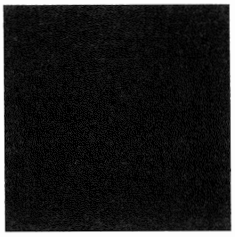
Form D05

(April 2021)

Math/Science
Version



The ACT® 2020 2021

In response to your request for Test Information Release materials, this booklet contains the test questions, scoring keys, and conversion tables used in determining your ACT scores. Enclosed with this booklet is a report that lists each of your answers, shows whether your answer was correct, and, if your answer was not correct, gives the correct answer.

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.

DO YOUR FIGURING HERE.

1. The 1st term in the geometric sequence below is −13. If it can be determined, what is the 6th term?

$$-13, 26, -52, 104, -208, \cdots$$

A. −416
B. −312
C. 312
D. 416
E. Cannot be determined from the given information

2. In the standard (x,y) coordinate plane, point A has coordinates $(-7,-5)$. Point A is translated 7 units to the left and 5 units down, and that image is labeled A'. What are the coordinates of A' ?

F. (−14,−10)
G. (−12,−12)
H. (−7,−10)
J. (0, 0)
K. (14, 10)

3. Olga worked on a project for $4\frac{1}{2}$ hours on each of 6 workdays. On the 7th day of working on the project, Olga worked $\frac{1}{3}$ of the time she had worked each of the previous workdays to complete the project. How many hours did it take Olga to complete the project?

A. $24\frac{1}{6}$

B. $28\frac{1}{2}$

C. 30

D. 33

E. $34\frac{1}{2}$

DO YOUR FIGURING HERE.

4. Given that 5 pounds of coffee makes exactly 210 servings, how many pounds of coffee makes exactly 70 servings?

   F. $1\frac{2}{3}$

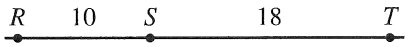
   G. 2

   H. $4\frac{2}{3}$

   J. $5\frac{1}{3}$

   K. 15

5. For $\overleftrightarrow{RT}$ shown below, point S is on $\overline{RT}$, the length of $\overline{RS}$ is 10 cm, and the length of $\overline{ST}$ is 18 cm. What is the distance, in centimeters, between T and the midpoint of $\overline{RS}$?

   A. 14
   B. 18
   C. 19
   D. 23
   E. 28

6. For all real values of p and r, which of the following expressions is equivalent to $p(2 - r) + 8(p - r)$?

   F. $6p - 9r$
   G. $6p - 8r$
   H. $6p - 8r - pr$
   J. $10p - 2r$
   K. $10p - 8r - pr$

7. Fifty shoppers at a pet store were asked if they owned at least 1 cat or at least 1 dog. Data from their answers were recorded below.

Ownership	Number of shoppers
Cat(s) only	13
Dog(s) only	24
Both cat(s) and dog(s)	7

   How many of these shoppers said that they owned NEITHER a cat NOR a dog?

   A. 0
   B. 6
   C. 7
   D. 13
   E. 43

DO YOUR FIGURING HERE.

8. Yvette has 6 pairs of leggings, 2 pairs of shoes, and 6 T-shirts, which all go together well. How many different groupings consisting of 1 of her 6 pairs of leggings, 1 of her 2 pairs of shoes, and 1 of her 6 T-shirts are available for Yvette to wear?

F. 8
G. 12
H. 14
J. 24
K. 72

9. According to the United States Department of Commerce, the approximate area of Rhode Island is 1.5×10^3 square miles and the approximate area of Alaska is 6.6×10^5 square miles. Using these measurements, which of the following is closest to the ratio of the area of Alaska to the area of Rhode Island?

A. 22:5
B. 440:1
C. 484:25
D. 510:1
E. 810:1

10. Rectangle A has a length of 64 inches and a width of 48 inches. Rectangle B has a length and a width that are both $\frac{3}{4}$ times the length and the width of Rectangle A. Rectangle C has a length and a width that are both $\frac{3}{4}$ times the length and the width of Rectangle B. What is the perimeter, in inches, of Rectangle C ?

F. 63
G. 84
H. 126
J. 168
K. 224

11. The expression $(x^6)^3$ is equivalent to:

A. x^9
B. x^{18}
C. x^{216}
D. $3x^3$
E. $3x^5$

DO YOUR FIGURING HERE.

12. A king-sized inflatable rectangular bed when fully inflated will have inside dimensions, in inches, of 78 by 75 by 5. An air pump can pump air into the bed at a rate of 100 cubic inches per second. At that rate, which of the following is closest to the number of seconds it will take to fully inflate the bed?

F. 58
G. 62
H. 158
J. 293
K. 1,170

13. Jake wants to build a scale model of his house. The house is 48 feet long and 32 feet wide, and it is 30 feet tall at the highest point. Jake wants the model to be 8 inches long. How wide, in inches, should his model be?

A. 5

B. $5\frac{1}{3}$

C. $7\frac{1}{2}$

D. 12

E. $12\frac{4}{5}$

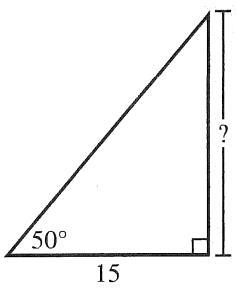
14. You see a circle graph in a newspaper article about student employment, but no percentages are given for the sectors. You want to use the information contained in the graph in a report for your sociology class. You measure the central angle of the sector titled "work during the week" with your protractor, and it measures 144°. According to the circle graph and your measurement, the "work during the week" sector is what percent, to the nearest percent, of the circle graph?

F. 40%
G. 30%
H. 25%
J. 14%
K. Cannot be determined from the given information

15. Josiah stands on level ground 15 ft from the base of a cliff. The angle of elevation from where Josiah is standing to the top of the cliff is 50°, as shown below. Which of the following values is closest to the height, in feet, of the cliff?

(Note: sin 50° ≈ 0.8; cos 50° ≈ 0.6; tan 50° ≈ 1.2)

A. 12
B. 13
C. 18
D. 25
E. 60



DO YOUR FIGURING HERE.

16. Consider the line $3x - 4y = 6$ in the standard (x,y) coordinate plane. For the point on this line with x-coordinate equal to 3, what is the y-coordinate?

F. $-\frac{15}{4}$

G. $-\frac{3}{4}$

H. $\frac{3}{4}$

J. $\frac{6}{5}$

K. $\frac{15}{4}$

17. What is the solution set to the equation $x^2 - x = 12$?

A. $\{-4, 3\}$

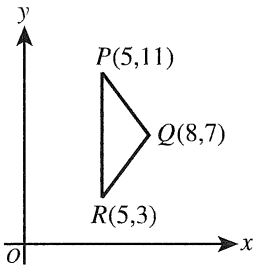
B. $\{-3, 4\}$

C. $\{-2, 6\}$

D. $\{12, 13\}$

E. $\{13\}$

18. The vertices of $\triangle PQR$ are given in the standard (x,y) coordinate plane below. What is the area, in square coordinate units, of $\triangle PQR$?



F. 6
G. 8
H. 12
J. 24
K. 28

19. In the standard (x,y) coordinate plane, a line intersects the y-axis at (0,2) and contains the point (8,5). What is the slope of the line?

A. $\frac{3}{8}$

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

C. $\frac{5}{6}$

D. $\frac{6}{5}$

E. $\frac{8}{3}$

DO YOUR FIGURING HERE.

20. One of the following values for a makes the expression $\frac{2a+5}{a^2+1}$ undefined. Which one?

F. -3

G. $-\frac{5}{2}$

H. -1

J. 0

K. i

21. What is the least positive number that has a remainder of 3 when divided by 5 and a remainder of 7 when divided by 9 ?

A. 24
B. 35
C. 43
D. 45
E. 78

22. Two warning signs begin flashing at the same time. One sign flashes every 3 seconds, and the other sign flashes every 8 seconds. How many seconds elapse from the moment the 2 signs flash at the same time until they next flash at the same time?

F. 5
G. 5.5
H. 11
J. 12
K. 24

23. Sets A, B, and C are defined below.

$A = \{1, 2, 3, 4, 5, 6\}$
$B = \{2, 4, 6\}$
$C = \{1, 2\}$

A number will be randomly selected from set A. What is the probability that the selected number will be an element of set B *and* an element of set C ?

A. 0

B. $\frac{1}{6}$

C. $\frac{2}{6}$

D. $\frac{4}{6}$

E. $\frac{5}{6}$

DO YOUR FIGURING HERE.

24. What rational number is exactly halfway between $\frac{3}{16}$ and $\frac{7}{32}$ on the real number line?

F. $\frac{13}{16}$

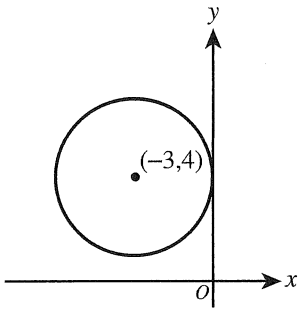
G. $\frac{13}{32}$

H. $\frac{5}{48}$

J. $\frac{1}{64}$

K. $\frac{13}{64}$

25. The circle that has a center of (−3,4) and is tangent to the y-axis is graphed in the standard (x,y) coordinate plane below. What is the area, in square coordinate units, of this circle?



A. 6π
B. 8π
C. 9π
D. 16π
E. 18π

26. An 8-sided game piece with faces numbered from 1 to 8 is rolled twice. What is the probability that an 8 is rolled both times?

(Note: Assume that each side has an equally likely chance of being rolled.)

F. $\frac{1}{64}$

G. $\frac{1}{32}$

H. $\frac{1}{8}$

J. $\frac{1}{4}$

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

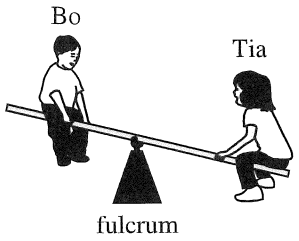
27. When $(3x - 2)^4$ is expanded and the like terms are combined, what is the coefficient of the x^4 term?

A. 9
B. 12
C. 16
D. 48
E. 81

DO YOUR FIGURING HERE.

28. Bo and Tia will balance perfectly on the seesaw shown below if $w_1 \times d_1 = w_2 \times d_2$, where w_1 and d_1 are the weight of Bo and his distance from the fulcrum, respectively, and w_2 and d_2 are similarly defined for Tia. Bo weighs 60 pounds and is sitting $3\frac{1}{2}$ feet from the fulcrum. Tia weighs $\frac{2}{3}$ Bo's weight. What distance, in feet, from the fulcrum must Tia sit in order for Bo and Tia to balance perfectly on the seesaw?

F. $1\frac{1}{6}$
G. $2\frac{1}{3}$
H. $5\frac{1}{4}$
J. $6\frac{5}{12}$
K. $10\frac{1}{2}$

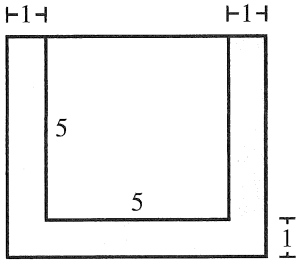


29. Given that $3(x - 2) = 6x - 3$, what is the value of $9x - 2$?

A. −29
B. −11
C. −5
D. 1
E. 7

30. Ally is planting flowers around her square patio. The region she is planting is a 1-foot-wide strip that runs along 3 sides of her 5-foot-by-5-foot patio, as shown below. What is the area, in square feet, of the shaded region where Ally is planting flowers?

F. 5
G. 11
H. 15
J. 17
K. 19



31. Consider 3 circles: A, B, and C. The sum of the radii of Circle A and Circle B is 5 m. The sum of the radii of Circle A and Circle C is 8 m. The sum of the radii of Circle B and Circle C is 7 m. What is the length, in meters, of the radius of Circle C ?

A. 1
B. 2
C. 3
D. 4
E. 5

DO YOUR FIGURING HERE.

32. What is the complex conjugate of the number below?

$$2 + 3i$$

F. $\sqrt{13}$
G. $-3i$
H. $3i$
J. $2 - 3i$
K. $2 + 3i$

33. The function $P(x) = x^3 - 10x^2 + 9x - 90$, where x is the number of items sold, models the profit $P(x)$, in dollars, for Company A. The company *breaks even* when the profit is \$0. How many items must Company A sell to break even?

A. 0
B. 3
C. 9
D. 10
E. 90

34. Which of the following statements shows that any subtraction can be written instead as an addition?

F. $a - b = |a| + |-b|$
G. $a - b = |-a| + |b|$
H. $a - b = a + |-b|$
J. $a - b = a + (-b)$
K. $a - b = (-a) + b$

35. What is the value of $\sqrt{\frac{9}{4}} - \sqrt[3]{-\frac{1}{8}}$?

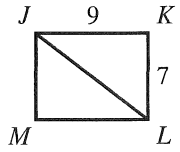
A. $\frac{1}{4}$
B. $\frac{5}{4}$
C. $\frac{7}{6}$
D. 1
E. 2

36. Given $f(x) = -x - 4$ and $h(x) = 2x + 3$, what is $h(f(x))$?

F. $-2x - 5$
G. $2x - 1$
H. $2x - 5$
J. $-2x^2 - 11x - 12$
K. $2x^2 + 11x + 12$

DO YOUR FIGURING HERE.

37. Rectangle $JKLM$ is shown below. The given side lengths are in feet. What is the cosine of $\angle KJL$?



A. $\frac{7}{9}$

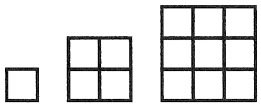
B. $\frac{7}{\sqrt{130}}$

C. $\frac{7}{16}$

D. $\frac{9}{\sqrt{130}}$

E. $\frac{9}{16}$

38. The first 3 elements of a pattern are shown below. Each element is composed of small squares that are 18 inches wide and 18 inches long. Each element after the 1st element is a square that is 18 inches wider and 18 inches longer than the previous element. What is the area, in square *feet*, of the 4th element?



F. 6
G. 9
H. 16
J. 24
K. 36

39. The operation $\otimes$ is defined on the set of positive integers by the rule $a \otimes b = a + b^2$. What is the value of $(4 \otimes 3) \otimes 5$?

A. 34
B. 38
C. 44
D. 50
E. 74

40. The number a is a positive integer greater than 1. The number b is a negative integer. The number a^b is:

F. zero.
G. positive.
H. negative.
J. irrational.
K. an integer.

DO YOUR FIGURING HERE.

Use the following information to answer questions 41–43.

The table below is part of a delivery truck log used in Aaron's trucking business. "Mileage out" and "Mileage in" represent the truck's mileage readings when it leaves the office and when it returns to the office, respectively, giving only the last 3 digits of the cumulative mileage reading. The "Hours away" column gives the amount of time from when the truck leaves the office until it returns to the office. When moving, the truck travels at an average speed of 50 miles per hour and does not travel more than 1,000 miles in any given day. Driver Ben forgot to complete the log for June 18.

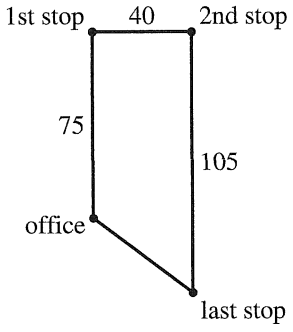
Date	Mileage out	Mileage in	Driver	Hours away
June 17	274	499	Aaron	5.00
June 18			Ben	
June 19	736	989	Lenny	5.50
June 20	989	245	Aaron	6.00
June 21	245	495	Lenny	5.75

41. According to the mileage reading, what distance, in miles, did the truck travel on June 20 ?

A. 234
B. 241
C. 250
D. 253
E. 256

42. The figure shown below represents the route traveled on July 16. Aaron started at the office, drove 75 miles due north to the 1st stop, then 40 miles due east to the 2nd stop, and then 105 miles due south to the last stop. On his return trip, Aaron drove a straight road from the last stop to the office without stopping. Given that Aaron drove at the truck's average speed, which of the following values is closest to the time, in hours, Aaron drove on the return trip?

F. $\frac{3}{5}$
G. $\frac{5}{7}$
H. 1
J. $\frac{7}{5}$
K. $\frac{5}{3}$

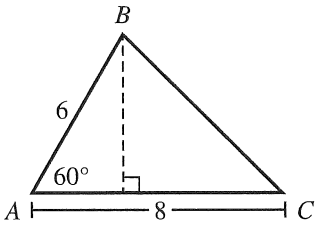


DO YOUR FIGURING HERE.

43. From June 17 through June 21, the average of the "Hours away" was 5.50 hours. To the nearest 0.01, what is the value of "Hours away" when Ben was driving the truck?

A. 5.25
B. 5.45
C. 5.50
D. 5.56
E. 5.75

44. In $\triangle ABC$ shown below, the given side lengths are in meters. What is the area, in square meters, of $\triangle ABC$?



F. 10
G. 12
H. $12\sqrt{2}$
J. $12\sqrt{3}$
K. 24

45. The value of $\log(x)$, to the nearest 0.1, is given in the table below for 4 different values of x.

x	$\log(x)$
3	0.5
30	1.5
300	2.5
3,000	3.5

To the nearest 0.1, what is the value of $\log(3 \times 10^{5,000})$?

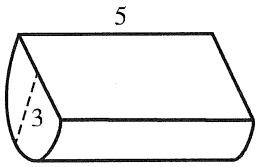
A. 0.5
B. 17.5
C. 2,500.0
D. 5,000.5
E. 5,003.5

DO YOUR FIGURING HERE.

46. Susan completed 20 courses in college and her grade point average was 3.15 (A = 4.0 and B = 3.0). If all of her grades were A's or B's, and each course grade carried equal weight, what is the number of A's that Susan received?

F. 1
G. 3
H. 4
J. 9
K. 15

47. The right semicircular cylinder shown below has a height of 5 centimeters and a semicircular base of radius 3 centimeters. What is the volume, in cubic centimeters, of the right semicircular cylinder?



A. $\frac{45}{4}\pi$

B. $\frac{45}{2}\pi$

C. $\frac{75}{2}\pi$

D. 15π

E. 45π

48. For positive real numbers M and N, $\log \frac{M}{N} = ?$

F. $\frac{\log M}{\log N}$

G. $\log(M - N)$

H. $\log(N - M)$

J. $\log M - \log N$

K. $\log N - \log M$

49. For what real number b, if any, will the equation $a - 2b + ab = 2$ be true for both $a = 1$ and $a = -1$?

A. -2
B. -1
C. 1
D. 2
E. No such real number b exists.

DO YOUR FIGURING HERE.

Use the following information to answer questions 50–52.

Terri is a dress designer and owns a retail store. She designs, produces, and sells 5 dress styles. These styles and the production cost of 1 dress of each style are shown in the table below.

Style	Production cost of 1 dress
A	$15.00
B	$25.00
C	$45.00
D	$60.00
E	$65.00

50. Terri will hang 1 dress of each style along a rod in the window of her store. How many total possible orders (permutations) of these dresses are there for Terri to consider?

F. 1
G. 5
H. 25
J. 120
K. 3,125

51. Terri will offer a coupon in the local newspaper for 20% off the regular price of a dress. What is the regular price Terri must set for a Style B dress so that the sale price using the coupon is exactly $15.00 more than the cost of producing 1 Style B dress?

A. $32.00
B. $45.00
C. $48.00
D. $50.00
E. $55.00

52. The labor cost of each dress is 40% of the production cost. What is the *average* labor cost per dress for 1 dress of each of the 5 styles?

F. $ 16.80
G. $ 25.20
H. $ 42.00
J. $ 84.00
K. $126.00

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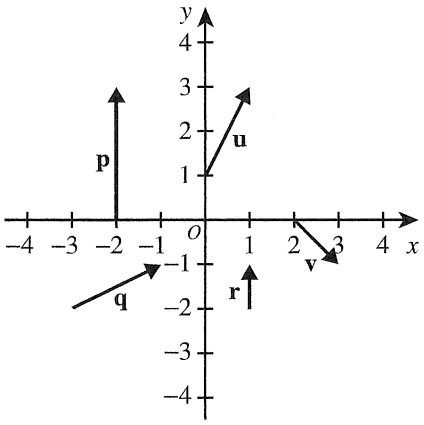
53. It took 0.5 second for an object to travel 60.5 feet. To the nearest 0.01 *mile* per hour, what was the speed of the object?

(Note: 1 mile = 5,280 feet)

A. 30.25
B. 61.00
C. 82.50
D. 87.30
E. 121.00

DO YOUR FIGURING HERE.

54. Representatives of vectors **u**, **v**, **p**, **q**, and **r** are shown in the standard (x,y) coordinate plane below.

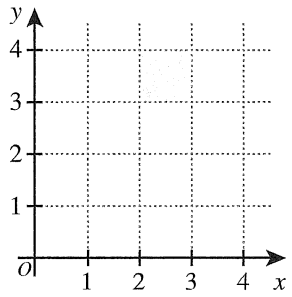


One of the following vectors is equal to the vector **u** + **v**. Which one?

F. **−r**
G. **−q**
H. **−p**
J. **p**
K. **q**

55. In the standard (x,y) coordinate plane below, a shaded square is shown with vertices at (2,3), (2,4), (3,3), and (3,4). Two lines, $y = rx$ and $y = sx$, each intersect the shaded square at exactly 1 point. Given that $r \neq s$, what is the positive difference of r and s ?

A. $\frac{1}{6}$
B. $\frac{1}{3}$
C. $\frac{1}{2}$
D. $\frac{2}{3}$
E. 1



56. A random number generator that generates an integer 1 through 6 will be used 15,000 times. Each time an integer is generated, the number will be recorded. Which of the following descriptors will most likely characterize the distribution of the 15,000 recorded numbers?

F. Bimodal
G. Normal
H. Skewed left
J. Skewed right
K. Uniform

DO YOUR FIGURING HERE.

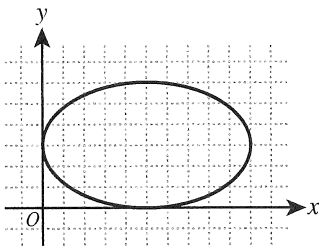
57. In the standard (x,y) coordinate plane, define the *h–v distance* between 2 points to be the length, in coordinate units, of the shortest path between the 2 points using only horizontal and vertical segments. The expression $|5-2|+|3-(-4)|$ gives the *h–v distance* between which of the following pairs of points?

A. (3, 5) and (−4, 2)
B. (3, 5) and (−2,−4)
C. (5,−4) and (−2, 3)
D. (5,−2) and (3, 4)
E. (5, 2) and (3,−4)

58. Let m and s be the mean and standard deviation, respectively, of the ages of children in a certain daycare center. Which of the following gives the mean and standard deviation of the ages of the same children 5 years later?

	Mean	Standard deviation
F.	m	s
G.	m	$s+5$
H.	$m+5$	s
J.	$m+5$	$s+5$
K.	$m+5$	$5s$

59. The ellipse in the standard (x,y) coordinate plane below is the graph of $\frac{(x-5)^2}{25}+\frac{(y-3)^2}{9}=1$. Which of the following points are the foci of the ellipse?



A. (0,3) and (5,3)
B. (0,3) and (10,3)
C. (1,3) and (5,0)
D. (1,3) and (9,3)
E. (5,0) and (5,6)

60. Lucinda ran a 3-mile cross-country course in 24.0 minutes while Frannie ran the same course in 21.0 minutes. Which of the following values, in miles per *hour*, is closest to the difference between Frannie's average speed and Lucinda's average speed?

F. 0.1
G. 1.0
H. 1.1
J. 1.5
K. 3.0

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

Solar time is determined by the position of the Sun relative to a *meridian* (an imaginary line that passes through the northernmost and southernmost points of the horizon, dividing the visible sky into 2 equal halves). At *solar noon*, the Sun appears to cross the meridian. A *solar day* is the period between one solar noon and the next. Because the Sun's apparent motion is not uniform, a solar day is generally not the same length as a *mean day*, which is exactly 24 hrs (1,440 min). See Figure 1.

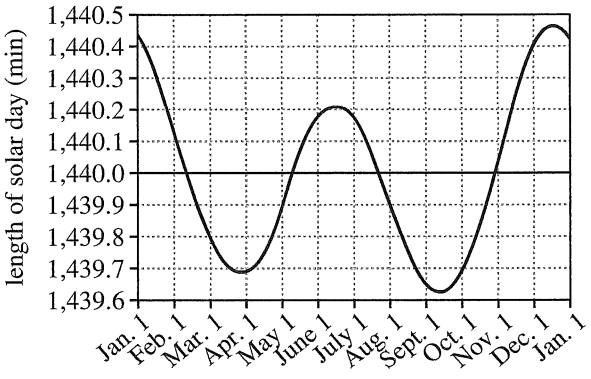
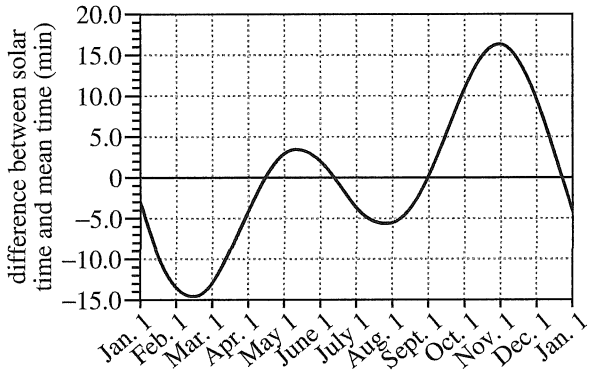


Figure 1

Figure 2 shows how the difference between solar time and *mean time* (time as indicated by a clock) varies throughout the year.



Note: If the difference between solar time and mean time is positive, solar time is ahead of mean time; if the difference is negative, solar time is behind mean time.

Figure 2

1. Based on Figure 2, on how many dates each year is solar time exactly 8 minutes behind mean time?
   - **A.** 2
   - **B.** 4
   - **C.** 6
   - **D.** 8

2. According to Figure 2, on which of the following dates does solar time have the same value as mean time?
   - **F.** February 10
   - **G.** March 15
   - **H.** April 15
   - **J.** July 1

3. During the first 6 months of the year, is solar time more often ahead of mean time or behind mean time?

   A. Ahead; the difference between solar time and mean time is more often positive during the first 6 months of the year.
   B. Ahead; the difference between solar time and mean time is more often negative during the first 6 months of the year.
   C. Behind; the difference between solar time and mean time is more often positive during the first 6 months of the year.
   D. Behind; the difference between solar time and mean time is more often negative during the first 6 months of the year.

4. According to Figure 1, on which of the following dates is the solar day longer than the mean day?

   F. February 15
   G. March 15
   H. June 15
   J. August 15

5. According to Figure 2, in a given year, solar time is ahead of mean time for approximately how many months in total?

   A. 3.5
   B. 5.5
   C. 7.5
   D. 9.5

6. Based on Figure 1, the longest solar day of the year is approximately how much longer than the shortest solar day of the year?

   F. 0.4 min
   G. 0.8 min
   H. 1.2 min
   J. 1.6 min

Passage II

An experiment was conducted to determine how seawater temperature and salinity affect food consumption and growth in *Scophthalmus maximus* (a species of fish). The table shows, for each of 8 trials, average total food consumption, C_T, and average gain in body mass for *S. maximus* kept at various temperature and salinity combinations. Each trial involved the same number of fish and lasted the same number of months.

Trial	Temperature (°C)	Salinity (ppt*)	Average C_T† (g)	Average gain in body mass (g)
1	22	15	53.3	91.6
2	22	25	52.1	87.1
3	22	30	46.4	81.0
4	22	35	42.6	74.5
5	10	15	15.6	24.3
6	14	15	27.9	50.7
7	18	15	44.6	79.5
8	22	15	53.6	92.6

*parts per thousand
†C_T = (food supplied to each fish) − (food uneaten)

Table adapted from Albert K. Imsland et al., "The Interaction of Temperature and Salinity on Growth and Food Conversion in Juvenile Turbot (*Scophthalmus maximus*)." ©2001 by Elsevier Science B. V.

7. Based on the table, for which 2 trials was the average C_T value less than 50 g and the average gain in body mass greater than 75 g ?

A. Trial 1 and Trial 2
B. Trial 1 and Trial 8
C. Trial 3 and Trial 4
D. Trial 3 and Trial 7

8. Consider Trials 1–4. Based on the table, as salinity increased, did average C_T increase or decrease, and did average gain in body mass increase or decrease?

	average C_T	average gain in body mass
F.	increase	decrease
G.	increase	increase
H.	decrease	decrease
J.	decrease	increase

9. Consider the 4 trials for which the average C_T values were less than 45 g. What is the order of these trials from the trial with the least average C_T value to the trial with the greatest average C_T value?

A. Trial 5, Trial 6, Trial 4, Trial 7
B. Trial 5, Trial 6, Trial 7, Trial 8
C. Trial 7, Trial 8, Trial 5, Trial 6
D. Trial 7, Trial 4, Trial 6, Trial 5

10. Based on the table, average gain in body mass was approximately how many times as great for the *S. maximus* in Trial 6 as for the *S. maximus* in Trial 5 ?

F. $\frac{1}{5}$
G. $\frac{1}{2}$
H. 2
J. 5

11. Suppose Trial 1 lasted 3 months. How many months did Trial 8 last?

A. 3 months
B. 8 months
C. 24 months
D. Cannot be determined from the given information

12. What was the average C_T, in *kilograms* (kg), for fish kept at a temperature of 22°C and a salinity of 25 ppt ?

F. 0.0521 kg
G. 0.521 kg
H. 52.1 kg
J. 52,100.0 kg

Passage III

Three studies examined the effects of *compost* (organic matter) on 3 physical properties of soil.

Five soil mixtures (Mixtures 1–5) were prepared (see Table 1).

Table 1		
	Percent by volume of:	
Mixture	compost	soil
1	5	95
2	25	75
3	50	50
4	75	25
5	95	5

Study 1

A 1.5 L pot was prepared by placing 500 g of Mixture 1 into the pot, after which the pot was stored at 30°C for 72 hr. The pot and its contents were then baked in a 105°C oven for 24 hr. After cooling, the mixture's *bulk density* (the dry mass of the mixture per unit volume) was determined.

These procedures were repeated for each of Mixtures 2–5 (see Table 2).

Table 2	
Mixture	Bulk density (mg/mL)
1	104
2	159
3	213
4	255
5	302

Study 2

Another 1.5 L pot of Mixture 1 was prepared, stored, and baked as in Study 1.

The dried mixture was ground into powder and passed through a screen with 2 mm diameter openings. Five grams of the screened powder were then mixed with 5 mL of H_2O, and the pH of the powder-H_2O suspension was determined.

These procedures were repeated for each of Mixtures 2–5 (see Table 3).

Table 3	
Suspension of H_2O and Mixture:	pH
1	6.5
2	6.2
3	6.7
4	7.0
5	7.2

Study 3

Another 1.5 L pot of Mixture 1 was prepared, stored, and baked as in Study 1. The dried mixture was then ground and screened as in Study 2.

Fifty grams of the screened powder were mixed with 5 mL of H_2O to form a soil paste, and the paste was placed on a filter. Suction was then applied to the filter, and the *extract* (the clear, colorless liquid that passed through the filter) was collected. The electrical conductivity of the extract was determined.

These procedures were repeated for each of Mixtures 2–5 (see Table 4).

Table 4	
Extract from Mixture:	Electrical conductivity (dS/m*)
1	2.40
2	2.56
3	3.45
4	2.15
5	1.86
*decisiemens per meter	

13. Which of the following is the most likely reason that a given mixture was exposed to a temperature of 105°C in Study 1 ?

    A. To allow the mixture to be passed through a screen
    B. To prevent the mixture from being passed through a screen
    C. To add moisture to the mixture
    D. To remove moisture from the mixture

14. In Study 3, once the suction was applied, the filters most likely allowed the passage of:

    F. soil but not liquid.
    G. liquid but not soil.
    H. both soil and liquid.
    J. neither soil nor liquid.

15. Based on the results of Study 1, if a mixture with 60% by volume of compost had been tested in Study 1, the bulk density of this mixture would most likely have been:

    A. less than 159 mg/mL.
    B. between 159 mg/mL and 213 mg/mL.
    C. between 213 mg/mL and 255 mg/mL.
    D. greater than 255 mg/mL.

16. Study 2 differed from Study 3 in which of the following ways?

    F. A greater mass of the screened powder was mixed with H_2O in Study 2 than in Study 3.
    G. A greater mass of the screened powder was mixed with H_2O in Study 3 than in Study 2.
    H. A longer storage time was used in Study 2 than in Study 3.
    J. A longer storage time was used in Study 3 than in Study 2.

17. Consider the mixture that resulted in the suspension with the *lowest* pH in Study 2. According to the results of Study 1, was the bulk density of this mixture greater than, less than, or equal to 150 mg/mL ?

    A. Greater than
    B. Less than
    C. Equal to
    D. Cannot be determined from the given information

18. In Study 2, was the suspension for Mixture 1 acidic or basic?

    F. Basic, because the pH was greater than 7.0.
    G. Basic, because the pH was less than 7.0.
    H. Acidic, because the pH was greater than 7.0.
    J. Acidic, because the pH was less than 7.0.

19. Consider the statement "The percent by volume of compost in the mixture that had the greatest bulk density was the same as the percent by volume of compost in the mixture that had the extract with the *lowest* electrical conductivity." Do the results of Studies 1 and 3 support this statement?

    A. Yes; 50% by volume of compost resulted in the greatest bulk density and the lowest electrical conductivity.
    B. Yes; 95% by volume of compost resulted in the greatest bulk density and the lowest electrical conductivity.
    C. No; 50% by volume of compost resulted in the greatest bulk density, but 95% by volume of compost resulted in the lowest electrical conductivity.
    D. No; 95% by volume of compost resulted in the greatest bulk density, but 50% by volume of compost resulted in the lowest electrical conductivity.

Passage IV

When a sand-covered drumhead vibrates at certain frequencies, the sand collects at *nodes* (areas of least vibration). Two types of nodes can form on a vibrating drumhead: *radial nodes*, which look like rings, and *linear nodes*, which look like straight lines. As sand collects at nodes, patterns called *nodal patterns* (NPs) form. Figure 1 shows two NPs that can form on a sand-covered drumhead: NP 1 (a radial node only) and NP 2 (a radial node and a linear node).

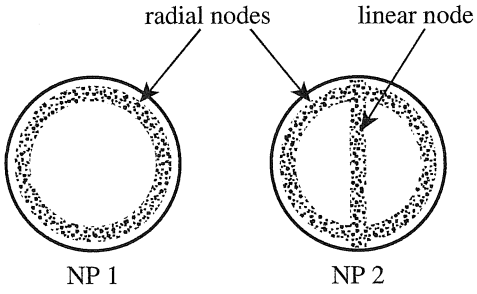


Figure 1

Students performed 2 experiments to study the formation of NP 1 and NP 2 on various drumheads.

Experiment 1

The students obtained 5 drumheads, each having a different diameter and each set to a tension of 2,000 newtons per meter (N/m). They performed a trial with each drumhead, using the following procedure: First, they placed the drumhead directly above a speaker emitting sound waves having a frequency of 90 hertz (Hz). Then, they gradually increased the frequency until they observed NP 1. Finally, they continued to increase the frequency until they observed NP 2. Throughout each trial, the *amplitude* (loudness) of the sound waves was held constant. Table 1 shows the frequency at which the students observed NP 1 and NP 2 for each trial.

Table 1

Diameter (cm)	Frequency (Hz) at which the students observed:	
	NP 1	NP 2
20	330	530
30	224	356
40	168	267
50	134	213
60	112	178

Experiment 2

The students performed 7 more trials with the 50 cm diameter drumhead. In each trial, first the tension was adjusted to a certain value, and then the procedures of the Experiment 1 trials were repeated. Figure 2 shows the results for each trial, as well as a line of best fit for each NP.

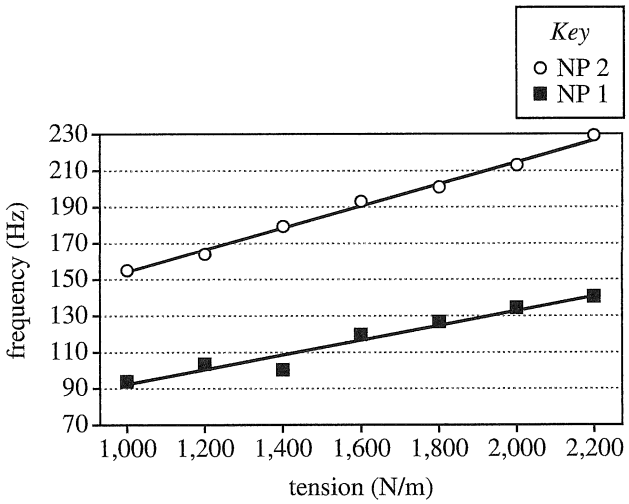


Figure 2

20. Based on the results of Experiment 1, for how many of the diameters tested was the frequency for NP 1 *less* than that for NP 2 ?

F. 1
G. 3
H. 4
J. 5

21. Which of the following questions about either drumhead diameter or drumhead tension can be answered by the results of Experiment 2 ? What effect did the:

A. diameter of the drumhead have on the frequency at which the NPs were observed?
B. diameter of the drumhead have on the time at which the NPs were observed?
C. tension of the drumhead have on the frequency at which the NPs were observed?
D. tension of the drumhead have on the time at which the NPs were observed?

22. Suppose that in Experiment 2 a trial had been performed in which NP 1 was observed at a frequency of 130 Hz. Based on Figure 2, the tension of the drumhead would most likely have been closest to which of the following?

F. 1,700 N/m
G. 1,900 N/m
H. 2,100 N/m
J. 2,300 N/m

23. Experiments 1 and 2 differed in which of the following ways? In Experiment 1:

A. loudness was held constant and frequency was varied, whereas in Experiment 2, loudness was varied and frequency was held constant.
B. loudness was varied and frequency was held constant, whereas in Experiment 2, loudness was held constant and frequency was varied.
C. 5 drumheads were used, whereas in Experiment 2, 1 drumhead was used.
D. 5 drumheads were used, whereas in Experiment 2, 7 drumheads were used.

24. Based on the results of Experiment 1, for the 60 cm diameter drumhead, what was the difference between the frequency at which NP 1 was observed and the frequency at which the speaker was initially set during the procedure?

F. 22 Hz
G. 88 Hz
H. 112 Hz
J. 178 Hz

25. For a given diameter and tension, the *fundamental frequency* is the frequency at which NP 1 is observed. Suppose that, for a 20 cm diameter drumhead set at a tension of 2,000 N/m, a certain NP is known to form at a frequency that is 2.3 times the fundamental frequency. Based on the results of Experiment 1, this NP would most likely form at approximately what frequency?

A. 330 Hz
B. 530 Hz
C. 759 Hz
D. 1,219 Hz

26. A student claimed that the greater the drumhead diameter, the longer the *wavelength* of sound needed to observe a given NP. Is this claim supported by the results for NP 2 from Experiment 1 ?

F. Yes; as the diameter was increased, the frequency at which NP 2 was observed increased.
G. Yes; as the diameter was increased, the frequency at which NP 2 was observed decreased.
H. No; as the diameter was increased, the frequency at which NP 2 was observed increased.
J. No; as the diameter was increased, the frequency at which NP 2 was observed decreased.

Passage V

Three students observed that Trait R is present in some people but not in others. The presence or absence of Trait R in a person is determined entirely by alleles of Gene R. Gene R has 2 alleles: *R*, which is dominant, and *r*, which is recessive.

A teacher gave the students a pedigree showing the inheritance of Trait R in a particular family (see Figure 1). Each individual represented in the pedigree was assigned a number (shown below the symbol for the individual) for reference. Based on the pedigree, each student proposed a hypothesis explaining the pattern of inheritance for Trait R in this family.

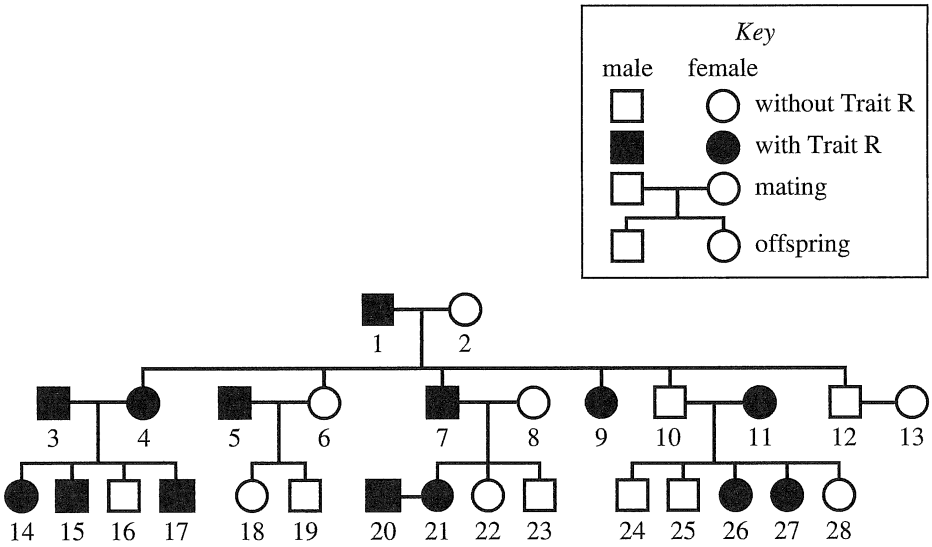


Figure 1

Student 1

Gene R is located on the X chromosome, so females (who inherit two X chromosomes) inherit 2 copies of Gene R, whereas males (who inherit one X chromosome) inherit only 1 copy of Gene R. All females with Trait R inherited 2 copies of the *r* allele, and all males with Trait R inherited 1 copy of the *r* allele. Table 1 shows the possible Gene R genotypes for females and for males and indicates whether the genotypes result in Trait R.

Table 1

Gender	Gene R genotype	Trait R present?
Female	*RR* *Rr* *rr*	no no yes
Male	*R** *r**	no yes

*Because males inherit only one X chromosome, their Gene R genotype has only 1 copy of Gene R.

Student 2

Gene R is not located on the X chromosome or the Y chromosome. All individuals with Trait R inherited 2 copies of the *r* allele.

Student 3

Gene R is not located on the X chromosome or the Y chromosome. All individuals with Trait R inherited either 1 or 2 copies of the *R* allele.

27. Which student, if any, would be likely to predict that the Gene R genotype of Individual 5 is *rr* ?

A. Student 1
B. Student 2
C. Student 3
D. None of the students

28. Which of the following tables is most consistent with the hypothesis of Student 3 ?

F.

Gene R genotype	Trait R present?
RR	yes
Rr	yes
rr	yes

G.

Gene R genotype	Trait R present?
RR	yes
Rr	yes
rr	no

H.

Gene R genotype	Trait R present?
RR	yes
Rr	no
rr	no

J.

Gene R genotype	Trait R present?
RR	no
Rr	no
rr	yes

29. Which of Student 2 or Student 3 implied that Trait R is a recessive trait?

A. Student 2, because Student 2 predicted that individuals with 2 copies of the recessive allele of Gene R will have Trait R.
B. Student 2, because Student 2 predicted that individuals with only 1 copy of the recessive allele of Gene R will have Trait R.
C. Student 3, because Student 3 predicted that individuals with 2 copies of the recessive allele of Gene R will have Trait R.
D. Student 3, because Student 3 predicted that individuals with only 1 copy of the recessive allele of Gene R will have Trait R.

30. Suppose that Individual 20 and Individual 21 have a biological child. Based on Student 2's hypothesis, what is the probability that the child will have Trait R ?

F. 0%
G. 25%
H. 50%
J. 100%

31. Based on Student 1's hypothesis, is an individual with the Gene R genotype *RR* female or male, and does the individual have Trait R ?

A. Female; yes
B. Female; no
C. Male; yes
D. Male; no

32. Which of the students proposed a pattern of inheritance that would most likely result in Trait R being rarer in females than in males?

F. Student 1 only
G. Student 2 only
H. Students 2 and 3 only
J. Students 1, 2, and 3

33. Consider Individuals 3 and 4 and their offspring. Is this portion of the pedigree more consistent with the hypothesis of Student 1 or the hypothesis of Student 3 ?

A. Student 1; this portion of the pedigree suggests that Trait R is a dominant trait.
B. Student 1; this portion of the pedigree suggests that Trait R is a recessive trait.
C. Student 3; this portion of the pedigree suggests that Trait R is a dominant trait.
D. Student 3; this portion of the pedigree suggests that Trait R is a recessive trait.

Passage VI

The hot, spicy flavor of chili peppers is directly proportional to the concentration of *capsaicinoids* (a class of chemical compounds). Scientists studied the effects of fertilizer application and pepper color on the capsaicinoid concentration of 3 varieties of chili peppers (V1–V3).

Study

Two hundred V1 plants that were 82 days old were divided into 4 equal groups, and each group was planted in a different plot (Plot L, M, N, or O) in a particular field. This procedure was repeated with V2 and V3 plants in separate, but adjacent, fields. Fertilizer was then applied to the type L plots and the type M plots. Each plot was irrigated equally once every 20 days until harvest. All the peppers in the type L plots and the type N plots were harvested 77 days after planting, while the peppers were still green. All the peppers in the type M plots and the type O plots were harvested 87 days after planting, after the peppers had turned red. Table 1 summarizes, for each plot type, whether fertilizer was applied to the plot and the color of the peppers in the plot at the time of harvest.

Table 1

Plot type	Fertilizer applied?	Pepper color at harvest
L	yes	green
M	yes	red
N	no	green
O	no	red

Immediately after being harvested, all the peppers were dried at 65°C for 24 hr. Then, for each field, all the dried peppers grown in a given plot were ground up and combined. The total capsaicinoid concentration, in milligrams of capsaicinoids per gram of dry pepper (mg/g), was then determined for the peppers from each plot of each field. The results are shown in Table 2.

Table 2

Pepper variety	Plot	Total capsaicinoid concentration (mg/g)
V1	L	78
	M	60
	N	70
	O	55
V2	L	105
	M	87
	N	92
	O	72
V3	L	87
	M	49
	N	71
	O	30

Tables adapted from Alberto González-Zamora et al., "Measurement of Capsaicinoids in Chiltepin Hot Pepper: A Comparison Study between Spectrophotometric Method and High Performance Liquid Chromatography Analysis." ©2015 by Alberto González-Zamora et al.

34. The hottest peppers in the study were most likely those of which variety grown in which plot?

F. The V2 peppers grown in Plot L, because they had the highest total capsaicinoid content.
G. The V2 peppers grown in Plot L, because they had the lowest total capsaicinoid content.
H. The V3 peppers grown in Plot O, because they had the highest total capsaicinoid content.
J. The V3 peppers grown in Plot O, because they had the lowest total capsaicinoid content.

35. The spiciness of a pepper is often reported in *Scoville heat units* (SHU). In general, the higher the total capsaicinoid concentration, the higher the SHU value. Based on the results of the study for V1 in the plots that had fertilizer applied, would the SHU rating likely have been higher for green peppers or for red peppers?

A. Green; the total capsaicinoid concentration of the Plot L peppers was higher than that of the Plot M peppers.
B. Green; the total capsaicinoid concentration of the Plot N peppers was higher than that of the Plot O peppers.
C. Red; the total capsaicinoid concentration of the Plot L peppers was higher than that of the Plot M peppers.
D. Red; the total capsaicinoid concentration of the Plot N peppers was higher than that of the Plot O peppers.

36. Consider the statement "For a given variety of pepper grown *without* applied fertilizer, the total capsaicinoid concentration of red peppers is generally higher than that of green peppers." Are the results of the study for V3 consistent with this statement?

F. No, because the total capsaicinoid concentration of the Plot L peppers was higher than that of the Plot M peppers.
G. No, because the total capsaicinoid concentration of the Plot N peppers was higher than that of the Plot O peppers.
H. Yes, because the total capsaicinoid concentration of the Plot L peppers was higher than that of the Plot M peppers.
J. Yes, because the total capsaicinoid concentration of the Plot N peppers was higher than that of the Plot O peppers.

37. Assume that 50 kg of fertilizer was applied to each plot that was fertilized in the study. Suppose an additional plot type in which 100 kg of fertilizer was applied to each plot had also been included in the study. The peppers grown in these plots were harvested 77 days after planting in the fields. The results are shown in the following table.

Pepper variety	Total capsaicinoid concentration (mg/g)
V1	91
V2	110
V3	97

Based on the available information, how did the total capsaicinoid concentration of the peppers change as the amount of fertilizer applied changed from 0 kg to 50 kg to 100 kg ? For each pepper variety, the total capsaicinoid concentration:

A. increased only.
B. decreased only.
C. increased and then decreased.
D. decreased and then increased.

38. For each of the 3 pepper varieties, which plot was most likely intended to serve as the control for the effect of applied fertilizer on peppers that were harvested when they were red?

F. Plot L
G. Plot M
H. Plot N
J. Plot O

39. Based on the description of the study, how many pepper plants were planted in each plot?

A. 50
B. 200
C. 600
D. Cannot be determined from the given information

40. Assume that the average mass of a dried V1 pepper was 20 g. On average, the total mass, in milligrams, of capsaicinoids found in a V1 pepper from Plot M was closest to which of the following?

F. 3 mg
G. 60 mg
H. 600 mg
J. 1,200 mg

END OF TEST 4

STOP! DO NOT RETURN TO ANY OTHER TEST.

Test 2: Mathematics—Scoring Key

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

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

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)	____ (21)

Test 3: Reading—Scoring Key

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

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

***Reporting Categories**
KID = Key Ideas & Details
CS = Craft & Structure
IKI = Integration of Knowledge & Ideas

Number Correct (Raw Score) for:

Key Ideas & Details (KID) _____ (24)

Craft & Structure (CS) _____ (11)

Integration of Knowledge & Ideas (IKI) _____ (5)

Total Number Correct for Reading Test (KID + CS + IKI) _____ (40)

Test 4: Science—Scoring Key

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

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

***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) _____ (20)

Scientific Investigation (SIN) _____ (10)

Evaluation of Models, Inferences & Experimental Results (EMI) _____ (10)

Total Number Correct for Science Test (IOD + SIN + EMI) _____ (40)

Explanation of Procedures Used to Obtain Scale Scores from Raw Scores

On each of the four 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 off 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 D05	Your Scale Score
English	_____
Mathematics	_____
Reading	_____
Science	_____
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.

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