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.
Passage 1

Researchers studied how diet and the ability to smell food can affect the life span of normal fruit flies (Strain N) and fruit flies unable to detect many odors (Strain X).

Study 1

Three tubes (Tubes 1–3), each with 15% sugar yeast (SY) medium (a diet with 15% sugar and 15% killed yeast), were prepared. Then, 200 virgin female Strain N fruit flies less than 24 hr old were added to each tube. No additional substance was added to Tube 1. Additional odors from live yeast were added to Tube 2, and live yeast was added to Tube 3. The percent of fruit flies alive was determined every 5 days for 75 days (see Figure 1).

Study 2

Three tubes (Tubes 4–6), each with 5% SY medium (a diet with 5% sugar and 5% killed yeast), were prepared. Then, 200 virgin female Strain N fruit flies less than 24 hr old were added to each tube. No additional substance was added to Tube 4. Additional odors from live yeast were added to Tube 5, and live yeast was added to Tube 6. The percent of fruit flies alive was determined every 5 days for 75 days (see Figure 2).
Study 3

Strain N fruit flies were modified to produce Strain X fruit flies. Strain X fruit flies lack Or83b (a protein required to detect a wide range of odors); therefore, they cannot detect many odors. The average life span was determined for virgin female Strain N and virgin female Strain X fruit flies fed with various SY media (see Table 1).

Table 1

<table>
<thead>
<tr>
<th>SY medium</th>
<th>Average % killed (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% sugar</td>
<td>% killed yeast</td>
</tr>
<tr>
<td>Strain N</td>
<td>3 3 50.1</td>
</tr>
<tr>
<td></td>
<td>5 5 50.1</td>
</tr>
<tr>
<td></td>
<td>7.5 7.5 43.9</td>
</tr>
<tr>
<td></td>
<td>10 10 44.8</td>
</tr>
<tr>
<td></td>
<td>15 15 41.6</td>
</tr>
<tr>
<td>Strain X</td>
<td>3 3 61.6</td>
</tr>
<tr>
<td></td>
<td>5 5 62.5</td>
</tr>
<tr>
<td></td>
<td>7.5 7.5 58.9</td>
</tr>
<tr>
<td></td>
<td>10 10 58.6</td>
</tr>
<tr>
<td></td>
<td>15 15 55.6</td>
</tr>
</tbody>
</table>

Table and figures adapted from Sergiy Libert et al., "Regulation of Drosophila Life Span by Olfaction and Food-Derived Odors." ©2007 by the American Association for the Advancement of Science.

1. In which of Studies 1 and 2 did some of the fruit flies live for more than 75 days, and what diet were those fruit flies fed?
   A. Study 1; 5% SY medium
   B. Study 1; 15% SY medium
   C. Study 2; 5% SY medium
   D. Study 2; 15% SY medium

2. During Studies 1 and 2, why did the size of the fruit fly population in each tube decrease rather than increase?
   F. The birthrate was 0, because the initial population contained only males.
   G. The birthrate was 0, because the initial population contained only virgin females.
   H. The death rate was 0, because the initial population contained only males.
   J. The death rate was 0, because the initial population contained only virgin females.

3. Suppose that an additional trial in Study 3 had been performed using a 12% SY medium (a diet with 12% sugar and 12% killed yeast). The average life span of the Strain X fruit flies in this trial would most likely have been:
   A. less than 55.6 days.
   B. between 55.6 days and 58.6 days.
   C. between 58.6 days and 61.6 days.
   D. greater than 61.6 days.

4. The researchers had predicted that decreasing a fruit fly's ability to detect odors would increase its life span. Are the results of Study 3 consistent with this prediction?
   F. No; for each SY medium tested, the average life span of Strain X fruit flies was longer than the average life span of Strain N fruit flies.
   G. No; for each SY medium tested, the average life span of Strain N fruit flies was longer than the average life span of Strain X fruit flies.
   H. Yes; for each SY medium tested, the average life span of Strain X fruit flies was longer than the average life span of Strain N fruit flies.
   J. Yes; for each SY medium tested, the average life span of Strain N fruit flies was longer than the average life span of Strain X fruit flies.

5. Suppose the researchers wanted to determine whether a defect in the ability to detect odors would change the life span of fruit flies fed 15% SY medium when live yeast is added to the diet or when additional odors from live yeast are added to the diet. Which of the following experiments should be performed?
   A. Repeat Study 1 except with Strain X fruit flies
   B. Repeat Study 1 except with Strain N fruit flies
   C. Repeat Study 2 except with Strain X fruit flies
   D. Repeat Study 2 except with Strain N fruit flies

6. The results for which 2 tubes should be compared to determine how a reduced calorie diet affects life span in the absence of live yeast and additional odors from live yeast?
   F. Tube 1 and Tube 4
   G. Tube 1 and Tube 2
   H. Tube 2 and Tube 5
   J. Tube 5 and Tube 6
Passage II

In the fall, monarch butterflies (*Danaus plexippus*) in eastern North America migrate to Mexico, where they overwinter in high-altitude forests of oyamel fir (an evergreen conifer). The butterflies store (accumulate) body lipids to use as a source of energy at a later time. Consider the following 3 hypotheses pertaining to when the butterflies store lipids and when the energy from the stored lipids is used, with respect to migration and overwintering.

**Hypothesis 1**
Monarch butterflies require energy from stored lipids for migration and during the overwintering period. The butterflies first store lipids before they begin their migration. During migration, as stored lipids are converted to energy, lipid mass continuously decreases. When the butterflies reach the overwintering sites, ending their migration, they must store lipids again before beginning the overwintering period.

**Hypothesis 2**
Monarch butterflies require energy from stored lipids for migration but not during the overwintering period. The butterflies store lipids before they begin their migration. During migration, as stored lipids are converted to energy, lipid mass continuously decreases. Because energy from stored lipids is not required during the overwintering period, the butterflies do not store lipids while at the overwintering sites.

**Hypothesis 3**
Monarch butterflies require energy from stored lipids during the overwintering period but not for migration. The butterflies do not store lipids before they begin their migration. Instead, lipids are stored during migration; therefore, lipid mass continuously increases from the beginning of migration until the end of migration. The butterflies arrive at the overwintering sites with enough lipids to provide themselves with energy during the overwintering period, so they do not store lipids while at the overwintering sites.

7. Which hypothesis, if any, asserts that monarch butterflies store lipids during 2 distinct periods?
   A. Hypothesis 1
   B. Hypothesis 2
   C. Hypothesis 3
   D. None of the hypotheses

8. Which hypothesis, if any, asserts that monarch butterflies require energy from stored lipids neither for migration nor during the overwintering period?
   F. Hypothesis 1
   G. Hypothesis 2
   H. Hypothesis 3
   J. None of the hypotheses

9. Based on Hypothesis 3, which of the following figures best depicts the change in the lipid mass of a monarch butterfly from the beginning of migration to the end of migration?
   (Note: In each figure, B represents the beginning of migration and E represents the end of migration.)
   A.
   B.
   C.
   D.

GO ON TO THE NEXT PAGE.
10. Assume that changes in the body mass of a monarch butterfly are caused only by changes in the mass of the butterfly's stored lipids. The statement "The percent of a monarch butterfly's body mass that is made up of lipids is greater at the beginning of migration than at the end of migration" is supported by which of the hypotheses?
   F. Hypothesis 1 only
   G. Hypothesis 2 only
   H. Hypotheses 1 and 2 only
   J. Hypotheses 1, 2, and 3

11. To store lipids, monarch butterflies convert sugar from nectar they have consumed into lipids. A supporter of which hypothesis, if any, would be likely to claim that to ensure the butterflies can store lipids for the overwintering period, nectar must be present at the butterflies' overwintering sites?
   A. Hypothesis 1
   B. Hypothesis 2
   C. Hypothesis 3
   D. None of the hypotheses

12. Which of the following statements about lipids in monarch butterflies is consistent with all 3 hypotheses?
   F. The butterflies' lipid masses do not change during the overwintering period.
   G. The butterflies' lipid masses change during migration.
   H. The butterflies use energy from stored lipids during the overwintering period.
   J. The butterflies use energy from stored lipids for migration.

13. When the monarch butterflies use their stored lipids, the lipids must be broken down to produce energy-rich molecules that can be readily used by cells. Which of the following molecules is produced as a direct result of the breakdown of the lipids?
   A. ATP
   B. Starch
   C. DNA
   D. Amino acids
Passage III

Greenhouse gases such as methane (CH₄) warm Earth's climate. Figure 1 shows the concentration of CH₄ in Earth's atmosphere and the solar radiation intensity at Earth's surface for tropical Europe and Asia over the past 250,000 years. As the figure shows, the CH₄ concentration and the solar radiation intensity have increased and decreased at the same times over most of this period. Figure 2 shows the same types of data for the same region over the past 11,000 years. This figure is consistent with the hypothesis that the greenhouse gases from human activities may have begun warming Earth's climate thousands of years earlier than once thought.

*ppb = parts per billion

Figure 1
14. According to Figure 2, the solar radiation intensity 8,000 years ago was closest to which of the following?
   F. 490 watts/m²
   G. 495 watts/m²
   H. 500 watts/m²
   J. 505 watts/m²

15. According to Figure 2, if the trend in the CH₄ concentration had continued to match the trend in the solar radiation intensity, the CH₄ concentration at present would most likely be:
   A. less than 550 ppb.
   B. between 550 ppb and 600 ppb.
   C. between 600 ppb and 650 ppb.
   D. greater than 650 ppb.

16. Suppose that whenever the CH₄ concentration increases, a corresponding, immediate increase in average global temperature occurs, and that whenever the CH₄ concentration decreases, a corresponding, immediate decrease in average global temperature occurs. Based on Figure 2, which of the following graphs best represents a plot of average global temperature over the past 11,000 years?

17. Based on Figure 1, the average solar radiation intensity over the past 250,000 years was closest to which of the following?
   A. 400 watts/m²
   B. 440 watts/m²
   C. 480 watts/m²
   D. 520 watts/m²

18. One solar radiation cycle is the time between a maximum in the solar radiation intensity and the next maximum in the solar radiation intensity. According to Figure 1, the average length of a solar radiation cycle during the past 250,000 years was:
   E. less than 15,000 years.
   G. between 15,000 years and 35,000 years.
   H. between 35,000 years and 55,000 years.
   J. greater than 55,000 years.
Passage IV

An ideal gas is a hypothetical gas that behaves exactly as predicted by the ideal gas law. Depending on the conditions, an ideal gas may or may not be a good model for a real gas. The compressibility factor \( z \) is a value that quantifies the deviation of a gas from ideal behavior. Figure 1 shows, for an ideal gas and for 5 real gases, how \( z \) varies with pressure (in atmospheres, atm) at 0\(^\circ\)C. Table 1 shows how the volume of 1 mole \((6 \times 10^{23}\) atoms or molecules\) of gas varies with pressure for an ideal gas, for 3 of those 5 real gases, and for air.

![Figure 1](image)

Table 1

<table>
<thead>
<tr>
<th>Pressure (atm)</th>
<th>Volume (in mL) of gas at 0(^\circ)C</th>
<th>ideal gas</th>
<th>He</th>
<th>N(_2)</th>
<th>CH(_4)</th>
<th>air</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td></td>
<td>2,241</td>
<td>2,258</td>
<td>2,219</td>
<td>2,180</td>
<td>2,216</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td>1,121</td>
<td>1,136</td>
<td>1,098</td>
<td>1,061</td>
<td>1,096</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td>747.2</td>
<td>763.7</td>
<td>725.4</td>
<td>686.0</td>
<td>723.4</td>
</tr>
<tr>
<td>40</td>
<td></td>
<td>560.4</td>
<td>577.0</td>
<td>539.5</td>
<td>499.2</td>
<td>536.8</td>
</tr>
</tbody>
</table>

Figure and table adapted from E. D. Eastman and G. R. Rollefson, Physical Chemistry, 1st ed. ©1947 by McGraw-Hill Book Co.

19. Based on Table 1, at 0\(^\circ\)C and 15 atm, the volume of 1 mole of air will most likely be closest to which of the following?
   A. 600 mL
   B. 900 mL
   C. 1,500 mL
   D. 2,500 mL

20. According to Figure 1, as pressure increases from 1 atm to 50 atm at 0\(^\circ\)C, the compressibility factor of an ideal gas:
   F. increases only.
   G. decreases only.
   H. increases, then decreases.
   J. remains constant.

21. A chemist claimed that CH\(_4\) will deviate more from ideal behavior than will H\(_2\). Does Figure 1 support this claim?
   A. Yes, because the magnitude of the slope of the line for CH\(_4\) is less than it is for H\(_2\).
   B. Yes, because the magnitude of the slope of the line for CH\(_4\) is greater than it is for H\(_2\).
   C. No, because the magnitude of the slope of the line for CH\(_4\) is less than it is for H\(_2\).
   D. No, because the magnitude of the slope of the line for CH\(_4\) is greater than it is for H\(_2\).

22. Based on Figure 1 and Table 1, at 0\(^\circ\)C and 30 atm, the volume of 1 mole of O\(_2\) will most likely be:
   F. less than 686 mL.
   G. between 686 mL and 725 mL.
   H. between 725 mL and 764 mL.
   J. greater than 764 mL.

23. Based on Table 1, at 40 atm, the volume of 1 mole of CH\(_4\) at a temperature of −30\(^\circ\)C will most likely be:
   A. less than 500 mL.
   B. between 500 mL and 1,000 mL.
   C. between 1,000 mL and 2,000 mL.
   D. greater than 2,000 mL.
4

Passage V

In 2 experiments, a student pulled each of 3 blocks in a straight line across a flat, horizontal surface.

In Experiment 1, the student measured the **pulling force** (the force required to move each block at a constant speed) and plotted the pulling force, in newtons (N), versus block mass, in kilograms (kg). The results are shown in Figure 1.

In Experiment 2, the student measured the speed versus time of a 2.00 kg block, a 2.50 kg block, and a 3.00 kg block as each block was pulled across the surface with a constant 30 N force. The results are shown in Figure 2.

![Figure 1](image1)

**Figure 1**

![Figure 2](image2)

**Figure 2**

24. Based on Figure 2, what is the order of the 3 blocks, from the block that required the shortest time to reach 15 m/sec to the block that required the longest time to reach 15 m/sec?

F. 2.00 kg block, 2.50 kg block, 3.00 kg block
G. 2.00 kg block, 3.00 kg block, 2.50 kg block
H. 3.00 kg block, 2.00 kg block, 2.50 kg block
J. 3.00 kg block, 2.50 kg block, 2.00 kg block

25. Based on Figure 2, what was the approximate value of the acceleration of the 3.00 kg block?

A. 0.0 m/sec^2
B. 5.0 m/sec^2
C. 15.0 m/sec^2
D. 20.0 m/sec^2

26. Based on Figure 1, the results of Experiment 1 are best modeled by which of the following equations?

F. Block speed (m/sec) = 0.2 × time (sec)
G. Block speed (m/sec) = 5.0 × time (sec)
H. Pulling force (N) = 0.2 × block mass (kg)
J. Pulling force (N) = 5.0 × block mass (kg)

27. At each of the times plotted in Figure 2 (except 0.00 sec), as block mass increased, block speed:

A. increased only.
B. decreased only.
C. varied, but with no general trend.
D. remained the same.

28. Based on Figure 1, an applied force of 30.00 N would most likely have been required to maintain the constant speed of a block having a mass of:

F. 4.00 kg.
G. 5.00 kg.
H. 6.00 kg.
J. 7.00 kg.

GO ON TO THE NEXT PAGE.
Passage VI

A typical acid-base indicator is a compound that will be one color over a certain lower pH range but will be a different color over a certain higher pH range. In the small range between these pH ranges—the transition range—the indicator’s color will be an intermediate of its other 2 colors.

Students studied 5 acid-base indicators using colorless aqueous solutions of different pH and a well plate (a plate containing a matrix of round depressions—wells—that can hold small volumes of liquid).

Experiment 1

The students added a pH = 0 solution to 5 wells in the first column of the well plate, then added a pH = 1 solution to the 5 wells in the next column, and so on, up to pH = 7. Next, they added a drop of a given indicator (in solution) to each of the wells in a row, and then repeated this process, adding a different indicator to each row. The color of the resulting solution in each well was then recorded in Table 1 (B = blue, G = green, O = orange, P = purple, R = red, Y = yellow).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Color in solution with a pH of:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>Metanil yellow</td>
<td>R R O Y Y Y Y</td>
</tr>
<tr>
<td>Resorcin blue</td>
<td>R R R R R R R P P B</td>
</tr>
<tr>
<td>Curcumin</td>
<td>Y Y Y Y Y Y Y Y Y</td>
</tr>
<tr>
<td>Hessian bordeaux</td>
<td>B B B B B B B B B B</td>
</tr>
<tr>
<td>Indigo carmine</td>
<td>B B B B B B B B B B</td>
</tr>
</tbody>
</table>

Table adapted from David R. Lide, ed., CRC Handbook of Chemistry and Physics, 78th ed. ©1997 by CRC Press LLC.

Experiment 2

Experiment 1 was repeated with solutions that had a pH of 8 or greater (see Table 2).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Color in solution with a pH of:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8 9 10 11 12 13 14</td>
</tr>
<tr>
<td>Metanil yellow</td>
<td>Y Y Y Y Y Y Y</td>
</tr>
<tr>
<td>Resorcin blue</td>
<td>B B B B B B B</td>
</tr>
<tr>
<td>Curcumin</td>
<td>O R R R R R R</td>
</tr>
<tr>
<td>Hessian bordeaux</td>
<td>B R R R R R R</td>
</tr>
<tr>
<td>Indigo carmine</td>
<td>B B B B B G Y Y</td>
</tr>
</tbody>
</table>

Experiment 3

Students were given 4 solutions (Solutions I–IV) of unknown pH. The well plate was used to test samples of each solution with 4 of the 5 indicators (see Table 3).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Color in Solution:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I  II III IV</td>
</tr>
<tr>
<td>Metanil yellow</td>
<td>Y Y Y Y O</td>
</tr>
<tr>
<td>Resorcin blue</td>
<td>B B R R R</td>
</tr>
<tr>
<td>Curcumin</td>
<td>R R Y Y Y</td>
</tr>
<tr>
<td>Indigo carmine</td>
<td>B Y B B B</td>
</tr>
</tbody>
</table>

Tables adapted from David R. Lide, ed., CRC Handbook of Chemistry and Physics, 78th ed. ©1997 by CRC Press LLC.
29. One way Experiment 2 differed from Experiment 3 was that in Experiment 2:
   A. the solutions to which indicators were added were of known pH.
   B. the solutions to which indicators were added were of unknown pH.
   C. metanil yellow was used.
   D. metanil yellow was not used.

30. Based on the description of the well plate and how it was used, the empty well plate would most likely have been which of the following colors?
   F. Black
   G. Blue
   H. Red
   J. White

31. Based on the results of Experiments 1 and 2, which of the following is a possible transition range for curcumin?
   A. pH = 3.9 to pH = 7.3
   B. pH = 4.2 to pH = 6.6
   C. pH = 7.4 to pH = 8.6
   D. pH = 8.4 to pH = 9.5

32. A chemist has 2 solutions, one of pH = 1 and one of pH = 6. Based on the results of Experiments 1 and 2, could indigo carmine be used to distinguish between these solutions?
   F. No; indigo carmine is blue at both pH = 1 and pH = 6.
   G. No; indigo carmine is blue at pH = 1 and is yellow at pH = 6.
   H. Yes; indigo carmine is blue at both pH = 1 and pH = 6.
   J. Yes; indigo carmine is blue at pH = 1 and is yellow at pH = 6.

33. A student claimed that Solution III has a pH of 7.3. Are the results of Experiments 1–3 consistent with this claim?
   A. No, because in Solution III metanil yellow was yellow.
   B. No, because in Solution III resorcin blue was red.
   C. Yes, because in Solution III metanil yellow was yellow.
   D. Yes, because in Solution III resorcin blue was red.

34. Based on the results of Experiments 1–3, which of Solutions I–IV has the lowest pH?
   F. Solution I
   G. Solution II
   H. Solution III
   J. Solution IV
Passage VII

Drilling mud (DM) is a suspension of clay particles in water. When a well is drilled, DM is injected into the hole to lubricate the drill. After this use, the DM is brought back up to the surface and then disposed of by spraying it on adjacent land areas.

A cover of DM on plants and soil can affect the albedo (proportion of the total incoming solar radiation that is reflected from a surface), which in turn can affect the soil temperature. The effect of a cover of DM on the albedo and the soil temperature of an unsloped, semiarid grassland area was studied from July 1 to August 9 of a particular year.

On June 30, 3 plots (Plots 1–3), each 10 m by 40 m, were established in the grassland area. For all the plots, the types of vegetation present were the same, as was the density of the vegetation cover. At the center of each plot, a soil temperature sensor was buried in the soil at a depth of 2.5 cm. An instrument that measures incoming and reflected solar radiation was suspended 60 cm above the center of each plot.

An amount of DM equivalent to 40 cubic meters per hectare (m³/ha) was then sprayed evenly on Plot 2. (One hectare equals 10,000 m².) An amount equivalent to 80 m³/ha was sprayed evenly on Plot 3. No DM was sprayed on Plot 1.

For each plot, the albedo was calculated for each cloudless day during the study period using measurements of incoming and reflected solar radiation taken at noon on those days (see Figure 1).

For each plot, the sensor recorded the soil temperature every 5 sec over the study period. From these data, the average soil temperature of each plot was determined for each day (see Figure 2).

35. Albedo was measured at noon because that time of day is when solar radiation reaching the ground is:
   A. 100% reflected.
   B. 100% absorbed.
   C. least intense.
   D. most intense.

36. Why was the study designed so that the 3 plots had the same types of vegetation present and the same density of vegetation cover? These conditions ensured that any variations in albedo and soil temperature would most likely be attributable only to variations among the plots in the:
   F. amount of DM sprayed.
   G. type of soil present.
   H. plot area.
   J. plot slope.
37. For each plot, the number of temperature readings recorded by the soil temperature sensor every minute was closest to which of the following?
   A. 5
   B. 12
   C. 50
   D. 60

38. According to Figure 1 and the description of the study, was July 20 a cloudless day?
   F. No, because albedo data were not collected on that day.
   G. No, because albedo data were collected on that day.
   H. Yes, because albedo data were not collected on that day.
   J. Yes, because albedo data were collected on that day.

39. According to the results of the study, did the presence of a cover of DM increase or decrease the albedo, and did the presence of a cover of DM increase or decrease the soil temperature?

<table>
<thead>
<tr>
<th>Albedo</th>
<th>Soil Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase</td>
<td>Increase</td>
</tr>
<tr>
<td>Increase</td>
<td>Decrease</td>
</tr>
<tr>
<td>Decrease</td>
<td>Decrease</td>
</tr>
<tr>
<td>Decrease</td>
<td>Increase</td>
</tr>
</tbody>
</table>

40. Based on Figure 1, on August 3, what percent of incoming solar radiation was NOT reflected from Plot 2?
   F. 20%
   G. 40%
   H. 60%
   J. 80%

END OF TEST 4
STOP! DO NOT RETURN TO ANY OTHER TEST.
1. The monthly fees for single rooms at 5 colleges are $370, $310, $380, $340, and $310, respectively. What is the mean of these monthly fees?
   A. $310  
   B. $340  
   C. $342  
   D. $350  
   E. $380  

2. Disregarding sales tax, how much will you save when you buy a $12.00 compact disc that is on sale for 25% off?
   F. $0.30  
   G. $0.48  
   H. $3.00  
   J. $5.00  
   K. $9.00  

3. Given \( f = cd^2 \), \( f = 450 \), and \( d = 10 \), what is \( c \)?
   A. 0.45  
   B. 4.5  
   C. 15  
   D. 45  
   E. 150  

4. Jorge's current hourly wage for working at Denti Smiles is $12.00. Jorge was told that at the beginning of next month, his new hourly wage will be an increase of 6% of his current hourly wage. What will be Jorge's new hourly wage?
   F. $12.06  
   G. $12.60  
   H. $12.72  
   J. $18.00  
   K. $19.20  

5. The first term is 1 in the geometric sequence 1, −3, 9, −27, …, What is the SEVENTH term of the geometric sequence?
   A. −243  
   B. −30  
   C. 81  
   D. 189  
   E. 729  

DO YOUR FIGURING HERE.
6. If $\sqrt{a} = b$ and $b = 36$, $a =$ ?
   F. 6
   G. 18
   H. 72
   J. 324
   K. 1,296

7. The shipping rate for customers of Ship Quick consists of a fee per box and a price per pound for each box. The table below gives the fee and the price per pound for customers shipping boxes of various weights.

<table>
<thead>
<tr>
<th>Weight of box (pounds)</th>
<th>Fee</th>
<th>Price per pound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 10</td>
<td>$5.00</td>
<td>$1.00</td>
</tr>
<tr>
<td>10–25</td>
<td>$10.00</td>
<td>$0.65</td>
</tr>
<tr>
<td>More than 25</td>
<td>$20.00</td>
<td>$0.30</td>
</tr>
</tbody>
</table>

Gregg wants Ship Quick to ship 1 box that weighs 15 pounds. What is the shipping rate for this box?
   A. $ 9.75
   B. $16.50
   C. $19.75
   D. $20.00
   E. $24.50

8. The table below shows the number of cars Jing sold each month last year. What is the median of the data in the table?

<table>
<thead>
<tr>
<th>Month</th>
<th>Number of cars sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>25</td>
</tr>
<tr>
<td>February</td>
<td>15</td>
</tr>
<tr>
<td>March</td>
<td>22</td>
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<tr>
<td>April</td>
<td>19</td>
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<td>May</td>
<td>16</td>
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<td>June</td>
<td>13</td>
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<td>July</td>
<td>19</td>
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<td>August</td>
<td>25</td>
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<td>September</td>
<td>26</td>
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<td>October</td>
<td>27</td>
</tr>
<tr>
<td>November</td>
<td>28</td>
</tr>
<tr>
<td>December</td>
<td>29</td>
</tr>
</tbody>
</table>

   F. 13
   G. 16
   H. 19
   J. 20.5
   K. 23.5

9. Students studying motion observed a cart rolling at a constant rate along a straight line. The table below gives the distance, $d$ feet, the cart was from a reference point at 1-second intervals from $t = 0$ seconds to $t = 5$ seconds.

<table>
<thead>
<tr>
<th>$t$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>$d$</td>
<td>14</td>
<td>20</td>
<td>26</td>
<td>32</td>
<td>38</td>
<td>44</td>
</tr>
</tbody>
</table>

Which of the following equations represents this relationship between $d$ and $t$?
   A. $d = t + 14$
   B. $d = 6t + 8$
   C. $d = 6t + 14$
   D. $d = 14t + 6$
   E. $d = 34t$
10. If \( x + \frac{5}{8} = \frac{5}{24} \), then \( x = ? \)

F. 3
G. \( \frac{5}{6} \)
H. \( \frac{1}{3} \)
J. 0
K. \( -\frac{5}{12} \)

11. The absolute value of which of the following numbers is the greatest?

A. \(-0.4\)
B. \(-0.042\)
C. \(-0.0048\)
D. \(0.04\)
E. \(0.047\)

12. In the figure below, \( C \) is the intersection of \( \overline{AD} \) and \( \overline{BE} \). If it can be determined, what is the measure of \( \angle BAC \)?

F. \( 80^\circ \)
G. \( 100^\circ \)
H. \( 110^\circ \)
J. \( 115^\circ \)
K. Cannot be determined from the given information

13. This month, Kami sold 70 figurines in 2 sizes. The large figurines sold for $12 each, and the small figurines sold for $8 each. The amount of money he received from the sales of the large figurines was equal to the amount of money he received from the sales of the small figurines. How many large figurines did Kami sell this month?

A. 20
B. 28
C. 35
D. 42
E. 50

14. Given that \( \sqrt{2x} - 11 = 1 \), \( x = ? \)

F. \(-50\)
G. 24
H. 36
J. 50
K. 72
15. Antwan drew the circle graph below describing his time spent at school in 1 day. His teacher said that the numbers of hours listed were correct, but that the central angle measures for the sectors were not correct. What should be the central angle measure for the Core subjects sector?

A. 72°  
B. 80°  
C. 160°  
D. 200°  
E. 288°

16. The area of a rectangular sheet of paper is 32 square inches. The length of the sheet of paper is twice its width. What is the perimeter, in inches, of the sheet of paper?

F. 4  
G. 8  
H. 12  
J. 16  
K. 24

17. A car accelerated from 88 feet per second (fps) to 220 fps in exactly 3 seconds. Assuming the acceleration was constant, what was the car’s acceleration, in feet per second per second, from 88 fps to 220 fps?

A. \( \frac{1}{44} \)  
B. \( 29\frac{1}{3} \)  
C. 44  
D. \( 75\frac{1}{3} \)  
E. \( 102\frac{2}{3} \)

18. In scientific notation, \( 670,000,000 + 700,000,000 = ? \)

F. \( 1.37 \times 10^9 \)  
G. \( 1.37 \times 10^7 \)  
H. \( 1.37 \times 10^8 \)  
J. \( 1.37 \times 10^9 \)  
K. \( 137 \times 10^{15} \)
19. In a plane, the distinct lines $AB$ and $CD$ intersect at $A$, where $A$ is between $C$ and $D$. The measure of $\angle BAC$ is $47^\circ$. What is the measure of $\angle BAD$?

A. $43^\circ$
B. $47^\circ$
C. $94^\circ$
D. $133^\circ$
E. $137^\circ$

20. Which of the following expressions is equivalent to $\frac{(3x)^2}{x}$?

F. $3x^2$
G. $6x^3$
H. $9x^3$
J. $3x^5$
K. $6x^7$

21. Whenever $4x + 7 = 2x - g$, which of the following expressions must be equal to $x$?

A. $\frac{-g + 7}{2}$
B. $\frac{-g - 7}{2}$
C. $\frac{2g + 7}{6}$
D. $\frac{g}{2}$
E. $\frac{7}{4}$

22. For trapezoid $ABCD$ shown below, $AB \parallel DC$, the measures of the interior angles are distinct, and the measure of $\angle D$ is $x^\circ$. What is the degree measure of $\angle A$ in terms of $x$?

F. $(180 - x)^\circ$
G. $(180 - 0.5x)^\circ$
H. $(180 + 0.5x)^\circ$
J. $(180 + x)^\circ$
K. $x^\circ$

23. Which of the following expressions is equivalent to $\frac{1}{2}y^2(6x + 2y + 12x - 2y)$?

A. $9xy^2$
B. $18xy$
C. $3xy^2 + 12x$
D. $9xy^2 - 2y^3$
E. $3xy^2 + 12x - y^3 - 2y$
24. Sara and Behzad are saving to make a down payment on a house. With an initial deposit of $8,000, they have opened an account that compounds interest at an annual rate of 2.1%. Assuming that Sara and Behzad make no additional deposits or withdrawals, which of the following expressions gives the dollar value of the account 4 years after the initial deposit?

(Note: For an account with an initial deposit of \( P \) dollars that compounds interest at an annual rate of \( r \)% per year, the value of the account \( t \) years after the initial deposit is \( P\left(1 + \frac{r}{100}\right)^t \) dollars.)

F. \( 8,000(1.021)^4 \)
G. \( 8,000(1.21)^4 \)
H. \( 8,000(3.1)^4 \)
J. \( 8,000(121)^4 \)
K. \( 8,000 + 8,000(0.21)^4 \)

25. Right triangle \(\triangle RST\) has its right angle at vertex \(S\). The length of \(ST\) is 6.0 feet and the length of \(RS\) is 2.5 feet. Which of the following values is closest to the length, in feet, of \(RT\) ?

A. 3.5
B. 4.3
C. 5.5
D. 6.5
E. 8.5

26. An artist makes a profit of \((500p - p^2)\) dollars from selling \(p\) paintings. What is the fewest number of paintings the artist can sell to make a profit of at least $60,000?

F. 100
G. 150
H. 200
J. 300
K. 600

27. Last month, Lucie had total expenditures of $900. The pie chart below breaks down these expenditures by category. The category in which Lucie’s expenditures were greatest is what percent of her total expenditures, to the nearest 1%?

A. 24%
B. 28%
C. 32%
D. 34%
E. 39%
28. When the system of inequalities below is graphed in the standard \((x,y)\) coordinate plane, one of the following graphs is that of the solution set of the system. Which graph?

\[
\begin{align*}
-3 &\leq x \leq 3 \\
-2 &\leq y \leq 2
\end{align*}
\]

F.  

G.  

H.  

J.  

K.  

29. Janelle is loading a truck by using a ramp, as shown below. The ramp is 8 feet long, and the end of the ramp that is resting on the truck is 2.5 feet above the level ground. Which of the following expressions gives the angle of inclination of the ramp?

A. \(\text{Arccos} \left( \frac{2.5}{8} \right) \)

B. \(\text{Arcsin} \left( \frac{2.5}{8} \right) \)

C. \(\text{Arctan} \left( \frac{2.5}{8} \right) \)

D. \(\text{Arccos} \left( \frac{8}{2.5} \right) \)

E. \(\text{Arcsin} \left( \frac{8}{2.5} \right) \)
30. What is the perimeter, in inches, of the isosceles right triangle shown below, whose hypotenuse is $8\sqrt{2}$ inches long?

F. 8
G. $8 + 8\sqrt{2}$
H. $8 + 16\sqrt{2}$
J. 16
K. $16 + 8\sqrt{2}$

31. The equation $y = ax^2 + bx + c$ is graphed in the standard $(x,y)$ coordinate plane below for real values of $a$, $b$, and $c$. When $y = 0$, which of the following best describes the solutions for $x$?

A. 2 distinct positive real solutions
B. 2 distinct negative real solutions
C. 1 positive real solution and 1 negative real solution
D. 2 real solutions that are not distinct
E. 2 distinct solutions that are not real

32. The radius of the base of the right circular cone shown below is 5 inches, and the height of the cone is 7 inches. Solving which of the following equations gives the measure, $\theta$, of the angle formed by a slant height of the cone and a radius?

F. $\tan \theta = \frac{5}{7}$
G. $\tan \theta = \frac{7}{5}$
H. $\sin \theta = \frac{5}{7}$
J. $\sin \theta = \frac{7}{5}$
K. $\cos \theta = \frac{7}{5}$

33. A formula to estimate the monthly payment, $p$ dollars, on a short-term loan is

$$p = \frac{1}{2} ar + a$$

where $a$ dollars is the amount of the loan, $r$ is the annual interest rate expressed as a decimal, and $y$ years is the length of the loan. When $a$ is multiplied by 2, what is the effect on $p$?

A. $p$ is divided by 6
B. $p$ is divided by 2
C. $p$ does not change
D. $p$ is multiplied by 2
E. $p$ is multiplied by 4
34. To make a 750-piece jigsaw puzzle more challenging, a puzzle company includes 5 extra pieces in the box along with the 750 pieces, and those 5 extra pieces do not fit anywhere in the puzzle. If you buy such a puzzle box, break the seal on the box, and immediately select 1 piece at random, what is the probability that it will be 1 of the extra pieces?

F. \( \frac{1}{5} \)
G. \( \frac{1}{755} \)
H. \( \frac{1}{750} \)
J. \( \frac{5}{755} \)
K. \( \frac{5}{750} \)

35. The length of a rectangle is 3 inches more than twice the width of the rectangle. The perimeter of the rectangle is 36 inches. What is the width of the rectangle, in inches?

A. 4  
B. 5  
C. 9  
D. 11  
E. 13

36. The solid shown below is composed of a right circular cylinder and a right circular cone with base diameters and heights given in centimeters. The cylinder and the cone have equal base diameters. What is the volume, in cubic centimeters, of the solid?

(Note: The volume of a right circular cylinder with base radius \( r \) and height \( h \) is \( \pi r^2 h \). The volume of a right circular cone with base radius \( r \) and height \( h \) is \( \frac{1}{3} \pi r^2 h \).)

F. 72\( \pi \)  
G. 96\( \pi \)  
H. 108\( \pi \)  
J. 144\( \pi \)  
K. 360\( \pi \)
Gianna is converting a 12-foot-by-15-foot room in her house to a craft room. Gianna will install tile herself but will have CC Installations build and install the cabinets. The scale drawing shown below displays the location of the cabinets in the craft room (0.25 inch represents 2 feet).

Cabinets will be installed along one of the 12-foot walls from floor to ceiling, and 4 cabinets that are each 3 feet tall will be installed in the middle of the room. These are the only cabinets that will be installed, and each of them will be 2 feet wide and 2 feet deep. CC Installations has given Gianna an estimate of $2,150.00 for building and installing the cabinets.

37. A 15-foot wall is how many inches long in the scale drawing?
   A. 1.5
   B. 1.875
   C. 3
   D. 3.375
   E. 3.75

38. Gianna will install tile on the portion of the floor that will NOT be covered by cabinets. What is the area, in square feet, of the portion of the floor that will NOT be covered by cabinets?
   F. 72
   G. 90
   H. 140
   J. 156
   K. 164

39. CC Installations’ estimate consists of a $650.00 charge for labor, plus a fixed charge per cabinet. The labor charge and the charge per cabinet remain the same for any number of cabinets built and installed. CC Installations would give Gianna what estimate if the craft room were to have twice as many cabinets as Gianna is planning to have?
   A. $2,800.00
   B. $3,000.00
   C. $3,450.00
   D. $3,650.00
   E. $4,300.00
Use the following information to answer questions 40–42.

Trapezoid $ABCD$ is graphed in the standard $(x,y)$ coordinate plane below.

40. What is the slope of $CD$?
   
   F. $-3$
   
   G. $-1$
   
   H. $1$
   
   J. $\frac{5}{21}$
   
   K. $\frac{3}{2}$

41. When $ABCD$ is reflected over the $y$-axis to $A'B'C'D'$, what are the coordinates of $D'$?
   
   A. $(-12, 1)$
   
   B. $(-12, -1)$
   
   C. $(12, -1)$
   
   D. $(1, 12)$
   
   E. $(1, -12)$

42. Which of the following vertical lines cuts $ABCD$ into 2 trapezoids with equal areas?
   
   F. $x = 2.5$
   
   G. $x = 3.5$
   
   H. $x = 4.5$
   
   J. $x = 5.5$
   
   K. $x = 6.5$

43. Given that $\begin{bmatrix} 2 & 6 \\ 1 & 4 \end{bmatrix} = \begin{bmatrix} x & 27 \\ y & z \end{bmatrix}$ for some real number $a$, what is $x + z$?
   
   A. $\frac{4}{3}$
   
   B. $\frac{27}{2}$
   
   C. $26$
   
   D. $27$
   
   E. $48$
44. The points $E(6,4)$ and $F(14,12)$ lie in the standard $(x,y)$ coordinate plane shown below. Point $D$ lies on $EF$ between $E$ and $F$ such that the length of $EF$ is 4 times the length of $DE$. What are the coordinates of $D$?

![Diagram showing points E(6,4) and F(14,12) with line segment EF and point D on EF.]

F. (7, 5)  
G. (8, 6)  
H. (8, 8)  
J. (10, 8)  
K. (12, 10)

45. A certain triangle has a perimeter of $x$ meters. One side of the triangle is 60 meters long, another side is $\frac{1}{3}$ the length of the perimeter, and the third side is $\frac{1}{4}$ the length of the perimeter. What is the perimeter, in meters, of the triangle?

A. 15  
B. 35  
C. 84  
D. 95  
E. 144

46. The difference (larger minus smaller) between 2 numbers is 15. If $n$ represents the larger number, which expression below represents the average (arithmetic mean) of the 2 numbers?

F. 7.5  
G. $n + 7.5$  
H. $n + 15$  
J. $n - 15$  
K. $n - 7.5$

47. $\frac{4}{\sqrt{2}} + \frac{2}{\sqrt{3}} = ?$

A. $\frac{4\sqrt{3} + 2\sqrt{2}}{\sqrt{5}}$  
B. $\frac{4\sqrt{3} + 2\sqrt{2}}{\sqrt{6}}$  
C. $\frac{6}{\sqrt{2} + \sqrt{3}}$  
D. $\frac{6}{\sqrt{5}}$  
E. $\frac{8}{\sqrt{6}}$
48. A square in the standard \((x,y)\) coordinate plane has vertices at \((1,3)\), \((2,1)\), \((4,2)\), and \((3,4)\). Where do the diagonals of the square intersect?

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

49. The shaded region in the graph below represents the solution set to which of the following systems of inequalities?

\[ (x-1)^2 + (y-2)^2 = 9 \]

A. \[ \begin{cases} y < -x + 2 \\ (x-1)^2 + (y-2)^2 < 9 \end{cases} \]
B. \[ \begin{cases} y > -x + 2 \\ (x-1)^2 + (y-2)^2 < 9 \end{cases} \]
C. \[ \begin{cases} y > -x + 2 \\ (x-1)^2 + (y-2)^2 > 9 \end{cases} \]
D. \[ \begin{cases} y < -x + 2 \\ (x-1)^2 + (y-2)^2 > 9 \end{cases} \]
E. \[ \begin{cases} (y-2) < 3 \\ (x-1) > 3 \end{cases} \]

50. In the standard \((x,y)\) coordinate plane, line \(a\) contains the points \((-4,2)\) and \((-1,-3)\), and line \(b\) contains the points \((3,0)\) and \((7,0)\). At what point does line \(a\) intersect line \(b\) ?

F. \((-\frac{14}{5}, 0)\)
G. \((\frac{107}{3}, \frac{3}{7})\)
H. \((0, -\frac{14}{3})\)
J. \((3, -\frac{29}{3})\)
K. \((7, -\frac{49}{3})\)
51. In the figure below, the side lengths and the length of an altitude of parallelogram $BCDE$ are given in feet. What is the area, in square feet, of $BCDE$?

A. 25
B. 38
C. 48
D. 66
E. 88

52. The square below is divided into 3 rows of equal area. In the top row, the region labeled A has the same area as the region labeled B. In the middle row, the 3 regions have equal areas. In the bottom row, the 4 regions have equal areas. What fraction of the square’s area is in a region labeled A?

F. $\frac{1}{9}$
G. $\frac{3}{9}$
H. $\frac{6}{9}$
J. $\frac{13}{12}$
K. $\frac{13}{36}$

53. Which of the following is a quadratic equation that has $-\frac{2}{3}$ as its only solution?

A. $9x^2 + 12x + 4 = 0$
B. $9x^2 - 12x + 4 = 0$
C. $9x^2 + 6x + 4 = 0$
D. $9x^2 + 4 = 0$
E. $9x^2 - 4 = 0$

54. Bonkosi mixes 60 milliliters of Solution A with 40 milliliters of Solution X. Solution A has a 40% hydrochloric acid concentration; Solution X has an unknown hydrochloric acid concentration. When Bonkosi tests the resulting 100-milliliter solution, she finds that it has a 36% hydrochloric acid concentration. What is the hydrochloric acid concentration of Solution X?

F. 19%
G. 24%
H. 30%
J. 32%
K. 38%
55. What are the real number values of \( x \) that make the equation \( \sqrt[4]{x^2} = x^3 \) true?

A. All real numbers
B. \( x < 0 \)
C. \( x > 0 \)
D. \( x \leq 0 \)
E. \( x \geq 0 \)

56. The functions \( y = \sin x \) and \( y = \sin(x + a) + b \), for constants \( a \) and \( b \), are graphed in the standard \((x,y)\) coordinate plane below. The functions have the same maximum value. One of the following statements about the values of \( a \) and \( b \) is true. Which statement is it?

F. \( a < 0 \) and \( b = 0 \)
G. \( a < 0 \) and \( b > 0 \)
H. \( a = 0 \) and \( b > 0 \)
J. \( a > 0 \) and \( b < 0 \)
K. \( a > 0 \) and \( b > 0 \)

57. Which of the following number line graphs shows the solution set to the inequality \( |x - 5| < -1 \) ?

A. \[ \begin{array}{cccc} 4 & 6 & x \end{array} \]
B. \[ \begin{array}{cccc} 4 & 6 & x \end{array} \]
C. \[ \begin{array}{cccc} 4 & 6 & x \end{array} \]
D. \[ \begin{array}{cccc} 4 & 6 & x \end{array} \]
E. \[ \begin{array}{cccc} 4 & 6 & x \end{array} \] (empty set)
58. The sides of an acute triangle measure 14 cm, 18 cm, and 20 cm, respectively. Which of the following equations, when solved for θ, gives the measure of the smallest angle of the triangle?

(Note: For any triangle with sides of length a, b, and c that are opposite angles A, B, and C, respectively, sin A = sin B = sin C and c² = a² + b² - 2ab cos C.)

F. \( \sin \theta = \frac{1}{14} \)
G. \( \sin \theta = \frac{1}{18} \)
H. \( \sin \theta = \frac{1}{20} \)
J. \( 14² = 18² + 20² - 2(18)(20)\cos \theta \)
K. \( 20² = 14² + 18² - 2(14)(18)\cos \theta \)

59. For all values of x where the expression is defined,
\[ \frac{\frac{3}{x-5}}{1 - \frac{2}{x-5}} = ? \]

A. -3
B. \( \frac{-3}{2} \)
C. \( \frac{-3}{x² - 25} \)
D. \( \frac{3}{x-7} \)
E. \( \frac{3}{x-3} \)

60. Mr. Martin wants to plant 7 trees evenly spaced along a straight fence 300 feet long, with 1 of the trees at each end of the fence. About how many feet apart should he plant the trees?

F. 33
G. 38
H. 43
J. 50
K. 60

END OF TEST 2

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

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### ACT Test 72C

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### ACT Test 72C

<table>
<thead>
<tr>
<th>Your Scale Score</th>
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<tbody>
<tr>
<td>English</td>
</tr>
<tr>
<td>Mathematics</td>
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<tr>
<td>Reading</td>
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<tr>
<td>Science</td>
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### Sum of scores

<table>
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<tr>
<th>Composite score (sum + 4)</th>
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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.
### ACT Assessment Test Information Release Report

**Test Date:** 06/14  
**Test Form:** 72C  
**Test Center:** 17940

<table>
<thead>
<tr>
<th>ITEM NUMBER</th>
<th>ENGLISH</th>
<th>MATHEMATICS</th>
<th>READING</th>
<th>SCIENCE</th>
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<td>B++C+++F++ D++GB+F D++C+++F++ D++GB+F D++C+++F++</td>
</tr>
</tbody>
</table>

**1st Row:** Correct responses to the items on the ACT tests.

**2nd Row:** Your Responses:
A plus (+) indicates your response was correct.
A letter (A through K) is the response you chose, if your answer was incorrect.
A dash (-) indicates you omitted the item.
An asterisk (*) indicates you gridded more than one response.

**3rd Row:** If the test includes subscores, one of the letters below indicates the category to which each item belongs:
- **English:** U = Usage/Mechanics  
  R = Rhetorical Skills
- **Math:** A = Pre-Algebra/Elementary Algebra  
  G = Intermediate Algebra/Coordinate Geometry  
  T = Plane Geometry/Trigonometry
- **Reading:** S = Social Studies/Sciences  
  L = Arts/Language