In response to your request for Test Information Release materials, this booklet contains the test questions 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.

If you wish to order a photocopy of your answer document—including, if you took the Writing Test, a copy of your written essay—please use the order form on the inside back cover of this booklet.
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. A car was purchased 4 years ago for $26,200. The current value of the car is $17,500. What was the car's average decrease in value per year?
   A. $2,175
   B. $2,900
   C. $4,350
   D. $4,375
   E. $6,550

2. For what value of $x$ is $6x - 3 = 4x + 7$ true?
   F. $\frac{2}{5}$
   G. $\frac{7}{8}$
   H. 1
   J. 2
   K. 5

3. Which of the following integers is NOT a factor of 132?
   A. 6
   B. 8
   C. 11
   D. 12
   E. 33

4. A vending machine only accepts quarters ($0.25$) and nickels ($0.05$). When the machine was emptied Friday afternoon, 325 coins were counted and had a value of $56.25$. Which of the following systems of equations, when solved, gives the number of quarters, $q$, and the number of nickels, $n$?
   F. $q + n = 325$ and $0.25q + 0.05n = 56.25$
   G. $q + n = 325$ and $0.25q + 0.50n = 56.25$
   H. $q + n = 325$ and $25q + 5n = 56.25$
   J. $q + n = 56.25$ and $0.25q + 0.05n = 325$
   K. $q + n = 56.25$ and $25q + 5n = 325$
5. Carlotta is helping her grandfather center a large framed picture on his living room wall. As shown in the figure below, the rectangular wall is 24 feet long, and the rectangular framed picture is 4.5 feet high and 7.5 feet long. The left edge of the frame will be \( x \) feet from the left edge of the wall, and the right edge of the frame will be \( x \) feet from the right edge of the wall. What is the value of \( x \)?

A. 8.25  
B. 9.75  
C. 12  
D. 16.5  
E. 19.5

6. In \( \triangle ABC \), the sum of the measures of \( \angle A \) and \( \angle B \) is 57°. What is the measure of \( \angle C \)?

F. 33°  
G. 57°  
H. 66°  
J. 114°  
K. 123°

7. A square and a rectangle have the same area. The length of the rectangle is 32 centimeters, and the width of the rectangle is 2 centimeters. What is the length, in centimeters, of a side of the square?

A. \( 2\sqrt{17} \)  
B. 8  
C. 17  
D. 64  
E. 68

8. As a motivational speaker, Bree speaks at school assemblies, charging a school district for her travel costs and a fixed amount per assembly. Bree used the equation \( C = 50a + 1,500 \) to determine the charge of \( C \) dollars to speak at \( a \) assemblies in the Escambia City School District. Bree charged the district \$4,250 to speak at school assemblies. How many assemblies did Bree speak at in this district?

F. 30  
G. 54  
H. 55  
J. 85  
K. 115

9. Let \( a \) and \( b \) be positive prime numbers. Which of the following numbers must be a factor of both \( a \) and \( b \)?

A. 0  
B. 1  
C. \( a \)  
D. \( b \)  
E. \( ab \)
10. What is the value of $80 - 5(x^2 - y) + y$ when $x = 4$ and $y = 6$?
   F. 0
   G. 24
   H. 36
   J. 76
   K. 756

11. At the Winter Weather Store, the price of 1 hat is $12 and the price of 1 scarf is $14. Jovon spent $128 to buy 10 items—a combination of hats and scarves. How many hats did he buy?
   A. 1
   B. 4
   C. 5
   D. 6
   E. 8

12. Square $ABEF$ and parallelogram $ACDG$ are shown in the figure below. Points $E$ and $F$ are on $DG$, $B$ is on $AC$, and the lengths given are in inches. What is the ratio of the area of $ABEF$ to the area of $ACDG$?
   F. 1:12
   G. 1:24
   H. 5:12
   J. 12:1
   K. 12:5

13. Which of the following graphs shows the solution set for the inequality $6x - 5 \geq 7$?
   A. 
   B. 
   C. 
   D. 
   E. 

14. The length of a rectangle is 5 inches longer than the width. The perimeter of the rectangle is 60 inches. What is the width of the rectangle, in inches?
   F. 12
   G. 12.5
   H. 24
   J. 25
   K. 27.5
Use the following information to answer questions 15–17.

Miriam conducted a survey of the students in her 8th-grade class to determine which of 7 Olympic sports were the most popular. Each student who responded to the survey selected 1 Olympic sport as his or her favorite. The circle graph below shows the number of students who selected each of the 7 Olympic sports. A total of 40 students responded to the survey.

15. To the nearest 0.1%, what percent of the students who responded to the survey selected Basketball?

A. 10.0%
B. 12.5%
C. 22.5%
D. 25.0%
E. 30.0%

16. In this survey, what is the ratio of the number of students who selected Athletics to the number of students who selected Soccer?

F. 5:9
G. 5:14
H. 9:5
J. 9:14
K. 9:40

17. In the circle graph, what is the angle measure of the sector that represents the number of students who responded to the survey who selected Tennis?

A. 1°
B. 4\(\frac{1}{2}\)°
C. 5°
D. 9°
E. 10°
18. A spinner dial from a game is shown in the figure below. Each numbered sector of the circle has the same central angle measure. If the arrow on the spinner dial is spun randomly, what is the probability the arrow will point to a sector whose number is both a multiple of 3 and a multiple of 4?

F. \( \frac{3}{8} \)
G. \( \frac{1}{2} \)
H. \( \frac{5}{8} \)
J. \( \frac{3}{4} \)
K. \( \frac{7}{8} \)

19. The counselors at Lakewood High School interviewed 200 students to determine placement in 3 different honors courses: Math, Chemistry, and Literature. The numbers of these students placed in these honors courses are shown in the Venn diagram below. Of these 200 students, 10% were placed into all 3 honors courses, and 35% were placed into exactly 2 honors courses. What percent of the students were placed into exactly 1 honors course?

Lakewood High School
Honors Course Placement

A. 7.5%
B. 10%
C. 32.5%
D. 45%
E. 50%

20. One sign flashes every 4 seconds, and another sign flashes every 14 seconds. At a certain instant, the 2 signs flash at the same time. How many seconds elapse until the 2 signs next flash at the same time?

F. 9
G. 10
H. 18
J. 28
K. 56

21. Which of the following transformations shifts all points graphed in the standard \((x,y)\) coordinate plane down 5 coordinate units?

A. \((x,y) \rightarrow (x, y - 5)\)
B. \((x,y) \rightarrow (x, y + 5)\)
C. \((x,y) \rightarrow (x, -5y)\)
D. \((x,y) \rightarrow (x - 5, y)\)
E. \((x,y) \rightarrow (x + 5, y)\)
22. For \( \overrightarrow{AC} \) shown below, \( B \) is on \( \overrightarrow{AE} \), the length of \( AB \) is 12 cm, and the length of \( BC \) is 20 cm. What is the distance, in centimeters, between \( C \) and the midpoint of \( AB \)?

\[ \begin{array}{c}
A \quad B \quad C \\
\end{array} \]

F. 16
G. 20
H. 22
J. 26
K. 32

23. Which of the following expressions is a factored form of \( x^2 - 5x + 6 \)?

A. \( (x - 3)(x - 2) \)
B. \( (x - 3)(x + 2) \)
C. \( (x - 5)(x - 1) \)
D. \( (x - 5)(x + 1) \)
E. \( (x + 5)(x - 1) \)

24. The sum of \( -2x^2 + 2x + 8 \) and which of the following polynomials is \( 5x^2 + 3 \)?

F. \( 3x^2 + 2x + 11 \)
G. \( -7x^2 + 2x + 5 \)
H. \( 7x^2 - 2x - 5 \)
J. \( -7x^2 + 5 \)
K. \( 7x^2 - 5 \)

25. The expression \( \frac{3 + \frac{1}{9}}{1 + \frac{1}{18}} \) is equal to:

A. \( \frac{9}{19} \)
B. 2
C. \( \frac{21}{2} \)
D. \( \frac{24}{19} \)
E. 5

26. Ava starts with a long list of numbers, each of which she must multiply by \( \frac{4}{3} \) and then divide by \( \frac{1}{6} \). She could get the same results by multiplying each number on her list by which of the following numbers?

F. \( \frac{1}{4} \)
G. \( \frac{3}{4} \)
H. 4
J. 6
K. 8
27. When \(6x = 2y - 18\) is graphed in the standard \((x,y)\) coordinate plane, what is the \(y\)-intercept?
   A. 2
   B. 3
   C. 4
   D. 6
   E. 9

28. Given functions \(f(x) = x - 5\) and \(g(x) = 5 - x^2\), what is \(f(g(-4))\) ?
   F. -76
   G. -20
   H. -16
   J. 16
   K. 86

29. For right triangle \(\triangle ABC\) shown below, which of the following expressions has a value that is equal to \(\cos A\) ?
   A. \(\sin A\)
   B. \(\sin B\)
   C. \(\cos B\)
   D. \(\tan A\)
   E. \(\tan B\)

   \[\text{A} \quad 9 \text{ feet} \quad \text{15 feet} \quad \text{C} \quad 12 \text{ feet} \quad \text{B}\]

30. The equation \(y = \frac{x+3}{x^2-4}\) is graphed in the standard \((x,y)\) coordinate plane below. No point on the graph has which of the following \(x\)-coordinates?
   F. -3
   G. -2
   H. -1
   J. 0
   K. 1

31. The Wilson family sold a shipment of walnuts to a farming cooperative for $210 at the rate of $0.03 per pound. If their shipment averaged 12 walnuts per pound, which of the following is closest to the total number of walnuts in the shipment?
   A. 580
   B. 840
   C. 7,000
   D. 7,600
   E. 84,000
32. Over a 7-day period at Phil's Fitness, the average attendance of the slowest day and the busiest day was 247 members. The average of the other 5 days was also 247 members. The total attendance for the 7-day period at Phil's Fitness was how many members?

F. 247  
G. 494  
H. 1,235  
J. 1,729  
K. 2,470

33. Which of the following values is a zero of \( f(x) = 2x^3 - 5x^2 - 12x \) ?

A. 3  
B. 2  
C. -\( \frac{3}{2} \)  
D. -4  
E. -6

34. The sum of a sequence of consecutive odd numbers, where the smallest term is 1, is always a perfect square. For example, 1 + 3 = 2^2 and 1 + 3 + 5 + 7 = 4^2.
One of the sequences described above has a sum of 144. What is the largest odd number in the sequence?

F. 11  
G. 13  
H. 15  
J. 23  
K. 73

35. What is the slope of the line that passes through the points (-2,5) and (3,-4) in the standard (x,y) coordinate plane?

A. 1  
B. -\( \frac{1}{5} \)  
C. -\( \frac{5}{9} \)  
D. -1  
E. -\( \frac{9}{5} \)

36. Among the following rational numbers, which has the greatest value?

F. 0.34  
G. 0.34  
H. 0.34  
J. 0.343  
K. 0.3409

DO YOUR FIGURING HERE.
Use the following information to answer questions 37–39.

A parabola with equation $y = ax^2$ is graphed in the standard $(x,y)$ coordinate plane below. Point $Z(p,q)$ lies on the parabola.

37. For any point $Z(p,q)$ on the parabola, which of the following points must also be on the parabola?
   A. $(-p,-q)$
   B. $(-p, q)$
   C. $(p,-q)$
   D. $(p^2, q^2)$
   E. $(q, p)$

38. What is the value of $a$ if the coordinates of $Z$ are $(5, 100)$?
   F. $\frac{1}{20}$
   G. 2
   H. 4
   J. 10
   K. 20

39. Suppose that the parabola is rotated clockwise ($\theta$) by $90^\circ$ about the origin. Which of the following is an equation for the parabola that results from this rotation?
   A. $x = -ay^2$
   B. $x = ay^2$
   C. $y = a\sqrt{x}$
   D. $y = -ax^2$
   E. $y = ax^2 + 90$

40. For all $k > 0$, $|x| = |y| = -k$ has how many $(x,y)$ solutions?
   F. 0
   G. 1
   H. 2
   J. 3
   K. 4

GO ON TO THE NEXT PAGE.
41. A Ferris wheel is turning at a constant speed during 1 of its rotations. Let $t$ represent the time that has elapsed since the wheel started turning and let $h$ represent the height above ground level of a certain seat on the wheel. The seat is at its minimum height at $t = a$ seconds and is at its maximum height at $t = b$ seconds. One of the following graphs represents the relationship between $t$ and $h$ during this rotation. Which one?

A. \[ h \]

B. \[ h \]

C. \[ h \]

D. \[ h \]

E. \[ h \]

42. In the figure below, $X$ and $Z$ are on line $m$, and $Y$ is on line $l$. The exterior angle at $XYZ$ at $Z$ measures $160^\circ$. One of the following statements gives sufficient additional information to find the measure of $\angle b$. Which one?

F. Line $l$ is parallel to line $m$.
G. The measure of $\angle d$ is $130^\circ$.
H. The measure of $\angle c$ is equal to the measure of $\angle f$.
J. The measure of $\angle a$ is greater than the measure of $\angle c$.
K. The sum of the measures of $\angle b$, $\angle e$, and $\angle f$ is $180^\circ$.

43. In the figure below, $C$ lies in the interior of the acute angle $\angle ABD$, and $D$ lies in the interior of the acute angle $\angle CBE$. The measure of $\angle ABE$ is $75^\circ$, the measure of $\angle ABC$ is $25^\circ$, and the measure of $\angle DBE$ is $35^\circ$. What is the measure of $\angle ABD$?

A. $15^\circ$
B. $30^\circ$
C. $40^\circ$
D. $50^\circ$
E. $60^\circ$
44. Li is standing at point L on the north side of the small canyon shown in the figure below. As measured by line of sight, Li is 2 miles from an observation tower at T, and she is 3 miles from a scenic overlook at S. Li, the observation tower, and the scenic overlook are all at the same elevation. The measure of \( \angle S \) is 28°. Which of the following equations, when solved, gives the measure of \( \angle T \)?

(Note: For a triangle with sides of length \( a, b, \) and \( c \) that are opposite \( \angle A, \angle B, \) and \( \angle C \), respectively, \( \frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c} \).)

F. \( \frac{\sin T}{3} = \frac{\sin 28^\circ}{2} \)

G. \( \frac{\sin T}{3} = 2 \)

H. \( \frac{\sin T}{2} = \frac{\sin 28^\circ}{3} \)

J. \( \frac{\sin 28^\circ}{T} = \frac{2}{3} \)

K. \( \sin T - \sin 28^\circ = 3 - 2 \)

45. Mr. Green is buying mulch for his triangular-shaped garden shown below. When the mulch is uniformly spread 2 inches deep, each bag of mulch will cover 12 square feet. Mr. Green plans to uniformly spread his mulch 3 inches deep. Which of the following is closest to the number of bags of mulch Mr. Green will need for his garden?

A. 11
B. 17
C. 22
D. 24
E. 33
46. A child’s dose of medicine is often based on an adult’s dose of medicine. For some medicines, Cowling’s rule, 
\[ d = \frac{D(a + 1)}{24} \], relates the dose of \( d \) milligrams for a child of age \( a \) years to the adult dose of \( D \) milligrams.

Which of the following expressions gives \( a \) in terms of \( D \) and \( d \)?

F. \( d - 1 = \frac{D}{24} \)
G. \( \frac{dD}{24} + 1 \)
H. \( \frac{24d - D}{D} \)
J. \( \frac{24d}{D} + 1 \)
K. \( \frac{24d - 1}{D} \)

47. For all \( x > 0 \), which of the following expressions is equivalent to \( \log(2x^2) \)?

A. \( \log x \)
B. \( \log 1 + \log \frac{x}{2} \)
C. \( \log 2 + \frac{1}{2} \log x \)
D. \( \frac{1}{2} \log 2 + \frac{1}{2} \log x \)
E. \( \frac{1}{2} \log 2 \log x \)

48. In \( \triangle AGD \) shown below, \( BE \) is parallel to \( CD \), and the given lengths are in feet. Given that \( CD \) denotes the length, in feet, of \( CD \), which of the following proportions involving \( CD \) must be true?

F. \( \frac{CD}{8} = \frac{16}{28} \)
G. \( \frac{CD}{12} = \frac{8}{16} \)
H. \( \frac{CD}{28} = \frac{8}{16} \)
J. \( \frac{CD}{28} = \frac{16}{8} \)
K. \( \frac{CD}{28} = \frac{8}{\sqrt{320}} \)
49. The graph of \( y = a \sin bx \) is shown below for certain positive values of \( a \) and \( b \). One of the following values is equal to \( a \). Which one?

A. \( \frac{1}{2} \)
B. \( \frac{2}{3} \)
C. \( \frac{3}{2} \)
D. \( 2 \)
E. \( 3 \)

DO YOUR FIGURING HERE.

50. The graph below illustrates the normal distribution curve. The percent of the data that falls within each standard deviation from the mean is given to the nearest 0.1%.

Suppose that the heights of men in a certain population are normally distributed with a mean of 69.0 inches and a standard deviation of 2.7 inches. To the nearest 0.1%, what percent of men in the population are at least 74.4 inches tall?

F. \( 2.3\% \)
G. \( 2.7\% \)
H. \( 4.6\% \)
J. \( 47.7\% \)
K. \( 54.4\% \)

51. Circles with centers \( A \), \( B \), and \( C \), respectively, are mutually tangent, as shown below, and have radii of lengths \( a \), \( b \), and \( c \), respectively. The lengths of \( AB \), \( BC \), and \( AC \) are 13 inches, 15 inches, and 26 inches, respectively. What is the value of \( a + b + c \) ?

(Note: The figure is not drawn to scale.)

A. \( 18 \)
B. \( 24 \)
C. \( 27 \)
D. \( 40 \)
E. \( 54 \)
52. Which of the following sets of 3 lengths, in decimeters, are the side lengths of an obtuse triangle?
(Note: An obtuse triangle has 1 angle whose measure is greater than 90° and less than 180°.)

F. {4, 4, 5}
G. {5, 12, 13}
H. {6, 8, 10}
J. {7, 10, 12}
K. {8, 11, 16}

53. Angle A measures $\frac{\pi}{2}$ radians from its initial side to its terminal side. Angle B has the same initial side and terminal side as Angle A. Which of the following measures could be that of Angle B?

A. 5°
B. 14°
C. 25°
D. 90°
E. 180°

54. A polynomial in $x$ has $m$ nonzero terms. Another polynomial in $x$ has $n$ nonzero terms, where $m < n$. These polynomials are multiplied and all like terms are combined. The resulting polynomial in $x$ has a maximum of how many nonzero terms?

F. $n$
G. $\frac{m+n}{2}$
H. $m + n$
J. $\frac{mn}{2}$
K. $mn$
55. Hannah is building a fence along 3 sides of a rectangle, leaving 2 of the short sides unfenced. The fence has a post at each corner. The rectangle is 30 feet by 48 feet, measured from the centers of the corner posts. As shown in the figure below, adjacent posts of the fence are set every 6 feet, and there are 12 wooden slats between each pair of posts. How many wooden slats will Hannah use for the fence?

A. 72
B. 156
C. 240
D. 252
E. 312

56. Which of the following graphs best represents the system of inequalities below?

\[10 \leq x \leq 40\]

\[0 \leq y \leq 30\]

\[y \geq \frac{1}{3}x + 10\]

\[y \leq -x + 45\]
57. In the diagram below, chord $EF$ is parallel to diameter $AB$. The length of $EF$ is 10 inches and the length of $AB$ is 14 inches. What is the distance, in inches, from $C$, the center of the circle, to $D$, the midpoint of $EF$?

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

58. The entire graph of $y = f(x)$ is shown in the standard $(x,y)$ coordinate plane below. One of the following sets is the domain of $f$. Which set?

F. ${0, 1, 2, 3}$  
G. ${-1, 0, 1, 2}$  
H. ${-1, 0, 1, 2, 3}$  
J. $\{x \mid 0 \leq x \leq 3\}$  
K. $\{x \mid -1 \leq x < 3\}$

59. Let the values of real numbers $a$, $b$, and $c$ be restricted by the 2 conditions given below.

1. $a$ is 5 less than $b$
2. $b$ is at least 3 more than $c$

Which of the following inequalities expresses the same relationship between $a$ and $c$ as given by the 2 conditions?

A. $a \geq c - 2$  
B. $a \geq c + 2$  
C. $a \geq c + 3$  
D. $a \geq c - 8$  
E. $a \geq c + 8$

60. Let $m$ and $n$ be nonzero real numbers such that $2^{n+1} = 2m$. Which of the following is an expression for $2^{n+3}$ in terms of $m$?

F. $\frac{1}{2m^3}$  
G. $\frac{1}{4m}$  
H. $m^3$  
J. $4m^2$  
K. $8m$

END OF TEST 2

STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.
DO NOT RETURN TO THE PREVIOUS TEST.
Passage 1

**Deicers** (mixtures of salt and water that are used on roads to melt ice) can over time cause concrete pavement to deteriorate.

Two studies examined how different deicers affected the length, mass, and compressive strength (CS) of identical cylinders made of hardened concrete. (CS is the maximum lengthwise pressure that can be applied to the ends of a cylinder without crushing it.) Each deicer was 15% by mass of Ca(OH)$_2$, NaCl, MgCl$_2$, or CaCl$_2$ kept at 4°C.

![Figure 1](image1.png)

**Study 1**

Five of the cylinders were submerged in 4 L of the Ca(OH)$_2$ deicer. Every 25 days over the next 600 days, the following was done:

1. The 5 cylinders were removed from the deicer and wiped dry.
2. Each cylinder’s length and mass were measured.
3. Two average values were calculated for the 5 cylinders: the average percent change in length relative to the original length and the average percent change in mass relative to the original mass.
4. The cylinders were resubmerged.

All of the above procedures were repeated for the other deicers (see Figures 1 and 2).

![Figure 2](image2.png)
Study 2

Sixty more of the cylinders were submerged in 20 L of the Ca(OH)₂ deicer. Every 50 days over the next 600 days, the following was done:

1. Five cylinders were removed from the deicer and wiped dry.

2. Each cylinder's CS, in megapascals (MPa), was determined.

3. The average CS was calculated for the 5 cylinders.

All of the above procedures were repeated for the other deicers. Finally, the CS of 5 more of the cylinders—cylinders that had not been submerged in any deicer—was determined, and their average CS was calculated (see Figure 3).

<table>
<thead>
<tr>
<th>Key</th>
<th>deicer</th>
</tr>
</thead>
<tbody>
<tr>
<td>MgCl₂</td>
<td>●●●●</td>
</tr>
<tr>
<td>CaCl₂</td>
<td>●●</td>
</tr>
<tr>
<td>NaCl</td>
<td>●</td>
</tr>
<tr>
<td>Ca(OH)₂</td>
<td>●●</td>
</tr>
</tbody>
</table>

![Figure 3](image)

Figures adapted from Lawrence Sutter et al., "The Deleterious Chemical Effects of Concentrated Deicing Solutions on Portland Cement Concrete," South Dakota Department of Transportation Study SD2002-01. 2008.

2. Which of the following diagrams best shows how pressure was applied to a cylinder to determine its CS?

F. ![Diagram F](image)

H. ![Diagram H](image)

G. ![Diagram G](image)

J. ![Diagram J](image)

3. The change in the mass of the cylinders was caused by the absorption of the deicer into the concrete. Based on Figure 2, the cylinders submerged in which deicer had absorbed, on average, the greatest mass of deicer at 250 days?

A. MgCl₂

B. CaCl₂

C. NaCl

D. Ca(OH)₂

4. Based on the information provided, how many grams of solid NaCl would have had to be dissolved in water to prepare 1,000 grams of the NaCl deicer?

F. 15 g

G. 30 g

H. 150 g

J. 300 g

5. In the studies, it is most likely that the cylinders were submerged in deicers at 4°C because that temperature is:

A. the freezing point of all 4 deicers.

B. the freezing point of water.

C. a typical summer temperature in areas where deicers are used.

D. a typical winter temperature in areas where deicers are used.

6. For pavement made of the same concrete as the cylinders, the minimum CS that is required to maintain a smooth, uncracked road surface is 25 MPa. Based on the results of Study 2, which deicer(s) could most likely be kept in contact with this concrete continuously for 600 days without lowering the average CS of the concrete below 25 MPa?

F. NaCl only

G. MgCl₂ and CaCl₂ only

H. MgCl₂, NaCl, and Ca(OH)₂ only

J. CaCl₂, NaCl, and Ca(OH)₂ only
Passage II

When the nucleus of an atom of a radioactive isotope undergoes certain types of decay, the atom transforms into an atom of a different isotope. An isotope's half-life is the time it takes for half of any given number of its nuclei to decay. An isotope's decay constant, $\lambda$, depends on the isotope's rate of decay. Table 1 gives the value of $\lambda$ (in yr$^{-1}$) for 8 isotopes of different elements.

<table>
<thead>
<tr>
<th>Element</th>
<th>Isotope</th>
<th>$\lambda$ (yr$^{-1}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nickel</td>
<td>Ni-63</td>
<td>0.0069</td>
</tr>
<tr>
<td>Titanium</td>
<td>Ti-44</td>
<td>0.010</td>
</tr>
<tr>
<td>Strontium</td>
<td>Sr-90</td>
<td>0.024</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>H-3</td>
<td>0.056</td>
</tr>
<tr>
<td>Sulfur</td>
<td>S-35</td>
<td>2.9</td>
</tr>
<tr>
<td>Iron</td>
<td>Fe-59</td>
<td>5.7</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>P-32</td>
<td>18</td>
</tr>
<tr>
<td>Iodine</td>
<td>I-131</td>
<td>32</td>
</tr>
</tbody>
</table>

Figures 1 and 2 show, for each of 6 of the isotopes listed in Table 1, the change over time in the number of the nuclei remaining, $N_t$, in a sample initially containing 1,000 of the nuclei.

(Note: In Figure 1, the unit of time is years; in Figure 2, the unit of time is days.)

7. The data in Figure 2 for time = 140 days are best shown by which of the following graphs?
8. According to Figure 2, for which isotope, S-35 or P-32, will the average rate of decay be greater over the first 200 days?
   F. S-35, because at any given time after zero, S-35 will have the lower $N_i$.
   G. S-35, because at any given time after zero, S-35 will have the higher $N_i$.
   H. P-32, because at any given time after zero, P-32 will have the lower $N_i$.
   J. P-32, because at any given time after zero, P-32 will have the higher $N_i$.

9. Based on Table 1 and Figure 1, if a sample initially contains 1,000 Ti-44 atoms, the number of Ti-44 atoms in the sample 20 yr later will most likely be:
   A. less than 300.
   B. between 300 and 600.
   C. between 600 and 900.
   D. greater than 900.

10. According to Figure 1, the half-life of Sr-90 is approximately:
    F. 30 yr.
    G. 90 yr.
    H. 160 yr.
    J. 200 yr.

11. Based on Figure 2, if a sample contained 2,000 atoms of Fe-59 at time = 0, at approximately what time will the $N_i$ of the sample be 400?
    A. 40 days
    B. 60 days
    C. 80 days
    D. 100 days
Passage III

**Transferrin** is a blood protein. When in the presence of iron ions (Fe\(^{3+}\)), each transferrin molecule will bind with 2 Fe\(^{3+}\). **Iron chelators** are used to remove excess iron in the blood because they can bind with and thereby remove Fe\(^{3+}\) from transferrin.

Transferrin bound to Fe\(^{3+}\) strongly absorbs light at a wavelength of 466 nanometers (nm), but unbound transferrin and unbound Fe\(^{3+}\) do not. Three experiments were done using a **colorimeter** (a device that measures a solution's absorbance of light) to study the removal of Fe\(^{3+}\) from transferrin by iron chelators.

**Experiment 1**

Seven solutions (Solutions 1–7) were made, all with an initial unbound transferrin concentration of 100.0 micromoles per liter (μM), but each with a different initial unbound Fe\(^{3+}\) concentration. The solutions were incubated at 37°C for 30 min. A test tube containing a sample of Solution 1 was placed in the colorimeter. The colorimeter was adjusted such that the absorbance reading measured at 466 nm for Solution 1 at 37°C was 0.00. The absorbance at 466 nm of each of Solutions 2–7 at 37°C was then measured (see Table 1).

<table>
<thead>
<tr>
<th>Solution</th>
<th>Initial unbound Fe(^{3+}) concentration (μM)</th>
<th>Absorbance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.0</td>
<td>0.00</td>
</tr>
<tr>
<td>2</td>
<td>50.0</td>
<td>0.35</td>
</tr>
<tr>
<td>3</td>
<td>100.0</td>
<td>0.64</td>
</tr>
<tr>
<td>4</td>
<td>150.0</td>
<td>0.76</td>
</tr>
<tr>
<td>5</td>
<td>200.0</td>
<td>0.80</td>
</tr>
<tr>
<td>6</td>
<td>250.0</td>
<td>0.80</td>
</tr>
<tr>
<td>7</td>
<td>300.0</td>
<td>0.80</td>
</tr>
</tbody>
</table>

**Figure 1**

Figure 1 adapted from Isabelle Turcot et al., "Fast Biological Iron Chelators: Kinetics of Iron Removal from Human Diferro Transferrin by Multidentate Hydroxypyryridonates." ©2000 by Society of Biological Inorganic Chemistry.

**Experiment 2**

For each of 4 trials, 0.0010 mL of solution that contained 10 millimoles of 1 of 4 iron chelators was added to 3 mL of Solution 5. The absorbance at 466 nm was then monitored at 37°C over the next 4,000 sec (see Figure 1).

**Figure 2**

Figure 2 adapted from Erin E. Batin et al., "Using Proteins in a Bioinorganic Laboratory Experiment: Iron Loading and Removal from Transferrin." ©2009 by Division of Chemical Education, Inc., American Chemical Society.

GO ON TO THE NEXT PAGE.
12. When a colorimeter is used, a solution called a *blank* is first placed in the colorimeter to establish a baseline value against which other solutions will be measured. Which of the solutions served as the blank?
   F. Solution 1
   G. Solution 3
   H. Solution 5
   J. Solution 7

13. In each trial of Experiments 2 and 3, how often was an absorbance measurement recorded?
   A. Every 10 sec
   B. Every 50 sec
   C. Every 100 sec
   D. Every 500 sec

14. Based on the experiments, as the concentration of Fe³⁺ bound to transferrin in a solution decreases, the absorbance:
   F. increases only.
   G. decreases only.
   H. varies, but with no general trend.
   J. remains constant.

15. Based on the results of Experiments 2 and 3, the average rate of change in the absorbance during the TREN-HOPO trial was closest to that observed during the trial with what other iron chelator and at what temperature?
   A. TREN-CAM at 25°C
   B. TREN-CAM at 37°C
   C. Deferoxamine at 25°C
   D. Deferoxamine at 32°C

16. Suppose that in Experiment 1, 10 mL of Solution 2 had been mixed with 10 mL of Solution 4 after the solutions were incubated. If the absorbance of a sample of the resulting solution had been measured at 37°C, it would most likely have been closest to which of the following?
   F. 0.35
   G. 0.36
   H. 0.76
   J. 0.80

17. Based on the description of Experiment 1 and of a colorimeter, the material making up the test tube that was placed in the colorimeter most likely:
   A. absorbed little or no light at 466 nm.
   B. strongly absorbed light at 466 nm.
   C. reflected all light that was less than 466 nm.
   D. reflected all light that was greater than 466 nm.
Passage IV

In 2 studies, students recorded the temperature changes that occurred in different liquids when the liquids were heated for 10 min each by various metal coils through which selected amounts of electrical current, \( I \), flowed.

For each trial in the studies, the students carried out the following procedure: First, they poured 400 mL of a liquid into an insulated container fitted with a thermometer and a metal coil and sealed the container (see diagram).

With the liquid, the container, and the coil at room temperature, 25°C, the students began to stir the liquid with a magnetic stirrer. Next, they adjusted the voltage across the ends of the coil until \( I \) reached the desired value, in amps (A). For the next 10 min, they continued to stir the liquid. After 10 min of heating, they recorded \( T \), the liquid’s temperature, in °C, and computed \( \Delta T \), the difference between \( T \) and the liquid’s initial temperature of 25°C.

Study 1

The students computed water’s \( \Delta T \) after 10 min of heating at each of several selected values of \( I \), first with a copper coil, then with an aluminum coil, and finally with a tungsten coil. Plots of water’s \( \Delta T \) versus \( I \) for each metal coil are shown in Figure 1.

Study 2

With the aluminum coil, the students heated ethylene glycol for 10 min at each of the values of \( I \) selected in Study 1. For each value of \( I \), they computed \( \Delta T \). They did likewise with vegetable oil, substituting it for the ethylene glycol. Plots of \( \Delta T \) versus \( I \) for water (from Figure 1), the ethylene glycol, and the vegetable oil are shown in Figure 2.

18. According to the results of the studies, for a given coil and a given liquid, as the current that passed through the coil was increased, \( \Delta T \):

E. increased only.
G. decreased only.
H. varied, but with no general trend.
J. remained the same.

19. Based on the results of the studies, to obtain the lowest \( \Delta T \) after 10 min of heating at a given \( I \) using the apparatus diagrammed in the passage, the students should select which liquid and which metal coil?

<table>
<thead>
<tr>
<th>liquid</th>
<th>metal coil</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. water</td>
<td>copper</td>
</tr>
<tr>
<td>B. water</td>
<td>aluminum</td>
</tr>
<tr>
<td>C. ethylene glycol</td>
<td>tungsten</td>
</tr>
<tr>
<td>D. vegetable oil</td>
<td>aluminum</td>
</tr>
</tbody>
</table>
20. The students stirred each liquid for which of the following reasons?
   
   F. To provide additional heat to the liquid
   G. To ensure that the temperature was uniform throughout the liquid
   H. To prevent the liquid from settling to the bottom of the container
   J. To prevent the liquid from contacting the metal coil

21. Suppose that, in Study 1, the students had also tested a coil made of a fourth metal, Metal X, at \( I = 1.5 \text{ A} \), and determined that after 10 min of heating, \( \Delta T \) was 6°C. Based on Figure 1, if the students had next tested the Metal X coil at \( I = 2.0 \text{ A} \), \( \Delta T \) after 10 min of heating would most likely have been:
   
   A. less than 5°C.
   B. between 5°C and 7°C.
   C. between 7°C and 15°C.
   D. greater than 15°C.

22. Based on the results of Study 2, when vegetable oil was heated with \( I = 1.5 \text{ A} \), \( \Delta T \) at the end of 10 min was closest to which of the following?
   
   F. 30°C
   G. 35°C
   H. 40°C
   J. 45°C

23. Suppose that, in a new study, the tungsten coil with \( I = 2.0 \text{ A} \) is used to heat 200 mL of water. After the water is heated for 10 min, \( \Delta T \) will most likely be:
   
   A. less than 5°C.
   B. between 5°C and 10°C.
   C. between 10°C and 15°C.
   D. greater than 15°C.
Hypothesis 4

Botulin is absorbed from the synaptic cleft by the muscle fiber. Botulin then binds to and breaks down myosin, a protein that is an essential component of the contractile apparatus of a muscle fiber. As a result of this breakdown, the muscle fiber cannot contract.

24. Both Hypothesis 1 and Hypothesis 4 indicate that, in the human body, botulin is:
   F. absorbed by a human cell.
   G. synthesized by a human cell.
   H. destroyed before it leaves the bloodstream.
   J. excreted before it enters the digestive tract.

25. Which of the following statements best characterizes ACh as it is described in the introduction?
   A. It is a hormone because it carries information from a muscle fiber to a synaptic terminal.
   B. It is a hormone because it carries information from a synaptic terminal to a muscle fiber.
   C. It is a neurotransmitter because it carries information from a muscle fiber to a synaptic terminal.
   D. It is a neurotransmitter because it carries information from a synaptic terminal to a muscle fiber.

26. An acetylcholinesterase is a molecule that binds to and breaks down ACh. Which hypothesis indicates that botulin functions like an acetylcholinesterase?
   F. Hypothesis 1
   G. Hypothesis 2
   H. Hypothesis 3
   J. Hypothesis 4

27. In which of the following ways do Hypotheses 3 and 4 differ with regard to how botulin disrupts muscle contraction? Hypothesis 3 asserts that botulin:
   A. breaks down a protein that partially composes the plasma membrane of a neuron; Hypothesis 4 asserts that botulin blocks ACh binding sites.
   B. breaks down a protein that partially composes the contractile apparatus of a muscle fiber; Hypothesis 4 asserts that botulin blocks ACh binding sites.
   C. blocks ACh binding sites; Hypothesis 4 asserts that botulin breaks down a protein that partially composes the plasma membrane of a neuron.
   D. blocks ACh binding sites; Hypothesis 4 asserts that botulin breaks down a protein that partially composes the contractile apparatus of a muscle fiber.
28. In which of the following ways does Hypothesis 1 differ from the other 3 hypotheses with regard to the location in the body where botulin is likely to be found after it is consumed? Only Hypothesis 1 asserts that botulin enters:

- F. NMJs.
- G. neurons.
- H. the bloodstream.
- J. muscle fibers.

29. According to Hypotheses 3 and 4, which of the following statements best describes a step in the mechanism that results in the disruption of function at an NMJ by botulin?

- A. Botulin binds to a protein that is part of a muscle fiber.
- B. Botulin binds to a protein that is part of a neuron.
- C. Botulin synthesizes a type of protein that is also synthesized by a muscle fiber.
- D. Botulin synthesizes a type of protein that is also synthesized by a neuron.

30. Which hypothesis would be best supported by the finding that botulin has a high affinity for the ACh receptors in a motor end plate?

- E. Hypothesis 1
- G. Hypothesis 2
- H. Hypothesis 3
- J. Hypothesis 4
Passage VI

Tasters are people who can taste Chemical P. Nontasters are people who cannot taste Chemical P. The ability to taste Chemical P is determined by Gene T, which has 2 alleles: T and t. In a population that is not evolving—a population in Hardy-Weinberg equilibrium (HWE)—the frequency of allele T is p and the frequency of allele t is q. Table 1 shows the Gene T genotype(s) of tasters and of nontasters and the expression that predicts the frequency of each genotype in a population in HWE. Table 2 shows p, q, and the frequency of each Gene T genotype for 4 populations in HWE.

<table>
<thead>
<tr>
<th>Phenotype</th>
<th>Genotype</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taster</td>
<td>TT</td>
<td>p^2</td>
</tr>
<tr>
<td>Taster</td>
<td>Tt</td>
<td>2pq</td>
</tr>
<tr>
<td>Nontaster</td>
<td>tt</td>
<td>q^2</td>
</tr>
</tbody>
</table>

31. Based on Table 2, in which population would the number of people with the genotype TT and the number of people with the genotype tt be closest to the same?
   A. Population 1
   B. Population 2
   C. Population 3
   D. Population 4

32. The frequency of nontasters is greatest in which population?
   F. Population 1
   G. Population 2
   H. Population 3
   J. Population 4

33. A student concluded that for Population 3, p is greater than q. Is this conclusion consistent with Table 2?
   A. Yes; p = 0.8 and q = 0.64.
   B. Yes; p = 0.8 and q = 0.2.
   C. No; p = 0.8 and q = 0.8.
   D. No; p = 0.8 and q = 0.9.

34. For Population 2, what is the frequency of the genotype TT?
   F. 0.16
   G. 0.4
   H. 0.6
   J. 1

35. People that are heterozygous for Gene T are most common in the population for which p is:
   A. greater than q.
   B. less than q.
   C. equal to q.
   D. not provided.
Passage VII

When an object floats in a liquid, a fraction of the object extends above the surface of the liquid.

Seven objects with different densities were placed in containers of 4 different liquids. Table 1 lists the objects and their densities, in grams per cubic centimeter (g/cm³), at 15°C.

<table>
<thead>
<tr>
<th>Object</th>
<th>Density (g/cm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.100</td>
</tr>
<tr>
<td>2</td>
<td>0.200</td>
</tr>
<tr>
<td>3</td>
<td>0.300</td>
</tr>
<tr>
<td>4</td>
<td>0.400</td>
</tr>
<tr>
<td>5</td>
<td>0.500</td>
</tr>
<tr>
<td>6</td>
<td>0.600</td>
</tr>
<tr>
<td>7</td>
<td>0.700</td>
</tr>
</tbody>
</table>

Table 1

Table 2 lists the 4 liquids and their densities, in g/cm³, at 15°C.

<table>
<thead>
<tr>
<th>Liquid</th>
<th>Density (g/cm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude oil</td>
<td>0.87</td>
</tr>
<tr>
<td>Gasoline</td>
<td>0.74</td>
</tr>
<tr>
<td>Mercury</td>
<td>13.6</td>
</tr>
<tr>
<td>Water</td>
<td>0.99</td>
</tr>
</tbody>
</table>

Table 2

Figure 1 shows, for each liquid, a graph of the fraction of each object extending above the liquid's surface versus the object's density, in g/cm³.

36. Based on Figure 1, for each liquid, as object density increased, the fraction of the object extending above the liquid's surface:
   F. increased only.
   G. decreased only.
   H. varied, but with no general trend.
   J. remained the same.

37. Based on Table 1 and Figure 1, the fraction of Object 6 extending above the surface of the crude oil was closest to which of the following values?
   A. 0.10
   B. 0.20
   C. 0.30
   D. 0.40

38. A material composing a cube has a density of 0.200 g/cm³ at 15°C. Each side of the cube is 10 cm long. The cube floats in a container of water. Based on Figure 1, what volume of the cube, in cm³, will extend above the surface of the water?
   F. 200 cm³
   G. 600 cm³
   H. 800 cm³
   J. 1,000 cm³

39. Suppose an object with a density of 0.99 g/cm³ floats in a container of water, and both the object and the water are at 15°C. If the temperatures of both the object and the water are raised to 90°C, and if the object neither expands nor contracts with the change in temperature, will the object more likely sink or remain afloat?
   A. Sink, because the water will become more dense than the object.
   B. Sink, because the water will become less dense than the object.
   C. Remain afloat, because the water will become more dense than the object.
   D. Remain afloat, because the water will become less dense than the object.

40. What is the meaning of the value for the density of mercury that is given in Table 2?
   F. One g of mercury has a volume of 13.6 cm³.
   G. One g of mercury has a mass of 13.6 cm³.
   H. One cm³ of mercury has a volume of 13.6 g.
   J. One cm³ of mercury has a mass of 13.6 g.

END OF TEST 4
STOP! DO NOT RETURN TO ANY OTHER TEST.
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.

<table>
<thead>
<tr>
<th>Raw Scores</th>
<th>Test 1 English</th>
<th>Test 2 Mathematics</th>
<th>Test 3 Reading</th>
<th>Test 4 Science</th>
<th>Scale Score</th>
</tr>
</thead>
<tbody>
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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.
Explanation of Procedures Used to Obtain Scale Subscores from Raw Scores

For each of the seven subscore areas, the total number of correct responses yields a raw score. Use the table below to convert your raw scores to scale subscores. For each of the seven subscore areas, locate and circle either the 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 subscore that corresponds to that raw score. As you determine your scale subscores, enter them in the blanks provided on the right. The highest possible scale subscore is 18. The lowest possible scale subscore is 1.

If you left a test completely blank and marked no items, do not list any scale subscores for that test.

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<th>Test 2 Mathematics</th>
<th>Test 3 Reading</th>
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Educators debate whether high school students should have an active role in classroom instruction, such as selecting some course materials and leading some class discussions. Some educators support giving students an active role in classroom instruction because they think doing so would increase students’ interest in their classes. Other educators do not support giving students an active role in classroom instruction because they think students would not learn as much from their peers as they would from a teacher. In your opinion, should high school students have an active role in classroom instruction?

In your essay, take a position on this question. You may write about either one of the two points of view given, or you may present a different point of view on this question. Use specific reasons and examples to support your position.
Six-Point Holistic Scoring Rubric for the ACT Writing Test
Papers at each level exhibit all or most of the characteristics described at each score point.

Score = 6
Essays within this score range demonstrate effective skill in responding to the task.

The essay shows a clear understanding of the task. The essay takes a position on the issue and may offer a critical context for discussion. The essay addresses complexity by examining different perspectives on the issue, or by evaluating the implications and/or complications of the issue, or by fully responding to counterarguments to the writer's position. Development of ideas is ample, specific, and logical. Most ideas are fully elaborated. A clear focus on the specific issue in the prompt is maintained. The organization of the essay is clear; the organization may be somewhat predictable or it may grow from the writer's purpose. Ideas are logically sequenced. Most transitions reflect the writer's logic and are usually integrated into the essay. The introduction and conclusion are effective, clear, and well developed. The essay shows a good command of language. Sentences are varied and word choice is varied and precise. There are few, if any, errors to distract the reader.

Score = 5
Essays within this score range demonstrate competent skill in responding to the task.

The essay shows a clear understanding of the task. The essay takes a position on the issue and may offer a broad context for discussion. The essay shows recognition of complexity by partially evaluating the implications and/or complications of the issue, or by responding to counterarguments to the writer's position. Development of ideas is specific and logical. Most ideas are elaborated, with clear movement between general statements and specific reasons, examples, and details. Focus on the specific issue in the prompt is maintained. The organization of the essay is clear, although it may be predictable. Ideas are logically sequenced, although simple and obvious transitions may be used. The introduction and conclusion are clear and generally well developed. Language is competent. Sentences are somewhat varied and word choice is sometimes varied and precise. There may be a few errors, but they are rarely distracting.

Score = 4
Essays within this score range demonstrate adequate skill in responding to the task.

The essay shows an understanding of the task. The essay takes a position on the issue and may offer some context for discussion. The essay may show some recognition of complexity by providing some response to counterarguments to the writer's position. Development of ideas is adequate, with some movement between general statements and specific reasons, examples, and details. Focus on the specific issue in the prompt is maintained throughout most of the essay. The organization of the essay is apparent but predictable. Some evidence of logical sequencing of ideas is apparent, although most transitions are simple and obvious. The introduction and conclusion are clear and somewhat developed. Language is adequate, with some sentence variety and appropriate word choice. There may be some distracting errors, but they do not impede understanding.

Score = 3
Essays within this score range demonstrate some developing skill in responding to the task.

The essay shows some understanding of the task. The essay takes a position on the issue but does not offer a context for discussion. The essay may acknowledge a counterargument to the writer's position, but its development is brief or unclear. Development of ideas is limited and may be repetitious, with little, if any, movement between general statements and specific reasons, examples, and details. Focus on the general topic is maintained, but focus on the specific issue in the prompt may not be maintained. The organization of the essay is simple. Ideas are logically grouped within parts of the essay, but there is little or no evidence of logical sequencing of ideas. Transitions, if used, are simple and obvious. An introduction and conclusion are clearly discernible but underdeveloped. Language shows a basic control. Sentences show a little variety and word choice is appropriate. Errors may be distracting and may occasionally impede understanding.

Score = 2
Essays within this score range demonstrate inconsistent or weak skill in responding to the task.

The essay shows a weak understanding of the task. The essay may not take a position on the issue, or the essay may take a position but fail to convey reasons to support that position, or the essay may take a position but fail to maintain a stance. There is little or no recognition of a counterargument to the writer's position. The essay is thinly developed. If examples are given, they are general and may not be clearly relevant. The essay may include extensive repetition of the writer's ideas or of ideas in the prompt. Focus on the general topic is maintained, but focus on the specific issue in the prompt may not be maintained. There is some indication of an organizational structure, and some logical grouping of ideas within parts of the essay is apparent. Transitions, if used, are simple and obvious, and they may be inappropriate or misleading. An introduction and conclusion are discernible but minimal. Sentence structure and word choice are usually simple. Errors may be frequently distracting and may sometimes impede understanding.

Score = 1
Essays within this score range show little or no skill in responding to the task.

The essay shows little or no understanding of the task. If the essay takes a position, it fails to convey reasons to support that position. The essay is minimally developed. The essay may include excessive repetition of the writer's ideas or of ideas in the prompt. Focus on the general topic is usually maintained, but focus on the specific issue in the prompt may not be maintained. There is little or no evidence of an organizational structure or of the logical grouping of ideas. Transitions are rarely used. If present, an introduction and conclusion are minimal. Sentence structure and word choice are simple. Errors may be frequently distracting and may significantly impede understanding.

No Score
Blank, Off-Topic, Illegible, Not in English, or Void