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M/S Version

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What's Inside

- Full-Length Practice ACT Test, including the Optional Writing Test
- Information about the Multiple-Choice and Writing Sections
- Test-Taking Strategies
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MATHEMATICS TEST

60 Minutes—60 Questions

DIRECTIONS: Solve each problem, choose the correct answer, and then fill in the corresponding oval on your answer document.

Do not linger over problems that take too much time. Solve as many as you can; then return to the others in the time you have left for this test.

You are permitted to use a calculator on this test. You may use your calculator for any problems you choose,

but some of the problems may best be done without using a calculator.

Note: Unless otherwise stated, all of the following should be assumed.

1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word *line* indicates a straight line.
4. The word *average* indicates arithmetic mean.

1. Marcus's favorite casserole recipe requires 3 eggs and makes 6 servings. Marcus will modify the recipe by using 5 eggs and increasing all other ingredients in the recipe proportionally. What is the total number of servings the modified recipe will make?

- A. 6
- B. 8
- C. 10
- D. 12
- E. 15

2. The 35-member History Club is meeting to choose a student government representative. The members decide that the representative, who will be chosen at random, CANNOT be any of the 3 officers of the club. What is the probability that Hiroko, who is a member of the club but NOT an officer, will be chosen?

- F. 0
- G. $\frac{4}{35}$
- H. $\frac{1}{35}$
- J. $\frac{1}{3}$
- K. $\frac{1}{32}$

3. For what value of x is the equation $2^{2x+7} = 2^{15}$ true?

- A. 2
- B. 4
- C. 11
- D. 16
- E. 44

4. Let the function f be defined as $f(x) = 5x^2 - 7(4x + 3)$. What is the value of $f(3)$?

- F. -18
- G. -26
- H. -33
- J. -60
- K. -75

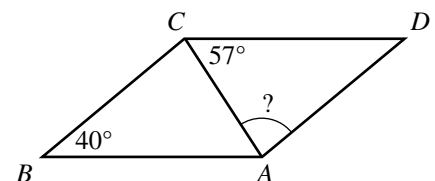
5. A wallet containing 5 five-dollar bills, 7 ten-dollar bills, and 8 twenty-dollar bills is found and returned to its owner. The wallet's owner will reward the finder with 1 bill drawn randomly from the wallet. What is the probability that the bill drawn will be a twenty-dollar bill?

- A. $\frac{1}{20}$
- B. $\frac{4}{51}$
- C. $\frac{1}{8}$
- D. $\frac{2}{5}$
- E. $\frac{2}{3}$

6. The ABC Book Club charges a \$40 monthly fee, plus \$2 per book read in that month. The Easy Book Club charges a \$35 monthly fee, plus \$3 per book read in that month. For each club, how many books must be read in 1 month for the total charges from each club to be equal?

- F. 1
- G. 4
- H. 5
- J. 6
- K. 75

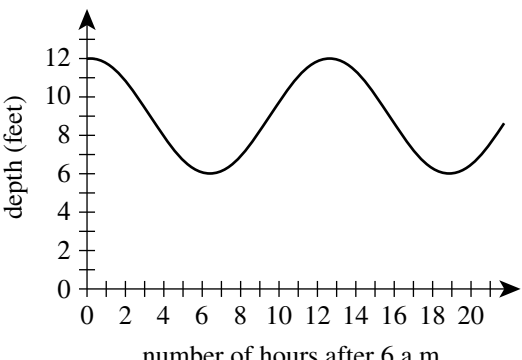
7. In parallelogram $ABCD$ below, \overline{AC} is a diagonal, the measure of $\angle ABC$ is 40° , and the measure of $\angle ACD$ is 57° . What is the measure of $\angle CAD$?



- A. 40°
- B. 57°
- C. 77°
- D. 83°
- E. 97°

GO ON TO THE NEXT PAGE.



8. When $x = \frac{1}{2}$, what is the value of $\frac{8x-3}{x}$?
- F. $\frac{1}{2}$
 G. 2
 H. $\frac{5}{2}$
 J. 5
 K. 10
9. In the standard (x,y) coordinate plane, what is the midpoint of the line segment that has endpoints $(3,8)$ and $(1,-4)$?
- A. $(-2,-12)$
 B. $(-1, -6)$
 C. $(\frac{11}{2}, -\frac{3}{2})$
 D. $(2, 2)$
 E. $(4,-12)$
10. The fluctuation of water depth at a pier is shown in the figure below. One of the following values gives the positive difference, in feet, between the greatest water depth and the least water depth shown in this graph. Which value is it?
- 
- F. 3
 G. 6
 H. 9
 J. 12
 K. 19
11. What is the slope of the line through $(-2,1)$ and $(2,-5)$ in the standard (x,y) coordinate plane?
- A. $\frac{3}{2}$
 B. 1
 C. -1
 D. $-\frac{3}{2}$
 E. -4
12. In Cherokee County, the fine for speeding is \$17 for each mile per hour the driver is traveling over the posted speed limit. In Cherokee County, Kirk was fined \$221 for speeding on a road with a posted speed limit of 30 mph. Kirk was fined for traveling at what speed, in miles per hour?
- F. 13
 G. 17
 H. 43
 J. 47
 K. 60
13. What is the sum of the solutions of the 2 equations below?
- $$\begin{aligned} 8x &= 12 \\ 2y + 10 &= 22 \end{aligned}$$
- A. $2\frac{2}{5}$
 B. $7\frac{1}{2}$
 C. 9
 D. 10
 E. $17\frac{1}{2}$
14. The average of 5 distinct scores has the same value as the median of the 5 scores. The sum of the 5 scores is 420. What is the sum of the 4 scores that are NOT the median?
- F. 315
 G. 320
 H. 336
 J. 350
 K. 360
15. What is the value of the expression below?
- $$| |-8 + 4| - |3 - 9| |$$
- A. -18
 B. -2
 C. 0
 D. 2
 E. 18
16. Which of the following expressions is equivalent to $x^{\frac{2}{3}}$?
- F. $\frac{x^2}{3}$
 G. $\frac{x(2)}{3}$
 H. $\sqrt{x^3}$
 J. $\sqrt[3]{x}$
 K. $\sqrt[3]{x^2}$



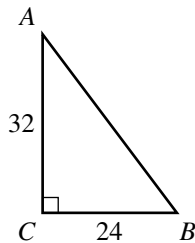
17. In the standard (x,y) coordinate plane, what is the slope of the line given by the equation $4x = 7y + 5$?

- A. $-\frac{4}{7}$
- B. $\frac{4}{7}$
- C. $\frac{7}{4}$
- D. 4
- E. 7

18. For which of the following conditions will the sum of integers m and n *always* be an odd integer?

- F. m is an odd integer.
- G. n is an odd integer.
- H. m and n are both odd integers.
- J. m and n are both even integers.
- K. m is an odd integer and n is an even integer.

19. The lengths of the 2 legs of right triangle $\triangle ABC$ shown below are given in inches. The midpoint of \overline{AB} is how many inches from A ?



- A. 16
- B. 20
- C. 21
- D. 28
- E. 40

20. In $\triangle DEF$, the length of \overline{DE} is $\sqrt{30}$ inches, and the length of \overline{EF} is 3 inches. If it can be determined, what is the length, in inches, of \overline{DF} ?

- F. 3
- G. $\sqrt{30}$
- H. $\sqrt{33}$
- J. $\sqrt{39}$
- K. Cannot be determined from the given information

21. Laura plans to paint the 8-foot-high rectangular walls of her room, and before she buys paint she needs to know the area of the wall surface to be painted. Two walls are 10 feet wide, and the other 2 walls are 15 feet wide. The combined area of the 1 window and the 1 door in her room is 60 square feet. What is the area, in square feet, of the wall surface Laura plans to paint?

- A. 200
- B. 340
- C. 360
- D. 390
- E. 400

22. The length of a rectangle is 5 inches longer than the width. The perimeter of the rectangle is 40 inches. What is the width of the rectangle, in inches?

- F. 7.5
- G. 8
- H. 15
- J. 16
- K. 17.5

23. 8% of 60 is $\frac{1}{5}$ of what number?

- A. 0.96
- B. 12
- C. 24
- D. 240
- E. 3,750

24. Armin is trying to decide whether to buy a season pass to his college basketball team's 20 home games this season. The cost of an individual ticket is \$14, and the cost of a season pass is \$175. The season pass will admit Armin to any home basketball game at no additional cost. What is the minimum number of home basketball games Armin must attend this season in order for the cost of a season pass to be less than the total cost of buying an individual ticket for each game he attends?

- F. 8
- G. 9
- H. 12
- J. 13
- K. 20

25. $\frac{4.8 \times 10^{-7}}{1.6 \times 10^{-11}} = ?$

- A. 3.0×10^4
- B. 3.0×10^{-4}
- C. 3.0×10^{-18}
- D. 3.2×10^{18}
- E. 3.2×10^4

26. A circle in the standard (x,y) coordinate plane has center $C(-1,2)$ and passes through $A(2,6)$. Line segment \overline{AB} is a diameter of this circle. What are the coordinates of point B ?

- F. $(-6,-2)$
- G. $(-5,-1)$
- H. $(-4,-2)$
- J. $(4, 2)$
- K. $(5,10)$

27. Which of the following expressions is a factor of $x^3 - 64$?

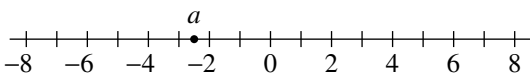
- A. $x - 4$
- B. $x + 4$
- C. $x + 64$
- D. $x^2 + 16$
- E. $x^2 - 4x + 16$



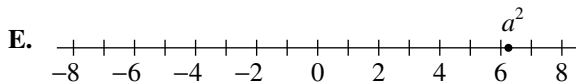
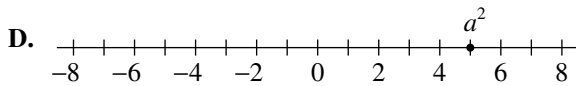
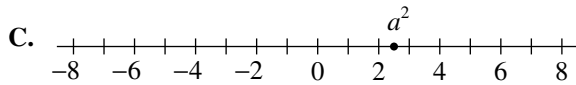
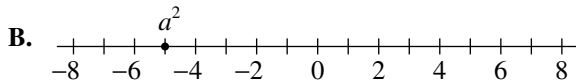
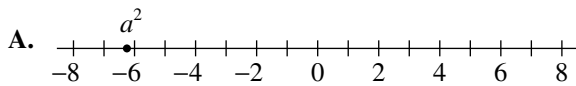
28. The average of a list of 4 numbers is 90.0. A new list of 4 numbers has the same first 3 numbers as the original list, but the fourth number in the original list is 80, and the fourth number in the new list is 96. What is the average of this new list of numbers?

F. 90.0
G. 91.5
H. 94.0
J. 94.5
K. 94.8

29. The number a is located at -2.5 on the number line below.



One of the following number lines shows the location of a^2 . Which number line is it?



30. Maria ordered a pizza. She ate only $\frac{2}{9}$ of it and gave the remaining pizza to her 3 brothers. What fraction of the whole pizza will each of Maria's brothers receive, if they share the remaining pizza equally?

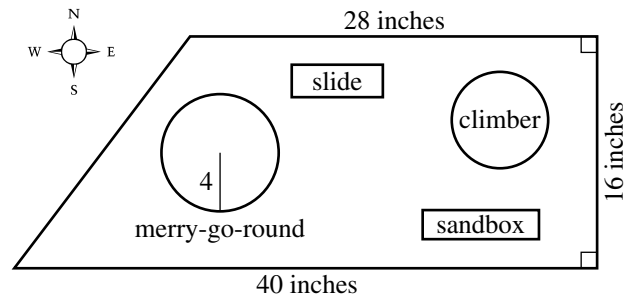
F. $\frac{7}{9}$
G. $\frac{3}{7}$
H. $\frac{1}{3}$
J. $\frac{7}{27}$
K. $\frac{2}{27}$

31. The number 1,001 is the product of the prime numbers 7, 11, and 13. Knowing this, what is the prime factorization of 30,030?

A. $3 \cdot 7 \cdot 10 \cdot 13$
B. $30 \cdot 7 \cdot 11 \cdot 13$
C. $2 \cdot 5 \cdot 7 \cdot 11 \cdot 13$
D. $3 \cdot 7 \cdot 10 \cdot 11 \cdot 13$
E. $2 \cdot 3 \cdot 5 \cdot 7 \cdot 11 \cdot 13$

Use the following information to answer questions 32–34.

Mikea, an intern with the Parks and Recreation Department, is developing a proposal for the new trapezoidal Springdale Park. The figure below shows her scale drawing of the proposed park with 3 side lengths and the radius of the merry-go-round given in inches. In Mikea's scale drawing, 1 inch represents 1.5 feet.



32. What is the area, in square inches, of the scale drawing of the park?

F. 448
G. 544
H. 640
J. 672
K. 1,088

33. Mikea's proposal includes installing a fence on the perimeter of the park. What is the perimeter, in feet, of the park?

A. 84
B. 88
C. 104
D. 126
E. 156

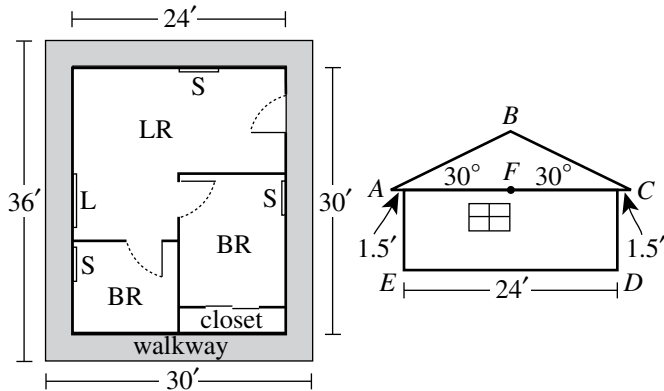
34. The length of the south side of the park is what percent of the length of the north side?

F. 112%
G. 124%
H. $142\frac{6}{7}\%$
J. 175%
K. 250%



Use the following information to answer questions 35–37.

The Smith family is planning to build a 3-room cabin which consists of 2 bedrooms (BR) and 1 living room (LR). Shown below are the rectangular floor plan (left figure) and a side view of the cabin (right figure). In the side view, the roof forms an isosceles triangle ($\triangle ABC$), the walls are perpendicular to the level floor (\overline{ED}), $\overline{AC} \parallel \overline{ED}$, F is the midpoint of \overline{AC} , and $\overline{BF} \perp \overline{AC}$.



During the week the Smiths plan to roof the cabin, there is a 20% chance of rain each day.

35. Mr. Smith plans to build a 3-foot-wide walkway around the outside of the cabin, as shown in the floor plan. What will be the area, in square feet, of the top surface of the walkway?
- A. 171
B. 324
C. 360
D. 396
E. 720
36. Mrs. Smith will install a ceiling fan in each room of the cabin and will place curtains over the 4 windows. Each of the ceiling fans has a price of \$52.00. The price of curtains for each small window (S) is \$39.50, and the price of curtains for the large window (L) is twice that for the small window. Based on this information, which of the following values is closest to the total price Mrs. Smith will pay for curtains and ceiling fans?
- F. \$262
G. \$302
H. \$341
J. \$354
K. \$393

37. Mr. and Mrs. Smith plan to roof the cabin on 2 consecutive days. Assuming that the chance of rain is independent of the day, what is the probability that it will rain both days?

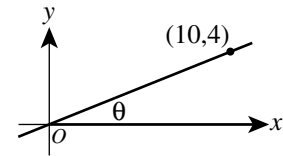
A. 0.04
B. 0.08
C. 0.16
D. 0.20
E. 0.40

38. Which of the following expressions, when evaluated, equals an irrational number?

F. $\frac{\sqrt{2}}{\sqrt{8}}$
G. $\frac{\sqrt{8}}{\sqrt{2}}$
H. $(\sqrt{8})^2$
J. $\sqrt{2} \times \sqrt{8}$
K. $\sqrt{2} + \sqrt{8}$

39. A line through the origin and (10,4) is shown in the standard (x,y) coordinate plane below. The acute angle between the line and the positive x -axis has measure θ . What is the value of $\tan \theta$?

A. $\frac{\sqrt{29}}{2}$
B. $\frac{2}{\sqrt{29}}$
C. $\frac{5}{\sqrt{29}}$
D. $\frac{2}{5}$
E. $\frac{5}{2}$



40. The equation $|2x - 8| + 3 = 5$ has 2 solutions. Those solutions are equal to the solutions to which of the following pairs of equations?

F. $2x - 5 = 5$
 $-2x - 5 = -5$
G. $2x - 8 = 2$
 $-2x - 8 = 2$
H. $2x - 8 = 8$
 $-(2x - 8) = 8$
J. $2x - 8 = 2$
 $-(2x - 8) = 8$
K. $2x - 8 = 2$
 $-(2x - 8) = 2$



41. The frequency chart below shows the cumulative number of Ms. Hernandez's science students whose test scores fell within certain score ranges. All test scores are whole numbers.

Score range	Cumulative number of students
65–70	12
65–80	13
65–90	19
65–100	21

How many students have a test score in the interval 71–80 ?

- A. 1
B. 6
C. 8
D. 12
E. 13
42. The number of decibels, d , produced by an audio source can be modeled by the equation $d = 10 \log\left(\frac{I}{K}\right)$, where I is the sound intensity of the audio source and K is a constant. How many decibels are produced by an audio source whose sound intensity is 1,000 times the value of K ?
- F. 4
G. 30
H. 40
J. 100
K. 10,000
43. Mario plays basketball on a town league team. The table below gives Mario's scoring statistics for last season. How many points did Mario score playing basketball last season?

Type of shot	Number attempted	Percent successful
1-point free throw	80	75%
2-point field goal	60	90%
3-point field goal	60	25%

- A. 129
B. 190
C. 213
D. 330
E. 380

44. The graph of $y = |x - 6|$ is in the standard (x, y) coordinate plane. Which of the following transformations, when applied to the graph of $y = |x|$, results in the graph of $y = |x - 6|$?

- F. Translation to the right 6 coordinate units
G. Translation to the left 6 coordinate units
H. Translation up 6 coordinate units
J. Translation down 6 coordinate units
K. Reflection across the line $x = 6$

45. Toby wants to find the volume of a solid toy soldier. He fills a rectangular container 8 cm long, 6 cm wide, and 10 cm high with water to a depth of 4 cm. Toby totally submerges the toy soldier in the water. The height of the water with the submerged toy soldier is 6.6 cm. Which of the following is closest to the volume, in cubic centimeters, of the toy soldier?

- A. 125
B. 156
C. 192
D. 208
E. 317

46. A box in the shape of a cube has an interior side length of 18 inches and is used to ship a right circular cylinder with a radius of 6 inches and a height of 12 inches. The interior of the box not occupied by the cylinder is filled with packing material. Which of the following numerical expressions gives the number of cubic inches of the box filled with packing material?

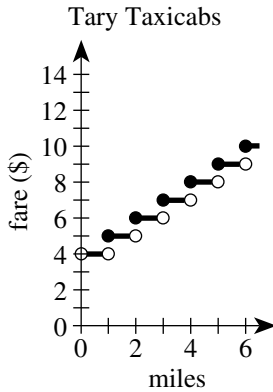
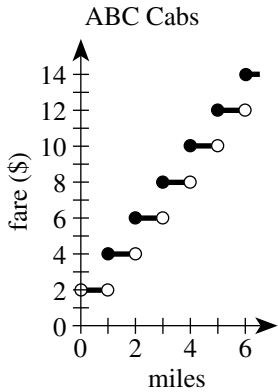
- F. $6(18)^2 - 2\pi(6)(12) - 2\pi(6)^2$
G. $6(18)^2 - 2\pi(6)(12)$
H. $18^3 - \pi(6)(12)^2$
J. $18^3 - \pi(6)^2(12)$
K. $18^3 - \pi(12)^3$

47. A room has a rectangular floor that is 15 feet by 21 feet. What is the area of the floor in square yards ?

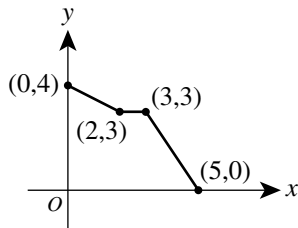
- A. 24
B. 35
C. 36
D. 105
E. 144



48. ABC Cabs and Tary Taxicabs both have an initial fare of a whole number of dollars for 1 passenger. The fare increases a whole number of dollars at each whole number of miles traveled. The graphs below show the 1-passenger fares, in dollars, for both cab companies for trips up to 6 miles. When the fares of the 2 cab companies are compared, what is the cheaper fare for a 5-mile trip?



- F. \$ 8
 G. \$ 9
 H. \$10
 J. \$11
 K. \$12
49. The graph of a function $y = f(x)$ consists of 3 line segments. The graph and the coordinates of the endpoints of the 3 line segments are shown in the standard (x,y) coordinate plane below. What is the area, in square coordinate units, of the region bounded by the graph of $y = f(x)$, the positive y -axis, and the positive x -axis?



- A. 10
 B. 13
 C. 14
 D. 15
 E. 20
50. The sum of 2 positive numbers is 151. The lesser number is 19 more than the square root of the greater number. What is the value of the greater number minus the lesser number?
- F. 19
 G. 66
 H. 85
 J. 91
 K. 121

51. The list of numbers 41, 35, 30, X , Y , 15 has a median of 25. The mode of the list of numbers is 15. To the nearest whole number, what is the mean of the list?
- A. 20
 B. 25
 C. 26
 D. 27
 E. 30

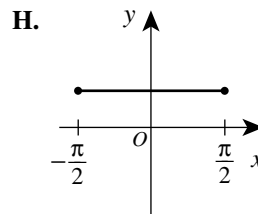
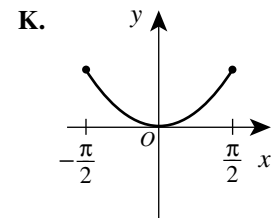
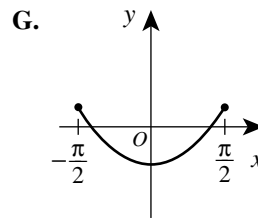
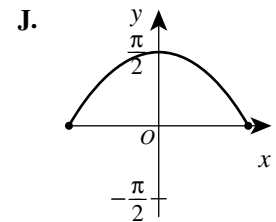
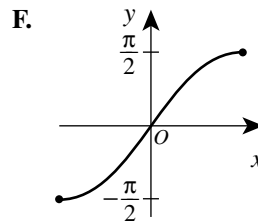
52. You are given the following system of equations:

$$y = x^2$$

$$rx + sy = t$$

where r, s , and t are integers. For which of the following will there be more than one (x,y) solution, with real-number coordinates, for the system?

- F. $r^2 + 4st > 0$
 G. $s^2 - 4rt > 0$
 H. $r^2 - 4st < 0$
 J. $s^2 - 4rt < 0$
 K. $s^2 + 4rt < 0$
53. The 3rd and 4th terms of an arithmetic sequence are 13 and 18, respectively. What is the 50th term of the sequence?
- A. 248
 B. 250
 C. 253
 D. 258
 E. 263
54. One of the following graphs in the standard (x,y) coordinate plane is the graph of $y = \sin^2 x + \cos^2 x$ over the domain $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$. Which one?





55. What is the period of the function $f(x) = \csc(4x)$?
- A. π
 B. 2π
 C. 4π
 D. $\frac{\pi}{4}$
 E. $\frac{\pi}{2}$
56. At the school carnival, Mike will play a game in which he will toss a penny, a nickel, and a dime at the same time. He will be awarded 3 points for each coin that lands with heads faceup. Let the random variable x represent the total number of points awarded on any toss of the coins. What is the expected value of x ?
- F. 1
 G. $\frac{3}{2}$
 H. $\frac{9}{2}$
 J. 6
 K. 9
57. For what positive real value of k , if any, is the determinant of the matrix $\begin{bmatrix} k & 4 \\ 3 & k \end{bmatrix}$ equal to k ?
 (Note: The determinant of matrix $\begin{bmatrix} a & b \\ c & d \end{bmatrix}$ equals $ad - bc$.)
- A. 3
 B. 4
 C. 12
 D. $\sqrt{12}$
 E. There is no such value of k .
58. Given a positive integer n such that $i^n = 1$, which of the following statements about n must be true?
 (Note: $i^2 = -1$)
- F. When n is divided by 4, the remainder is 0.
 G. When n is divided by 4, the remainder is 1.
 H. When n is divided by 4, the remainder is 2.
 J. When n is divided by 4, the remainder is 3.
 K. Cannot be determined from the given information
59. For $-\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$, $|\sin \theta| \geq 1$ is true for all and only the values of θ in which of the following sets?
- A. $\left\{-\frac{\pi}{2}, \frac{\pi}{2}\right\}$
 B. $\left\{\frac{\pi}{2}\right\}$
 C. $\left\{\theta \mid -\frac{\pi}{2} < \theta < \frac{\pi}{2}\right\}$
 D. $\left\{\theta \mid -\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}\right\}$
 E. The empty set
60. Ray \overrightarrow{PK} bisects $\angle LPM$, the measure of $\angle LPM$ is $11x^\circ$, and the measure of $\angle LPK$ is $(4x + 18)^\circ$. What is the measure of $\angle KPM$?
- F. 12°
 G. $28\frac{2}{7}^\circ$
 H. 42°
 J. $61\frac{1}{5}^\circ$
 K. 66°

END OF TEST 2

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

DO NOT RETURN TO THE PREVIOUS TEST.



SCIENCE TEST

35 Minutes—40 Questions

DIRECTIONS: There are several passages in this test. Each passage is followed by several questions. After reading a passage, choose the best answer to each question and fill in the corresponding oval on your answer document. You may refer to the passages as often as necessary.

You are NOT permitted to use a calculator on this test.

Passage I

A study was conducted to examine whether female *Blattella germanica* (a species of cockroach) prefer to eat cat food, cheese, ham, or peanuts. First, 200 mg of each of the 4 foods was separately placed into a single box. Then, adult female *B. germanica* were added to the box. Figure 1 shows how the mass, in mg, of each food in the box changed over time after the addition of the *B. germanica*. Table 1 shows the percent by mass of carbohydrates, lipids, proteins, and water, respectively, present in each of the 4 foods tested in the study.

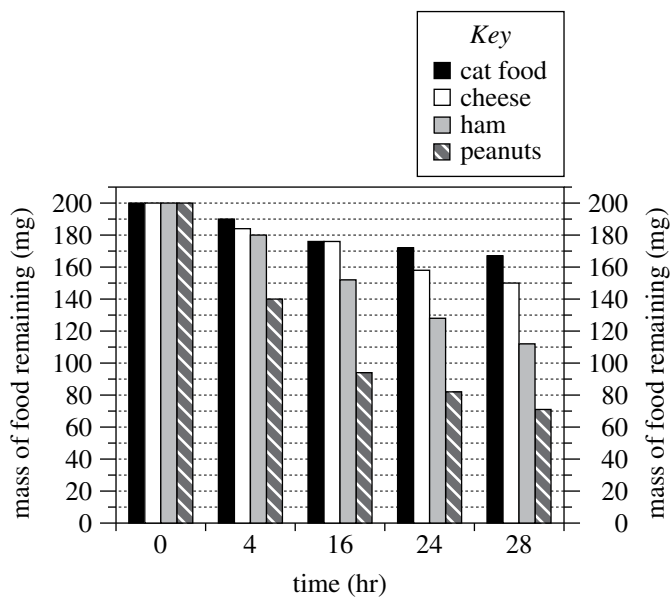


Figure 1

Figure adapted from Prachumporn Lauprasert et al., "Food Preference and Feeding Behavior of the German Cockroach, *Blattella germanica* (Linnaeus)." ©2006 by the Faculty of Science, Chulalongkorn University.

Food	Percent by mass			
	carbohydrates	lipids	proteins	water
Cat food	1.2	6.0	16.9	66.2
Cheese	0.5	27.7	20.8	48.4
Ham	0.0	18.2	23.6	57.1
Peanuts	15.8	49.6	26.2	6.4

Table adapted from U.S. Department of Agriculture, *USDA National Nutrient Database for Standard Reference, Release 24*. 2011.

- According to Figure 1, the mass of cheese remaining at 4 hr was closest to which of the following values?
 - 140 mg
 - 176 mg
 - 185 mg
 - 190 mg
- Suppose a company wants to use food as bait in a trap designed to capture female *B. germanica*. Based on Figure 1, which of the 4 foods should the company place in the trap to maximize the chance of capturing female *B. germanica*?
 - Cat food
 - Cheese
 - Ham
 - Peanuts

4**4**

3. Consider the 4 foods in order of the percent by mass of proteins, from lowest to highest. From food to food, as the percent by mass of proteins increased, the mass of food remaining at 28 hr:
- A. increased only.
 - B. decreased only.
 - C. increased and then decreased.
 - D. decreased and then increased.
4. Consider the statement “The *B. germanica* ate the food between 0 hr and 4 hr, between 4 hr and 16 hr, between 16 hr and 24 hr, and between 24 hr and 28 hr.” This statement is consistent with the data in Figure 1 for how many of the 4 foods?
- F. 1
 - G. 2
 - H. 3
 - J. 4
5. A student predicted that the *B. germanica* would eat less cat food than ham by the end of the study. Do the data in Figure 1 support this prediction?
- A. Yes; at 28 hr, the mass of cat food remaining was about 55 mg greater than the mass of ham remaining.
 - B. Yes; at 28 hr, the mass of cat food remaining was about 95 mg greater than the mass of ham remaining.
 - C. No; at 28 hr, the mass of cat food remaining was about 55 mg less than the mass of ham remaining.
 - D. No; at 28 hr, the mass of cat food remaining was about 95 mg less than the mass of ham remaining.
6. Based on Table 1, when 200 mg of each of the 4 foods was placed in the box, water accounted for more than 100 mg of the mass of which food(s)?
- F. Peanuts only
 - G. Cat food and ham only
 - H. Cheese and peanuts only
 - J. Cat food, cheese, and ham only

**Passage II**

A teacher provided the table below to the students in a science class. The table gives 5 properties for each of Samples A–H. The students were told to assume that each sample is a completely solid cube composed of a single hypothetical pure substance.

Sample	Mass (g)	Volume (cm ³)	Density (g/cm ³)	Melting point (°C)	Boiling point (°C)
A	8.0	4.0	2.0	126	747
B	8.0	4.0	2.0	342	959
C	6.0	3.0	2.0	237	885
D	6.0	3.0	2.0	237	885
E	8.0	2.0	4.0	126	747
F	8.0	2.0	4.0	126	747
G	4.0	1.0	4.0	126	747
H	4.0	1.0	4.0	342	959

Note: Assume that mass, volume, and density were determined at 20°C and that all 5 properties were determined at 1 atmosphere (atm) of pressure.

The teacher asked each of 4 students to explain how these data could be used to predict which samples are composed of the same substance.

Student 1

If 2 samples have the same values for all 5 properties, they are composed of the same substance. If 2 samples have different values for any of the 5 properties, they are composed of different substances.

Student 2

If 2 samples have the same values for any 3 or more of the 5 properties, they are composed of the same substance. If 2 samples have the same values for fewer than 3 of the 5 properties, they are composed of different substances.

Student 3

If 2 samples have the same mass, volume, and density, they are composed of the same substance. If 2 samples have different values for any of these 3 properties, they are composed of different substances. Neither melting point nor boiling point, by itself, can distinguish between substances.

Student 4

If 2 samples have the same density, melting point, and boiling point, they are composed of the same substance. If 2 samples have different values for any of these 3 properties, they are composed of different substances. Neither mass nor volume, by itself, can distinguish between substances.

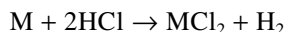
7. Based on Student 1's explanation, the same substance composes both of the samples in which of the following pairs?
- A. Samples A and B
 - B. Samples B and C
 - C. Samples C and D
 - D. Samples D and E



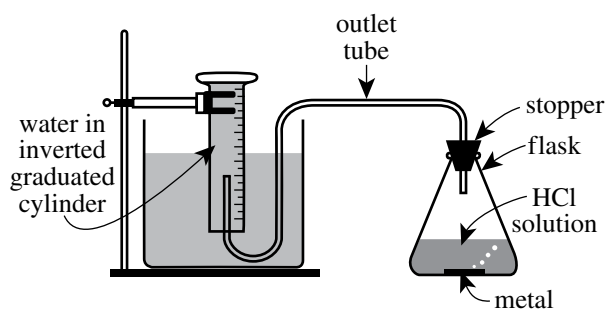
8. Based on Student 3's explanation, the same substance composes both of the samples in which of the following pairs?
- F. Samples A and C
 - G. Samples B and E
 - H. Samples F and G
 - J. Samples G and H
9. Suppose that the temperature of Sample A is increased to 250°C at 1 atm of pressure. At 250°C , would Sample A be a solid or a liquid?
- A. Solid, because the melting point of Sample A is 126°C .
 - B. Solid, because the melting point of Sample A is 747°C .
 - C. Liquid, because the melting point of Sample A is 126°C .
 - D. Liquid, because the melting point of Sample A is 747°C .
10. Consider the claim that 2 samples having the same density will always be composed of the same substance, regardless of the values of the other 4 properties. Which of the students, if any, would be likely to agree with this claim?
- F. Students 1 and 2 only
 - G. Students 2, 3, and 4 only
 - H. All of the students
 - J. None of the students
11. Which of Students 2, 3, and 4 would be likely to agree that Sample A and Sample B are composed of the same substance?
- A. Students 2 and 3 only
 - B. Students 2 and 4 only
 - C. Students 3 and 4 only
 - D. Students 2, 3, and 4
12. Consider the statement "Two samples that have the same mass, volume, density, and boiling point are composed of the same substance, even if the two samples have different melting points." Which of Students 2 and 4, if either, would be likely to agree with this statement?
- F. Student 2 only
 - G. Student 4 only
 - H. Both Student 2 and Student 4
 - J. Neither Student 2 nor Student 4
13. Suppose that the temperature of Sample D is increased to 890°C at 1 atm of pressure. Will the sample's density be lower than or higher than it was at 20°C and 1 atm?
- A. Lower; Sample D will be a gas, and gases generally have lower densities than do solids.
 - B. Lower; Sample D will be a liquid, and liquids generally have lower densities than do solids.
 - C. Higher; Sample D will be a gas, and gases generally have higher densities than do solids.
 - D. Higher; Sample D will be a liquid, and liquids generally have higher densities than do solids.

**Passage III**

When a solid metal (M) such as iron (Fe), nickel (Ni), or zinc (Zn) is placed in an aqueous hydrochloric acid (HCl) solution, a reaction that produces H_2 gas occurs:



Two experiments were conducted to study the production of H_2 in this reaction. The apparatus shown in the diagram below was used to collect the H_2 gas produced in each trial.



diagram

As H_2 was produced in the stoppered flask, it exited the flask through the outlet tube and displaced the water that had been trapped in the inverted graduated cylinder. (This displacement occurred because the H_2 did not dissolve in the water.) The volume of water displaced equaled the volume of gas (H_2 and water vapor) collected.

In each trial of the experiments, Steps 1–3 were performed:

1. The apparatus was assembled, and 25 mL of a 4 moles/L HCl solution was poured into the empty flask.
2. A selected mass of Fe, Ni, or Zn was added to the flask, and the stopper was quickly reinserted into the flask.
3. When H_2 production ceased, the volume of water that was displaced from the graduated cylinder was recorded.

The apparatus and its contents were kept at a selected temperature throughout Steps 2 and 3. The atmospheric pressure was 758 mm Hg throughout all 3 steps.

Experiment 1

In each trial, a selected mass of Fe, Ni, or Zn was tested at 30°C (see Figure 1).

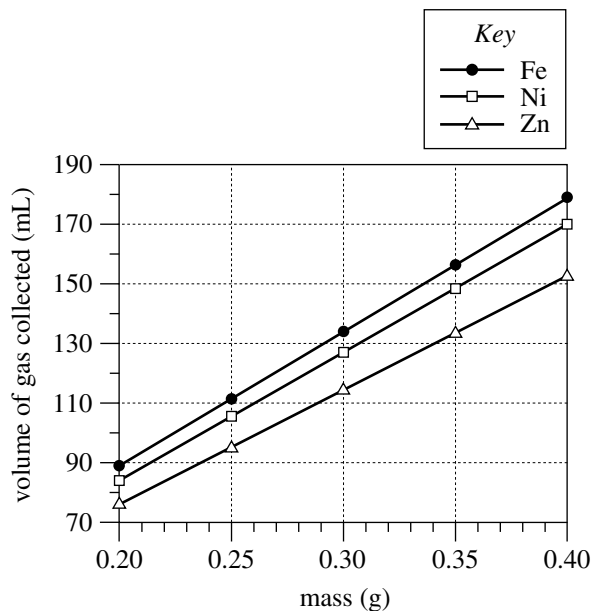


Figure 1

Experiment 2

In each trial, 0.30 g of Fe, Ni, or Zn was tested at a selected temperature (see Figure 2).

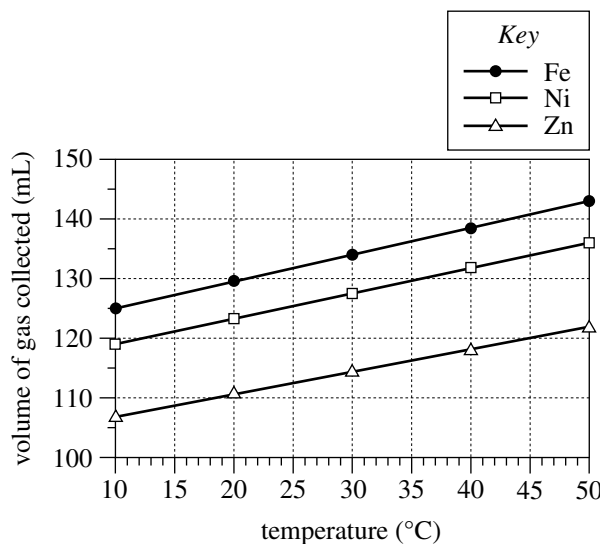


Figure 2



14. Consider the volume of gas collected in the trial in Experiment 2 for Ni at 30°C. The same approximate volume of gas was collected in the trial in Experiment 1 for what mass of Ni ?
- F. 0.20 g
G. 0.25 g
H. 0.30 g
J. 0.35 g
15. How many temperatures were tested in Experiment 1, and how many temperatures were tested in Experiment 2 ?
- | | Experiment 1 | Experiment 2 |
|----|--------------|--------------|
| A. | 1 | 1 |
| B. | 1 | 5 |
| C. | 5 | 1 |
| D. | 5 | 5 |
16. Which of the following statements describes a difference between Experiments 1 and 2 ? In Experiment 1:
- F. only Fe was tested, but in Experiment 2, Fe, Ni, and Zn were tested.
G. Fe, Ni, and Zn were tested, but in Experiment 2, only Fe was tested.
H. the same mass value of each metal was tested, but in Experiment 2, multiple mass values of each metal were tested.
J. multiple mass values of each metal were tested, but in Experiment 2, the same mass value of each metal was tested.
17. Which of the following variables remained constant throughout both experiments?
- A. Atmospheric pressure
B. Mass of metal
C. Temperature
D. Volume of gas collected
18. If a temperature of 5°C had been tested in Experiment 2, would the volume of gas collected for Zn more likely have been greater than 107 mL or less than 107 mL ?
- F. Greater than 107 mL, because for a given metal, the volume of collected gas increased as the temperature decreased.
G. Greater than 107 mL, because for a given metal, the volume of collected gas increased as the temperature increased.
H. Less than 107 mL, because for a given metal, the volume of collected gas decreased as the temperature decreased.
J. Less than 107 mL, because for a given metal, the volume of collected gas decreased as the temperature increased.
19. Consider the balanced chemical equation in the passage. Based on this equation, if 10 moles of HCl are consumed, how many moles of H₂ are produced?
- A. 5
B. 10
C. 15
D. 20
20. Suppose that the trial in Experiment 1 with 0.25 g of Zn is repeated, except that the inverted graduated cylinder is replaced by inverted test tubes, each completely filled with 60 mL of water. Based on Figure 1, how many test tubes will be needed to collect all the gas?
- F. 1
G. 2
H. 3
J. 4

**Passage IV**

Figure 1 is a diagram of an *RLC circuit*. The circuit has a power supply and 3 components: a resistor (R), an inductor (L), and a capacitor (C).

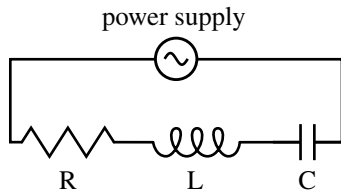


Figure 1

Electric current can flow through the circuit either clockwise (positive current) or counterclockwise (negative current). Figure 2 shows how the electric current in the circuit, I (in amperes, A), and the power supply voltage, V_S (in volts, V), both changed during a 20-millisecond (msec) time interval.

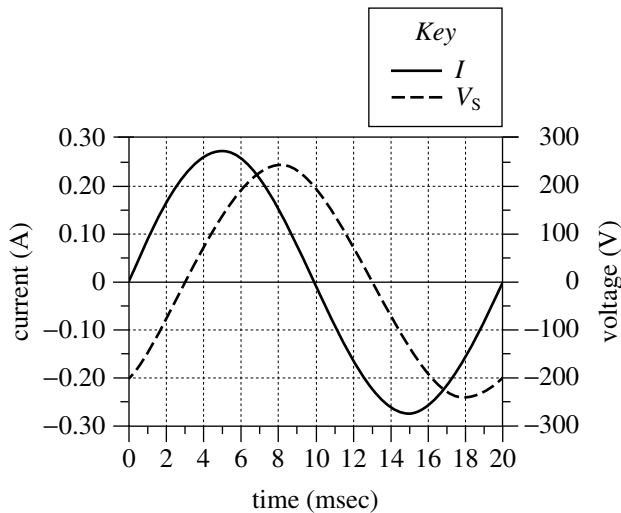


Figure 2

Figure 3 shows how the voltages across the components— V_R , V_L , and V_C , respectively—each changed during the same 20 msec time interval.

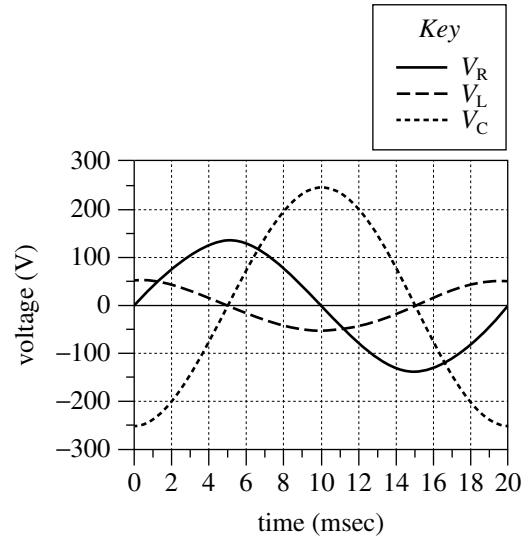


Figure 3

21. According to Figure 2, the maximum positive value of V_S was approximately:
- 125 V.
 - 200 V.
 - 250 V.
 - 275 V.
22. A *period* is the time required for a wave to complete one full cycle. Based on Figure 3, the period for V_L was:
- 5 msec.
 - 10 msec.
 - 20 msec.
 - 40 msec.



23. According to Figures 2 and 3, which voltage varied the *least* during the 20 msec interval?

- A. V_S
- B. V_R
- C. V_L
- D. V_C

24. *Polarity* refers to whether a voltage is positive or negative (a voltage of 0 V has no polarity and can be ignored). Based on Figures 2 and 3, which 2 voltages were always *opposite* in polarity?

- F. V_R and V_L
- G. V_R and V_S
- H. V_L and V_C
- J. V_L and V_S

25. Based on Figure 2, at which of the following times was the current in the circuit flowing counterclockwise?

- A. 0 msec
- B. 5 msec
- C. 10 msec
- D. 15 msec

26. The table below lists the electric charge (in microcoulombs, μC) stored on the capacitor at 3 different times during the 20 msec interval.

Time (msec)	Charge (μC)
7	0.51
10	0.87
13	0.51

Based on Figures 2 and 3, from time = 7 msec through time = 13 msec, did the charge on the capacitor more likely change in sync with I or with V_C ?

- F. I ; over that time interval, both the charge and I decreased and then increased.
- G. I ; over that time interval, both the charge and I increased and then decreased.
- H. V_C ; over that time interval, both the charge and V_C decreased and then increased.
- J. V_C ; over that time interval, both the charge and V_C increased and then decreased.

**Passage V**

Strains of bacteria carrying a genetic mutation that prevents them from synthesizing the amino acid *histidine* are called *His⁻*. These strains of bacteria must absorb histidine from their environment in order to sustain their growth. Exposing *His⁻* strains of bacteria to *mutagens* (substances that induce DNA mutations) can cause new mutations that restore the ability of some bacteria to synthesize histidine. Any bacterium that regains the ability to synthesize histidine becomes *His⁺* and is known as a *His⁺ revertant*.

The number of *His⁺* revertants in a population of bacteria can indicate the potential of a substance to be mutagenic in humans. Scientists tested 4 substances, each suspected to be a mutagen, on a *His⁻* strain of the bacteria *Salmonella typhimurium*.

Study

A sterile petri dish (Dish 1) containing a nutrient agar lacking histidine was prepared. Then, 1×10^8 cells of *His⁻ S. typhimurium* were added to Dish 1 and evenly spread over the surface of the nutrient agar. These procedures were repeated for 4 more nutrient agar dishes (Dishes 2–5), except that the bacteria were mixed with 1 of the 4 suspected mutagens before being spread over the surface of the nutrient agar. Table 1 lists, for each of Dishes 2–5, the substance that was mixed with the bacteria before they were added to the dish.

Dish	Substance
2	L
3	M
4	N
5	P

The 5 dishes were incubated at 37°C for 2 days. At the end of the incubation period, the number of colonies growing on the nutrient agar in each dish was determined (see Table 2).

Dish	Number of colonies
1	2
2	14
3	25
4	107
5	6

27. Based on the results of the study, which of the suspected mutagens resulted in the greatest number of *His⁺* revertants in a dish?
- A. Substance L
 B. Substance M
 C. Substance N
 D. Substance P
28. Which dish in the study was intended to serve the purpose of testing whether some of the *S. typhimurium* cells became *His⁺* revertants without the addition of a mutagen?
- F. Dish 1
 G. Dish 2
 H. Dish 3
 J. Dish 4



29. Based on the results of the study, what is the order of the suspected mutagens, from the substance with the *least* potential to be mutagenic to the substance with the *most* potential to be mutagenic?
- P, M, N, L
 - P, L, M, N
 - N, L, P, M
 - N, M, L, P

30. In the study, the scientists tested the effect of Substance P at a concentration of 5×10^{-9} g/mL. After the study, the scientists repeated their test of the effect of Substance P, but at 3 other concentrations. The 3 concentrations and their corresponding results are shown in the table below.

Concentration of Substance P	Number of colonies
10×10^{-9} g/mL	14
50×10^{-9} g/mL	54
100×10^{-9} g/mL	114

What is the relationship, if any, between the concentration of Substance P and its potential to cause mutations?

- As the concentration of Substance P increases, its potential to cause mutations increases only.
- As the concentration of Substance P increases, its potential to cause mutations decreases only.
- As the concentration of Substance P increases, its potential to cause mutations first decreases and then increases.
- There is no relationship between the concentration of Substance P and its potential to cause mutations.

31. Before bacteria were added to it, the dish that was intended to serve as the control dish in the study lacked which of the substances listed below?

- Histidine
- Nutrient agar
- Suspected mutagen

- II only
- III only
- I and II only
- I and III only

32. Which of the following statements about the numbers of bacteria that regained the ability to synthesize histidine is consistent with the results of the study for Dishes 2 and 3? The number of bacteria that became His⁺ revertants after exposure to:

- Substance M was about 2 times the number of bacteria that became His⁺ revertants after exposure to Substance L.
- Substance L was about 2 times the number of bacteria that became His⁺ revertants after exposure to Substance M.
- Substance M was about 4 times the number of bacteria that became His⁺ revertants after exposure to Substance L.
- Substance L was about 4 times the number of bacteria that became His⁺ revertants after exposure to Substance M.

33. The particular strain of *S. typhimurium* chosen for the study lacks normal DNA repair mechanisms. Which of the following statements gives the most likely reason this particular strain was chosen? The scientists:

- did not want the bacteria in the study to synthesize any DNA.
- did not want the bacteria in the study to synthesize any proteins.
- wanted the bacteria in the study to be able to repair the mutations caused by the substances.
- wanted the bacteria in the study to be unable to repair the mutations caused by the substances.

**Passage VI**

Three studies examined how the volume of runoff from melting ice is affected by wind speed and by the presence of sand beneath the ice.

In a lab kept at 18°C, runoff was collected from a plastic box containing melting ice. The box was tilted at 10° and had horizontal openings in its lower end. After flowing through the openings, the runoff fell into a trough (see diagram) and was conveyed to a measuring device.

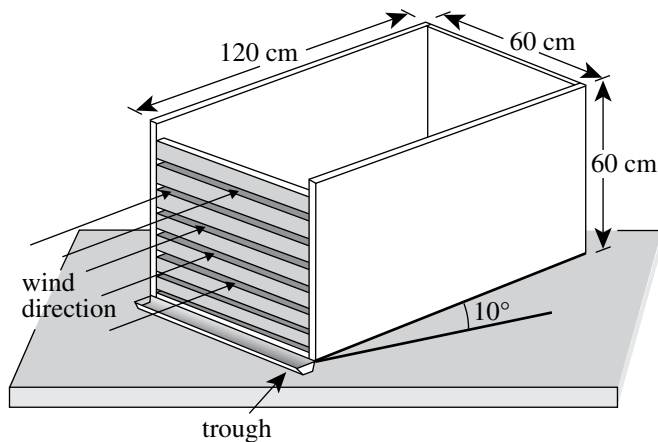


diagram of box

Study 1

In each of the first 3 of 4 trials, the following steps were carried out:

1. A 30 cm deep layer of a particular clean, dry sand was placed in the box.
2. A 30 cm deep layer of *chipped ice* (density 0.4 g/cm³) was placed in the box on top of the layer of sand.
3. A fan was turned on to blow air at a constant speed onto the trough end of the box.
4. For the next 600 min, the volume of runoff collected over each 20 min period was measured.

The wind speed was 2.5 m/sec, 1.0 m/sec, and 0.5 m/sec in the first, second, and third trials, respectively.

In the fourth trial, all steps except Step 3 were carried out. (The fan was not turned on.)

The results of the 4 trials are shown in Figure 1.

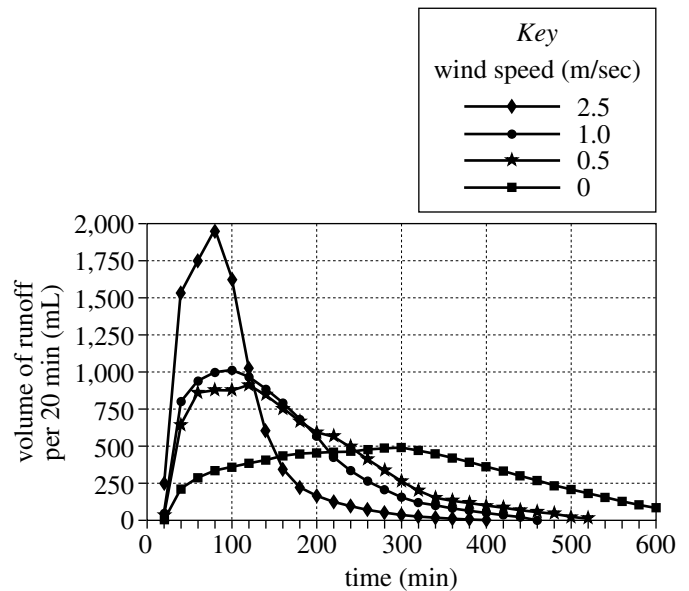


Figure 1

Study 2

The second trial of Study 1 was repeated. Then the second trial of Study 1 was again repeated, except that Step 1 was omitted. (No sand layer was placed in the box.) The results of the 2 trials are shown in Figure 2.

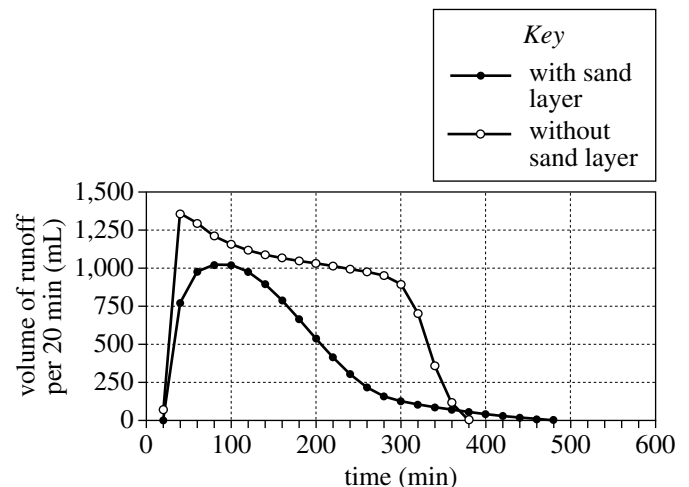
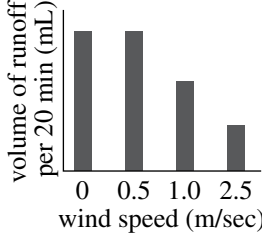
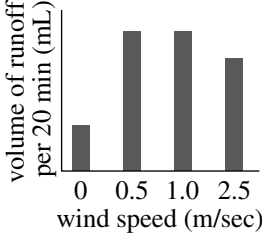
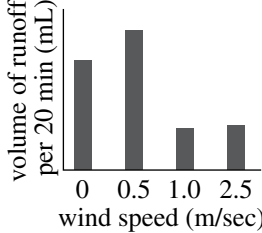
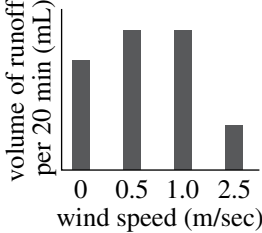


Figure 2

Figures adapted from Masahiko Hasebe and Takanori Kumekawa, "The Effect of Wind Speed on the Snowmelt Runoff Process: Laboratory Experiment." ©1994 by International Association of Hydrological Sciences Publishing.



34. The researchers conducting the studies chose to use a box made of a type of plastic rather than of wood to ensure that all of the water from the melting ice would flow from the box and into the trough. The researchers most likely made that choice because that type of plastic, unlike wood, is:
- porous and permeable, and therefore incapable of absorbing water.
 - nonporous and impermeable, and therefore incapable of absorbing water.
 - porous and permeable, and therefore capable of absorbing water.
 - nonporous and impermeable, and therefore capable of absorbing water.
35. Suppose Study 2 had been repeated, except in a lab kept at -1°C . The total volume of runoff measured over the 600 min in the repeated study would most likely have been:
- near or at zero, because -1°C is below the freezing point of water.
 - near or at zero, because -1°C is above the freezing point of water.
 - greater than that in the original study, because -1°C is below the freezing point of water.
 - greater than that in the original study, because -1°C is above the freezing point of water.
36. According to the results of Study 1, for which of the wind speeds did the runoff volume per 20 min decrease to zero from its maximum value *before* 500 min?
- 0 m/sec only
 - 2.5 m/sec only
 - 0.5 m/sec and 1.0 m/sec only
 - 1.0 m/sec and 2.5 m/sec only
37. Compare the results of the 2 trials in Study 2. In which trial did the volume of runoff per 20 min reach a greater maximum value, and in which trial did the volume of runoff per 20 min decrease to zero from the maximum value in the shorter amount of time?
- | <u>greater maximum</u> | <u>shorter time to zero</u> |
|------------------------|-----------------------------|
| A. with sand layer | with sand layer |
| B. with sand layer | without sand layer |
| C. without sand layer | with sand layer |
| D. without sand layer | without sand layer |
38. The volume of runoff measured at 200 min in Study 1 for the 4 wind speeds is best represented by which of the following graphs?
- F. 
- H. 
- G. 
- J. 
39. Which factor was varied in Study 1 but kept the same in Study 2?
- Depth of sand layer
 - Wind speed
 - Tilt of box
 - Type of material that melted
40. Based on the diagram and the description of Study 1, which of the following expressions would most likely be used to calculate the *volume* of the sand layer in the plastic box (before chipped ice was placed on top)?
- $30\text{ cm} \times 60\text{ cm} \times 60\text{ cm}$
 - $30\text{ cm} \times 60\text{ cm} \times 120\text{ cm}$
 - $60\text{ cm} \times 60\text{ cm} \times 60\text{ cm}$
 - $60\text{ cm} \times 60\text{ cm} \times 120\text{ cm}$

END OF TEST 4

STOP! DO NOT RETURN TO ANY OTHER TEST.

Scoring Keys for the ACT Practice Tests

Use the scoring key for each test to score your answer document for the multiple-choice tests. Mark a “1” in the blank for each question you answered correctly. Add up the numbers in each reporting category and enter the total number correct for each reporting category in the blanks provided. Also enter the total number correct for each test in the blanks provided. The total number correct for each test is the sum of the number correct in each reporting category.

Test 1: English—Scoring Key

1874FPRE

Key	Reporting Category*		
	POW	KLA	CSE
1. A	—		
2. G			—
3. A		—	
4. F			—
5. C			—
6. F			—
7. D		—	
8. G	—		
9. C			—
10. J		—	
11. C			—
12. F		—	
13. B	—		
14. J			—
15. B			—
16. G			—
17. C			—
18. F			—
19. C	—		
20. G			—
21. D	—		
22. G		—	
23. C			—
24. H	—		
25. B			—
26. F			—
27. C			—
28. F			—
29. D		—	
30. G	—		
31. C		—	
32. J			—
33. C	—		
34. G			—
35. A	—		
36. J			—
37. C	—		
38. F			—

Key	Reporting Category*		
	POW	KLA	CSE
39. D	—		
40. H	—		
41. B			—
42. F			—
43. C	—		
44. G			—
45. A		—	
46. F			—
47. B			—
48. G			—
49. D	—		
50. F			—
51. B			—
52. F		—	
53. D			—
54. H			—
55. D	—		
56. H			—
57. A			—
58. G	—		
59. C	—		
60. J	—		
61. C			—
62. G			—
63. D		—	
64. J			—
65. B	—		
66. F			—
67. B			—
68. F	—		
69. D			—
70. F			—
71. C		—	
72. H	—		
73. D		—	
74. F	—		
75. D	—		

*Reporting Categories

POW = Production of Writing

KLA = Knowledge of Language

CSE = Conventions of Standard English

Number Correct (Raw Score) for:	
Production of Writing (POW)	_____ (23)
Knowledge of Language (KLA)	_____ (12)
Conventions of Standard English (CSE)	_____ (40)
Total Number Correct for English Test (POW + KLA + CSE)	_____ (75)

Key		Reporting Category*						
		PHM					IES	MDL
		N	A	F	G	S		
1.	C						—	
2.	K							—
3.	B		—					
4.	J			—				
5.	D						—	—
6.	H		—					—
7.	D							—
8.	G				—		—	
9.	D				—		—	
10.	G						—	—
11.	D			—				
12.	H	—						—
13.	B						—	
14.	H							—
15.	D						—	
16.	K	—						
17.	B		—					
18.	K						—	—
19.	B				—			
20.	K				—			—
21.	B				—			—
22.	F						—	—
23.	C						—	—
24.	J						—	—
25.	A		—					
26.	H				—			—
27.	A		—					
28.	H						—	—
29.	E						—	—
30.	J						—	—

Key		Reporting Category*						
		PHM					IES	MDL
		N	A	F	G	S		
31.	E						—	
32.	G						—	—
33.	E						—	
34.	H						—	—
35.	C						—	—
36.	J						—	
37.	A						—	
38.	K	—						
39.	D				—			
40.	K		—					
41.	A						—	—
42.	G			—				
43.	C						—	—
44.	F			—				—
45.	A						—	—
46.	J				—			—
47.	B						—	
48.	G						—	—
49.	B				—			
50.	J		—					—
51.	C						—	
52.	F		—					
53.	A			—				—
54.	H			—				—
55.	E			—				—
56.	H						—	—
57.	B	—						
58.	F	—						
59.	A			—				
60.	K						—	—

Combine the totals of these columns and put in the blank for PHM in the box below.

***Reporting Categories**

PHM = Preparing for Higher Math

N = Number & Quantity

A = Algebra

F = Functions

G = Geometry

S = Statistics & Probability

IES = Integrating Essential Skills

MDL = Modeling

Number Correct (Raw Score) for:	
Preparing for Higher Math (PHM) (N + A + F + G + S)	_____ (35)
Integrating Essential Skills (IES)	_____ (25)
Total Number Correct for Mathematics Test (PHM + IES)	_____ (60)
Modeling (MDL) (Not included in total number correct for mathematics test raw score)	_____ (28)

Test 3: Reading—Scoring Key

1874FPRE

Key	Reporting Category*		
	KID	CS	IKI
1. A		___	
2. G	___		
3. A		___	
4. J	___		
5. C	___		
6. G	___		
7. D	___		
8. H		___	
9. C	___		
10. F	___		
11. D		___	
12. G			___
13. D	___		
14. J	___		
15. A		___	
16. G		___	
17. B	___		
18. H			___
19. A			___
20. H			___

Key	Reporting Category*		
	KID	CS	IKI
21. C	___		
22. G		___	
23. D		___	
24. H	___		
25. D	___		
26. F		___	
27. C	___		
28. J	___		
29. A	___		
30. F		___	
31. D	___		
32. H	___		
33. B	___		
34. J	___		
35. C	___		
36. G	___		
37. A		___	
38. G	___		
39. A	___		
40. J	___		

***Reporting Categories**

KID = Key Ideas & Details

CS = Craft & Structure

IKI = Integration of Knowledge & Ideas

Number Correct (Raw Score) for:	
Key Ideas & Details (KID)	___ (25)
Craft & Structure (CS)	___ (11)
Integration of Knowledge & Ideas (IKI)	___ (4)
Total Number Correct for Reading Test (KID + CS + IKI)	___ (40)

Test 4: Science—Scoring Key

1874FPRE

Key	Reporting Category*		
	IOD	SIN	EMI
1. C	___		
2. J			___
3. B	___		
4. J			___
5. A			___
6. G	___		
7. C			___
8. J			___
9. C		___	
10. J			___
11. A			___
12. F			___
13. A	___		
14. H	___		
15. B		___	
16. J		___	
17. A		___	
18. H		___	
19. A	___		
20. G		___	

Key	Reporting Category*		
	IOD	SIN	EMI
21. C	___		
22. H	___		
23. C	___		
24. H	___		
25. D	___		
26. J	___		
27. C	___		
28. F		___	
29. B	___		
30. F			___
31. D		___	
32. F			___
33. D		___	
34. G		___	
35. A		___	
36. J	___		
37. D	___		
38. J	___		
39. B		___	
40. G	___		

***Reporting Categories**

IOD = Interpretation of Data

SIN = Scientific Investigation

EMI = Evaluation of Models,
Inferences & Experimental Results

Number Correct (Raw Score) for:	
Interpretation of Data (IOD)	___ (18)
Scientific Investigation (SIN)	___ (12)
Evaluation of Models, Inferences & Experimental Results (EMI)	___ (10)
Total Number Correct for Science Test (IOD + SIN + EMI)	___ (40)

TABLE 1**Explanation of Procedures Used to Obtain Scale Scores from Raw Scores**

On each of the four multiple-choice tests on which you marked any responses, the total number of correct responses yields a raw score. Use the table below to convert your raw scores to scale scores. For each test, locate and circle your raw score or the range of raw scores that includes it in the table below. Then, read across to either outside column of the table and circle the scale score that corresponds to that raw score. As you determine your scale scores, enter them in the blanks provided on the right. The highest possible scale score for each test is 36. The lowest possible scale score for any test on which you marked any responses is 1.

Next, compute the Composite score by averaging the four scale scores. To do this, add your four scale scores and divide the sum by 4. If the resulting number ends in a fraction, round it to the nearest whole number. (Round down any fraction less than one-half; round up any fraction that is one-half or more.) Enter this number in the blank. This is your Composite score. The highest possible Composite score is 36. The lowest possible Composite score is 1.

ACT Test 1874FPRE	Your Scale Score
English	_____
Mathematics	_____
Reading	_____
Science	_____
<hr/>	
Sum of scores	_____
Composite score (sum ÷ 4)	_____

NOTE: If you left a test completely blank and marked no items, do not list a scale score for that test. If any test was completely blank, do not calculate a Composite score.

To calculate your writing score, use the rubric on pages 61–62.

Scale Score	Raw Scores				Scale Score
	Test 1 English	Test 2 Mathematics	Test 3 Reading	Test 4 Science	
36	74-75	59-60	40	40	36
35	71-73	57-58	38-39	—	35
34	70	55-56	37	39	34
33	69	54	36	38	33
32	68	53	34-35	—	32
31	67	51-52	33	37	31
30	66	49-50	32	36	30
29	64-65	47-48	31	—	29
28	63	45-46	30	35	28
27	61-62	42-44	—	34	27
26	59-60	39-41	29	32-33	26
25	56-58	37-38	28	31	25
24	53-55	34-36	26-27	29-30	24
23	50-52	32-33	25	26-28	23
22	47-49	31	23-24	24-25	22
21	44-46	29-30	22	22-23	21
20	41-43	27-28	20-21	20-21	20
19	39-40	25-26	19	18-19	19
18	37-38	22-24	18	17	18
17	35-36	19-21	16-17	15-16	17
16	32-34	16-18	15	14	16
15	29-31	13-15	14	13	15
14	26-28	10-12	12-13	11-12	14
13	24-25	8-9	11	10	13
12	22-23	7	10	9	12
11	19-21	5-6	8-9	8	11
10	16-18	4	7	7	10
9	13-15	—	6	6	9
8	11-12	3	5	5	8
7	9-10	—	—	4	7
6	7-8	2	4	3	6
5	6	—	3	—	5
4	4-5	1	2	2	4
3	3	—	—	1	3
2	2	—	1	—	2
1	0-1	0	0	0	1

