm by 90 cm

71. Which number line below shows the solution to the inequality $-4 < \frac{x}{2} < 2$?



72. 1 dollar = 7 longs
1 dollar = 0.5 dalt

Kevin has 140 longs and 16 dalts. If he exchanges the longs and dalts for dollars according to the rates above, how many dollars will he receive?

- E. \$28
F. \$52
G. \$182
H. \$282

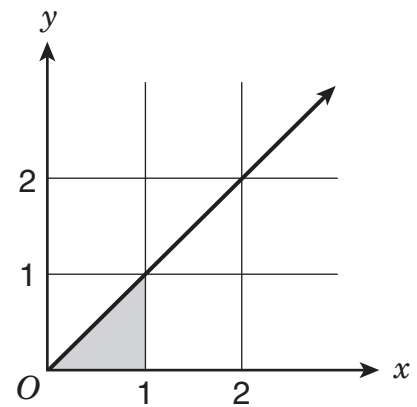
73. A box of colored pencils contains exactly 6 red pencils. The probability of choosing a red pencil from the box is $\frac{2}{7}$. How many of the pencils in the box are **not** red?

- A. 5
B. 15
C. 21
D. 30

74. The sum of the numbers x , y , and z is 50. The ratio of x to y is 1:4, and the ratio of y to z is 4:5. What is the value of y ?

- E. 4
F. 8
G. 10
H. 20

75.



What is the area of the shaded region in the graph above?

- A. 0.25 square unit
B. 0.5 square unit
C. 1 square unit
D. 1.5 square units

76. In Centerville, 45% of the population is female, and 60% of the population commutes to work daily. Of the total Centerville population, 21% are females who commute to work daily. What percentage of the total Centerville population are males who do **not** commute to work daily?

- E. 15%
F. 16%
G. 24%
H. 39%

77. Mrs. Cranston bought five bottles of water for \$0.90 each and 8 pounds of meat. She paid a total of \$26.90 for these items, not including tax. What was the price per pound of the meat?

A. \$2.80
B. \$3.25
C. \$14.40
D. \$22.40

78. In a sample of 10 cards, 4 are red and 6 are blue. If 2 cards are selected at random from the sample, one at a time without replacement, what is the probability that both cards are **not** blue?

E. $\frac{2}{15}$
F. $\frac{4}{25}$
G. $\frac{3}{10}$
H. $\frac{1}{3}$

79. 1 sind = 4 largs
2 plunks = 5 dalts
5 sinds = 2 harps
1 plunk = 3 harps

A nation has five types of coins: sinds, dalts, largs, harps, and plunks. The relationship between the coins is shown above. Which coin is most valuable?

A. sind
B. dalt
C. harp
D. plunk

- 80.

SCORES ON MATH QUIZ

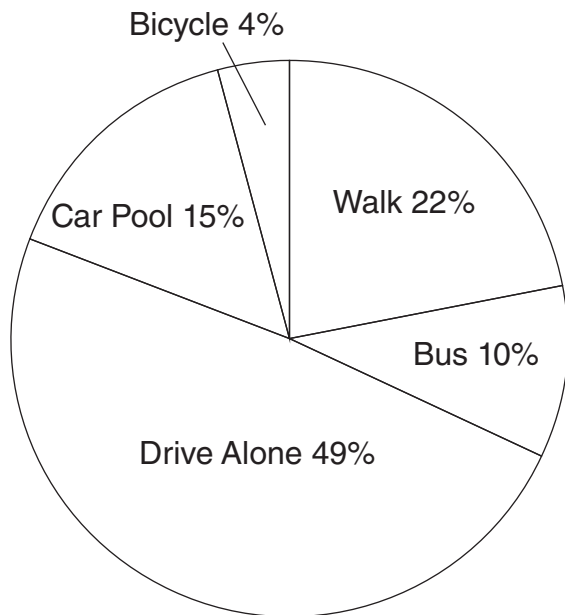
Score	Number of Students
85	4
75	4
65	2

What is the mean score of the 10 students in the table above?

E. 22.5
F. 75
G. 77
H. 85

81.

HOW PEOPLE GET TO WORK IN CENTER CITY



Total number of people
working in Center City = 15,000

How many more people in Center City walk to
work than ride their bicycle to work?

- A. 2,500
- B. 2,700
- C. 2,800
- D. 3,000

82. Which of the following numbers has factors
that include the smallest factor (other than 1)
of 91?

- E. 30
- F. 35
- G. 39
- H. 44

83. In a scale drawing of a triangular banner, one
side measures 16 centimeters and the other
two sides each measure 12 centimeters. On
the actual banner, these two sides each
measure 36 feet. What is the length of the
remaining side of the actual banner?

- A. 16 ft
- B. 32 ft
- C. 40 ft
- D. 48 ft

84. The faculty of a certain four-year college
consists of 179 teachers. There are
663 first-year students. The student-to-faculty
ratio for the entire college is 15 to 1. What is
the total number of second-, third-, and
fourth-year students?

- E. 1,989
- F. 2,022
- G. 2,652
- H. 2,685

85. $2\frac{1}{5} + 3\frac{3}{10} + 4\frac{2}{5} + 5\frac{1}{2}$

What is the value of the expression shown
above?

- A. $14\frac{7}{20}$
- B. $14\frac{2}{5}$
- C. $15\frac{7}{20}$
- D. $15\frac{2}{5}$

86. A car is traveling 55 miles per hour, and 1 mile = 5,280 feet. Which of the following calculations would give the car's speed in **feet per second**?

E. $\frac{55 \cdot 5,280}{1}$

F. $\frac{55 \cdot 5,280}{3,600}$

G. $\frac{55 \cdot 3,600}{5,280}$

H. $\frac{55 \cdot 5,280}{60}$

87. Today, Tien's age is $\frac{1}{4}$ of Jordan's age. In 2 years, Tien's age will be $\frac{1}{3}$ of Jordan's age. How old is Jordan today?

- A. 4 years old
B. 6 years old
C. 12 years old
D. 16 years old

88. How many positive even factors of 48 are greater than 24 and less than 48?

- E. 0
F. 1
G. 2
H. 12

89. The least of 5 consecutive integers is l , and the greatest is g . What is the value of $\frac{l+g}{2}$ in terms of l ?

- A. $2l$
B. $3l$
C. $l + 2$
D. $l + 5$

90. Johan leased a car for three years. He paid a one-time fee of \$1,000, and an additional \$300 per month for the full three years. At the end of the three years, what is the total amount Johan paid for leasing this car?

- E. \$1,900
F. \$4,600
G. \$10,800
H. \$11,800

91. There are 6 different cookies on a plate. Aiden will choose 2 of these cookies to pack in his lunch. How many different pairs of 2 cookies can he choose from the 6?

- A. 12
B. 15
C. 30
D. 36

92. For a presentation, Deion can create 5 slides in 20 minutes, working at a constant rate. Kyra can create 3 slides in 10 minutes, working at her own constant rate. What is the total number of slides the two of them can create in one hour?

- E. 16
F. 30
G. 33
H. 55

93.



On the number line above, $LN = \frac{1}{8}$. Point M (not shown) is located between point L and point N. Which value below is a possible value for M?

- A. 4.26
- B. 4.31
- C. 4.35
- D. 4.58

94. An unmarked straight stick will be laid end over end to measure a distance of exactly 72 feet. The same stick will be used in the same way to measure a distance of exactly 30 feet. What is the length of the longest possible stick that can be used for both measurements?

- E. 3 ft
- F. 4 ft
- G. 6 ft
- H. 8 ft

95. Ryan must read 150 pages for school this weekend. It took him 30 minutes to read the first 20 pages. At this rate, how much **additional** time will it take him to finish the reading?

- A. $2\frac{1}{6}$ hr
- B. $3\frac{1}{4}$ hr
- C. $3\frac{3}{4}$ hr
- D. $7\frac{1}{2}$ hr

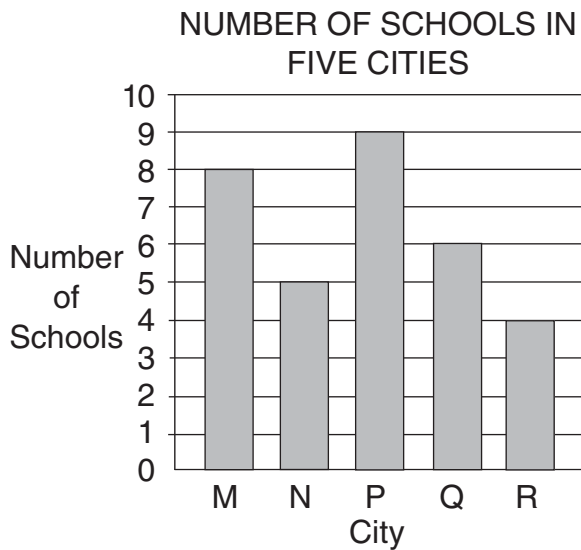
96. Suppose $M = \frac{w}{x}$, $N = \frac{y}{z}$, and $w, x, y,$ and z do not equal 0. What is $\frac{M}{N}$ in terms of $w, x, y,$ and z ?

- E. $\frac{wx}{yz}$
- F. $\frac{wy}{xz}$
- G. $\frac{wz}{xy}$
- H. $\frac{xy}{wz}$

97. In the set of consecutive integers from 12 to 30, inclusive, there are four integers that are multiples of both 2 and 3. How many integers in this set are multiples of **neither** 2 nor 3?

- A. 5
- B. 6
- C. 13
- D. 15

98.



The graph above shows the number of schools per city for five small cities. Cities M and N each have 500 students per school. City P has 400 students per school. Cities Q and R each have 700 students per school. Which of the five cities has the **greatest** number of students?

- E. City M
- F. City P
- G. City Q
- H. City R

99. A box contains 5 strawberry candies, 3 banana candies, and 2 orange candies. If Braden selects 2 candies at random from this box, without replacement, what is the probability that both candies are **not** banana?

- A. $\frac{1}{15}$
- B. $\frac{9}{100}$
- C. $\frac{7}{15}$
- D. $\frac{49}{100}$

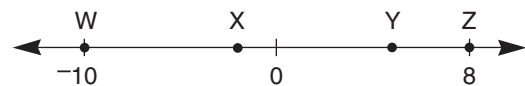
100.

$$\frac{w}{x} = \frac{y}{z}$$

In the equation above, w , x , y , and z are positive numbers. Which of these is equal to z ?

- E. x
- F. xy
- G. $\frac{w}{xy}$
- H. $\frac{xy}{w}$

101.



On the number line above, points W, X, Y, and Z are integers, and $WX:XY:YZ = 4:2:3$. What is the value of $\overline{WY}$?

- A. 8
- B. 11
- C. 12
- D. 18

102. A metal plate used in an electronic device must have a thickness of 0.02 inch, with an allowable error of 1 percent. What is the **greatest** allowable thickness of the metal plate?

- E. 0.0002 in.
- F. 0.02 in.
- G. 0.0202 in.
- H. 0.03 in.

103.

SCORES ON BIOLOGY TEST

Section	Lowest Score	Range
I	65	28
II	62	25
III	67	22

Mr. Blake's biology class is divided into three sections. The same test was given to each section. The table above shows both the lowest score and the range of scores on this test for each section. What is the **overall** range of all scores in all three sections?

- A. 25
- B. 27
- C. 28
- D. 31

104. If $3n$ is a positive even number, how many **odd** numbers are in the range from $3n$ up to and including $3n + 5$?

- E. 2
- F. 3
- G. 4
- H. 5

105.

$$\frac{10}{13} = 0.\overline{769230}$$

In the infinitely repeating decimal above, 7 is the first digit in the repeating pattern. What is the 391st digit?

- A. 0
- B. 3
- C. 6
- D. 7

106. A car travels at 4,400 feet per minute. The radius of each tire on the car is 1 foot. How many revolutions does one of these tires make in 1 minute? (Use the approximation $\frac{22}{7}$ for π .)

- E. 700
- F. 1,925
- G. 13,828
- H. 15,400

107. $100(2 + 0.1)^2 - 100 =$

- A. 101
- B. 200
- C. 301
- D. 341

108. A sports store has a container of handballs: 4 blue, 5 red, 8 yellow, 9 white, and 11 green. If one ball is picked from the container at random, what is the probability that it will be yellow?

- E. $\frac{1}{37}$
- F. $\frac{1}{8}$
- G. $\frac{8}{37}$
- H. $\frac{8}{29}$

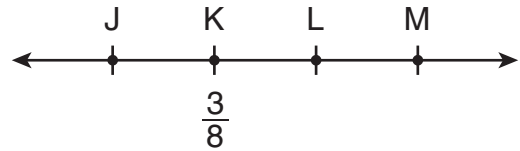
109. Each week, Leon has fixed expenses of \$1,250 at his furniture shop. It costs him \$150 to make a chair in his shop, and he sells each chair for \$275. What is Leon's **profit** if he makes and sells 25 chairs in 1 week?

A. \$1,875
B. \$2,500
C. \$3,125
D. \$4,375

110. Using the approximation
2.54 centimeters = 1 inch, how many centimeters are in 4 feet 7 inches?

E. 21.65 cm
F. 119.38 cm
G. 121.92 cm
H. 139.70 cm

111.



On the number line above, $JK = 3\frac{1}{2}$, $JM = 9\frac{3}{4}$, and $LM = 1\frac{1}{8}$. What is the position of point L?

A. $5\frac{1}{8}$
B. $5\frac{1}{4}$
C. $5\frac{1}{2}$
D. $6\frac{1}{4}$

112. If $4x - 3y = 12$, what is x in terms of y ?

E. $x = \frac{3}{4}y + 12$
F. $x = -\frac{3}{4}y + 12$
G. $x = \frac{3}{4}y + 3$
H. $x = -\frac{3}{4}y + 3$

113.

SERVINGS OF FRUITS AND VEGETABLES

Number of Servings of Fruits and Vegetables	Number of Students
0	5
1	7
2	3
3	4
4	0
5	1

There are 20 students in a class. The frequency table above shows the number of students in this class who ate 0, 1, 2, 3, 4, or 5 servings of fruits and vegetables yesterday. What is the mean number of servings of fruits and vegetables eaten yesterday per student in this class?

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

114. A paste is made by mixing the following ingredients by weight: 4 parts powder, 3 parts water, 2 parts resin, and 1 part hardener. One billboard requires 30 pounds of this paste. How many total pounds of resin are required for 4 billboards?

- E. 6 lb
- F. 8 lb
- G. 24 lb
- H. 48 lb

THIS IS THE END OF THE TEST.
IF TIME REMAINS, YOU MAY CHECK
YOUR ANSWERS. BE SURE THAT THERE
ARE NO STRAY MARKS, PARTIALLY
FILLED ANSWER CIRCLES, OR
INCOMPLETE ERASURES ON YOUR
ANSWER SHEET. ■