

## Answer Keys and Analysis Charts

## ENGLISH TEST

1. D	16. G	31. D	46. F	61. C
2. H	17. A	32. J	47. B	62. J
3. A	18. G	33. D	48. F	63. B
4. J	19. D	34. H	49. C	64. H
5. C	20. H	35. A	50. J	65. B
6. J	21. B	36. H	51. D	66. H
7. C	22. H	37. B	52. H	67. B
8. J	23. C	38. F	53. B	68. G
9. D	24. F	39. B	54. J	69. A
10. H	25. B	40. H	55. A	70. J
11. B	26. J	41. A	56. H	71. D
12. H	27. B	42. F	57. D	72. G
13. C	28. G	43. D	58. H	73. C
14. F	29. C	44. H	59. B	74. H
15. C	30. H	45. A	60. H	75. B

## Analysis Chart

Skills	Questions	Possible Score	Your Score
<b>Usage/Mechanics</b>			
Punctuation	3, 9, 14, 17, 24, 48, 55, 62, 66, 68	10	
Basic Grammar and Usage	1, 2, 6, 19, 21, 23, 34, 50, 53, 69, 70, 71	12	
Sentence Structure	8, 11, 26, 29, 31, 39, 41, 43, 44, 49, 51, 52, 56, 57, 58, 59, 63, 67	18	
<b>Rhetorical Skills</b>			
Strategy	4, 5, 10, 13, 18, 30, 35, 38, 47, 65, 72, 73	12	
Organization	7, 15, 20, 25, 27, 28, 42, 45, 64, 74, 75	11	
Style	12, 16, 22, 32, 33, 36, 37, 40, 46, 54, 60, 61	12	

Number correct: \_\_\_\_\_

**MATHEMATICS TEST**

- |       |       |       |       |       |
|-------|-------|-------|-------|-------|
| 1. D  | 13. A | 25. B | 37. B | 49. C |
| 2. H  | 14. J | 26. F | 38. J | 50. K |
| 3. E  | 15. B | 27. C | 39. C | 51. C |
| 4. H  | 16. H | 28. H | 40. K | 52. K |
| 5. D  | 17. D | 29. A | 41. D | 53. C |
| 6. K  | 18. G | 30. G | 42. F | 54. J |
| 7. A  | 19. C | 31. B | 43. D | 55. E |
| 8. J  | 20. H | 32. H | 44. H | 56. J |
| 9. E  | 21. B | 33. A | 45. C | 57. D |
| 10. G | 22. F | 34. H | 46. H | 58. F |
| 11. A | 23. B | 35. D | 47. C | 59. D |
| 12. H | 24. J | 36. H | 48. H | 60. K |

**Analysis Chart**

Content Area	Skill Level			Possible Score	Your Score
	Basic Skills	Application	Analysis		
Pre-Algebra Algebra	1, 8, 15, 27, 45, 52, 53, 55	2, 3, 6, 9, 13, 16, 23, 31, 34, 35, 37, 39	4, 11, 25, 28	24	
Intermediate Algebra Coordinate Geometry	17, 29, 30, 44, 48, 51, 56	5, 7, 22, 24, 26, 32, 57	18, 19, 41, 47, 60	19	
Geometry	10, 38, 40, 43, 50	12, 14, 21, 33, 36, 42, 54, 58		13	
Trigonometry	20, 46	49, 59		4	

Number correct: \_\_\_\_\_

## READING TEST

- |      |       |       |       |       |       |       |       |
|------|-------|-------|-------|-------|-------|-------|-------|
| 1. C | 6. G  | 11. B | 16. J | 21. B | 26. J | 31. C | 36. F |
| 2. H | 7. B  | 12. H | 17. C | 22. H | 27. D | 32. J | 37. A |
| 3. C | 8. J  | 13. D | 18. H | 23. C | 28. G | 33. C | 38. H |
| 4. G | 9. A  | 14. F | 19. A | 24. F | 29. A | 34. G | 39. A |
| 5. A | 10. G | 15. C | 20. H | 25. C | 30. H | 35. D | 40. G |

## Analysis Chart

Passage Type	Referring	Reasoning	Possible Score	Your Score
Prose Fiction	1, 2, 5, 6	3, 4, 7, 8, 9, 10	10	
Social Studies	15, 18, 19	11, 12, 13, 14, 16, 17, 20	10	
Humanities	22, 28, 30	21, 23, 24, 25, 26, 27, 29	10	
Natural Science	33, 35, 38, 39	31, 32, 34, 36, 37, 40	10	

Number correct: \_\_\_\_\_

## SCIENCE REASONING TEST

- |      |       |       |       |       |       |       |       |
|------|-------|-------|-------|-------|-------|-------|-------|
| 1. C | 6. G  | 11. A | 16. J | 21. B | 26. F | 31. B | 36. G |
| 2. H | 7. C  | 12. F | 17. C | 22. H | 27. D | 32. H | 37. A |
| 3. D | 8. G  | 13. B | 18. G | 23. C | 28. H | 33. A | 38. H |
| 4. F | 9. D  | 14. H | 19. D | 24. H | 29. A | 34. G | 39. B |
| 5. A | 10. G | 15. C | 20. G | 25. B | 30. J | 35. D | 40. G |

## Analysis Chart

Kind of Questions	Skill Level			Possible Score	Your Score
	Understanding	Analysis	Generalization		
Data Representation	1, 12, 13, 17, 18	2, 3, 16, 19, 20	4, 5, 14, 15, 21	15	
Research Summaries	6, 22, 23, 26, 28	7, 8, 9, 24, 25, 29	10, 11, 27, 30, 31, 32, 33	18	
Conflicting Viewpoints	34, 35, 36	37, 39	38, 40	7	

Number correct: \_\_\_\_\_

## COMPOSITE SCORE

To calculate your composite score (not including the Writing Test) follow these directions:

1. On the form below fill in the first column of blanks with the number of correct answers on each test.
2. Multiply each number by 36 and divide the product by the number of questions on each test. The results are your scale scores.
3. Add up your scale scores and divide by 4. The result should be rounded to the nearest whole number to determine your composite score.

	Number of correct answers		Scale score
English	_____	$\times 36 =$	_____ $\div 75 =$ _____
Math	_____	$\times 36 =$	_____ $\div 60 =$ _____
Reading	_____	$\times 36 =$	_____ $\div 40 =$ _____
Science	_____	$\times 36 =$	_____ $\div 40 =$ _____
		Total	_____ $\div 4 =$ _____
		Composite Score	

No test can give you a totally precise measurement of your academic achievement. Rather, think of your composite score as the mid-point in a range of scores that can vary one or more points in either direction. A composite score of 27, for example, means that you scored somewhere between 25 and 29.

### Answer Explanations: English Test

1. **D** The singular subject *one* requires a singular verb, so A and C are wrong. Choice B is incorrect because both the verb *totaled* in the same sentence and the verb in question refer to the year 1999, which is in the past.
2. **H** An objective-case pronoun is required after the preposition *of*; hence choices F and G are wrong. The comma in G and J is unnecessary.
3. **A** The dash is appropriately employed here to dramatize the pathos of *or can*.
4. **J** The first sentence of the paragraph mentions *images*, and therefore calls for description.
5. **C** To present an orderly and economical review of both nursing home extremes, with details characteristic of each type, the best choice of those given is the comparison/contrast strategy.
6. **J** The adverbial clause *than they once were* helps maintain the sequence of tenses in this paragraph.
7. **C** This passage is characterized by quick summaries and sparse detail. It would not be consistent with the rest of the passage to include detailed material.
8. **J** The clause *many of them are unclean and unhealthy* is the best choice because the pronoun *them* refers to the existing *nursing homes*; the other choices introduce a new subject.
9. **D** Parallel adjectives occurring before a noun must be separated by commas.
10. **H** The paragraph is about conditions within nursing homes; the other options touch on related but basically irrelevant subject matter.
11. **B** If the noun *qualities* is used as the subject (A and C), the introductory phrase becomes a dangling participle. *Interested parties* is a better choice of subject than *the patient* (D) because, as the passage makes clear, choosing a home is usually a family undertaking.

12. H The phrase *behooves us* (F) is archaic; *best suits us* (G) and *is not a bad idea* (J) depart from the serious tone of the passage.
13. C This article is almost journalistic in style, given to quick summary and unembellished detail. Only a sparse summary paragraph would be appropriate in this context.
14. F The relative pronoun *which*, preceded by a comma, is needed to introduce a nonrestrictive clause.
15. C Paragraph 5 begins with the phrase *For these reasons*. With a quick scanning of the passage, it is clear that the reasons referred to are given at the end of paragraph 3, and that paragraph 5 should follow.
16. G The metaphor in this sentence is that of a loom; the verb *can be woven* maintains the metaphor.
17. A The dash correctly sets off examples.
18. G The term *cultural activities* is the focus of this passage, and yet it is not clearly defined.
19. D The antecedent of the pronoun in question is *rural people*.
20. H Paragraphs 1 and 2 both deal with the concept *cultural activities* and belong together.
21. B The word *that* is needed before the last clause to make it a noun clause. The conjunction *when* (A), *because* (C), or *for* (D) cannot introduce a clause used as a predicate nominative.
22. H *Farther* is used to refer to a measurable distance or space. *Further* means "greater in measure, time, and degree."
23. C Use digits for dates; years are almost never spelled out.
24. F Hyphenate a compound adjective that precedes the noun it modifies.
25. B The first sentence suggests that a heritage festival may begin economic development, but the paragraph as it stands does not pick up that idea.
26. J The preceding sentence makes the point that farms in this area employ a third of the work force. The conjunction should be *thus* for that reason. The other options suggest contrast, which is meaningless at this point.
27. B The repetition of the preposition *in* and the noun *farming* or *production* results in parallelism.
28. G The three awkward options employ the phrase *spent its years of existence* in various versions, all of them unnatural sounding. The correct choice is a strong, clear statement.
29. C The pattern in this paragraph has been to give each accomplishment of the Council its own sentence. Also, choices A and B are run-on sentences.
30. H The paragraph does describe economic development, but does not explain how cultural activities "supplied the drive" for such development.
31. D All choices but *most distinguished* are either awkward or unnecessarily wordy.
32. J The most familiar idiom using these words is *method of playing*.
33. D Fine shades of meaning separate these words, but the only sound one to use here is *developed*.
34. H The participle *accomplished* modifies *musician* and is the most sensible choice. *More accomplished* compares two musicians.
35. A Classifying and dividing is the strategy that permits a writer full scope in exploring three or more subjects in one passage.
36. H The only meaningful choice is *quality*.
37. B Only the correct phrase conveys meaning that relates to the point being made in the paragraph—the difference in sound between the human and the mechanical piano player.
38. F The statements listing the three most distinguished musical instruments and comparing a player piano with a concert pianist are very opinionated; the passage would be more substantial if some hard data accompanied the opinions.
39. B The statement about the organ is in contrast to those made about other instruments, so a transitional word that indicates contrast is required.
40. H The other options are either redundant (F and G) or inferior (J).
41. A The word *whether* signals the need for the subjunctive mood at this point.



42. **F** Two characteristics are being considered in the sentence; *pressure* ("hard or soft") and *speed* ("slow or quick"), so each pair should remain intact, the pairs separated by a comma.
43. **D** *Most acutest* (A) is a double superlative, *more acute* (C) incorrectly suggests that there are only two listeners, and *acute* (B) lacks the force of the superlative and is therefore misleading.
44. **H** All the other options are awkward and wordy, and are not parallel to *the human organist*.
45. **A** The point of the passage is to persuade potential buyers to consider an organ.
46. **F** This phrase, not a common one in popular English, is appropriate to the deliberate, reflective tone of this passage.
47. **B** Quoted material, when available, is one of the most effective means of representing a person's thought and personality.
48. **F** The dash is appropriately used here to punctuate a parenthetical aside.
49. **C** This sentence consists of three clauses ending with predicate adjectives—*broad*, (*constantly*) *accumulating*, and *intricate*—each adjective (or adverb) modified by the adverb *so*. The only choice that maintains this parallel structure is C.
50. **J** The pronoun *that* does not have a clear antecedent here, so a noun should be supplied.
51. **D** This sentence is in contrast to the ideas expressed in the preceding paragraph.
52. **H** The past tense is appropriate here. The historical present is usually reserved for discussions of what a writer says or thinks in a particular work of literature.
53. **B** The pronoun *this* almost never is adequate by itself; a noun is required here for clarity.
54. **J** This sentence is incompatible in style and content with the rest of the passage.
55. **A** Coordinate sentences, that is, two independent clauses joined by a coordinate conjunction, must be separated by a comma.
56. **H** Three parallel prepositional phrases modify the noun *problems* in this sentence: *problems of variability*, (*of heredity*, and (*of*) *isolation*. The object of the preposition is always a noun.
57. **D** The pronoun *that* refers to the plural *problems*, and the verb must agree. The tense must be the present perfect (*have occupied*) since the reference is to the immediate past.
58. **H** The present tense is required because natural selection still stands as a general law today.
59. **B** The statement regarding Darwin's place in history *depends upon* how his theories are regarded in the future—thus the need for the *if* clause at the beginning of the sentence.
60. **H** If nothing else, this passage praises Darwin.
61. **C** The use of *throughout* is clear and direct; the other options are awkward or wordy.
62. **J** There is no need for any punctuation between the parallel adjectives *governmental* and (*many*) *private*.
63. **B** The verb *described* completes the parallel pair of passive verbs *are ... marked* and (*are*) *described*.
64. **H** The word *unattended* in the preceding clause renders the word *unsupervised* redundant.
65. **B** An understanding of the word *antiquities* is essential to an understanding of the passage.
66. **H** Word combinations containing an *-ly* word should not be hyphenated. The adverb *carefully* modifies the adjective *carved*, and there should be no hyphen between them.
67. **B** Instead of a subordinating conjunction indicating *cause*, what is required here is a conjunction signaling *contrast* (*vertical* versus *horizontal*).
68. **G** The comma separating items in a series must come after the parenthesis.
69. **A** Spell out an occasional number that can be expressed in one or two words; with the exception of numbers from twenty-one through ninety-nine, which are always hyphenated, compound numbers are not hyphenated.
70. **J** *In which* is the only prepositional phrase that draws focus to the structure itself.
71. **D** The subject of this sentence is the singular *series*.
72. **G** This passage has all the characteristics of a scholarly paper, including assumption of some sophistication on the part of the reader, close attention to detail, and esoteric language.

73. **C** The paragraph begins with a bare statement about a significant prehistoric stone, one of the earliest erected. A younger reader would require more detail to understand the significance of such early monoliths.
74. **H** This paragraph seems to have two main ideas needing development: the stone first mentioned, and the development of Christianity in the region. With two main ideas, the structure is deeply flawed.
75. **B** The paragraph needs either to be restructured or to be introduced by a general statement that could accommodate both of the ideas present in the paragraph.

### Answer Explanations: Mathematics Test

1. **D** Although 3.14 is frequently used as an approximate for  $\pi$ , it is rational since it represents  $3\frac{14}{100}$  or  $\frac{314}{100}$ .
2. **H** Jane's score increased 9 points. The question is "9 is what percent of 72?"  $A = 9$ ,  $P$  is unknown, and  $B = 72$ .

$$\frac{P}{100} = \frac{9}{72} \left( = \frac{1}{8} \right)$$

$$8P = 100$$

$$P = 12.5$$

3. **E**  $4^2 - 3 - 5 \cdot 8 - 2[(-3) - (-7)]$   
 $= 4^2 - 3 - 5 \cdot 8 - 2[(-3) + 7]$   
 $= 4^2 - 3 - 5 \cdot 8 - 2[4]$   
 $= 16 - 3 - 5 \cdot 8 - 2[4]$   
 $= 16 - 3 - 40 - 8$   
 $= 13 - 40 - 8$   
 $= -27 - 8$   
 $= -35$

4. **H** The space at the top is found by multiplying 4 times  $2\frac{3}{8}$  and then subtracting the product from 10.

$$10 - 4 \left( 2\frac{3}{8} \right) = 10 - 4 \left( \frac{19}{8} \right) = 10 - \frac{19}{2}$$

$$= 10 - 9\frac{1}{2}$$

$$= \frac{1}{2}$$

(This means  $\frac{1}{2}$  of a foot.)

$$\frac{1}{2} (12 \text{ inches}) = 6 \text{ inches}$$

5. **D** The inequality  $|x - 4| \leq 2$  is easily translated to

$$-2 \leq x - 4 \leq 2$$

$$2 \leq x \leq 6$$

The solution set of this inequality is the set of numbers between 2 and 6 inclusive. These are the numbers shown on the graph.

6. **K** The lowest common denominator is the least common multiple of the denominators.

$$4x^2y = 2 \cdot 2x^2y,$$

$$6xy^2 = 2 \cdot 3xy^2,$$

$$15xy = 3 \cdot 5xy$$

To find the lowest common denominator, use each factor the greatest number of times it appears in any of the factorizations.

$$\text{LCD} = 2 \cdot 2 \cdot 3 \cdot 5x^2y^2 = 60x^2y^2$$

7. **A** The greatest common factor must be factored out first.

$$\begin{aligned} 4x^3 - 24x^2 + 36x &= 4x(x^2 - 6x + 9) \\ &\quad \text{(a perfect square trinomial)} \\ &= 4x(x - 3)^2 \end{aligned}$$

8. **J** Composite numbers are whole numbers, greater than 1, that are not prime. The numbers 1 and  $\frac{2}{3}$  are not greater than 1, and 43 and 83 are prime, but  $57 = (3)(19)$ .

9. **E**

$$\begin{aligned} ab^2 - (a - b) &= (-3)^4 - [(-3) - 4] \\ &= (-3)^4 - [(-3) + (-4)] \\ &= (-3)^4 - (-7) \\ &= (-3) 16 - (-7) \\ &= -48 - (-7) \\ &= -48 + 7 = -41 \end{aligned}$$

10. **G** Among the choices only  $\angle DFG$  has its vertex on the circle.

11. **A**

$$D = r \cdot t$$

Jon	$40\left(x + \frac{1}{2}\right)$	40	$x + \frac{1}{2}$
Joel	$50x$	50	$x$

The distances are equal, so the equation is

$$40\left(x + \frac{1}{2}\right) = 50x$$

12. **H** Three or more parallel lines cut transversals in the same proportion, so

$$\frac{AB}{BC} = \frac{DE}{EF}$$

$$\frac{2}{6} = \frac{DE}{5}$$

$$(BC = AC - AB)$$

$$6(DE) = 10$$

$$DE = \frac{5}{3} = 1\frac{2}{3}$$

13. **A**

$$5\frac{1}{8} \quad 5\frac{3}{24}$$

The LCD is 24.

$$-3\frac{5}{6} \quad -3\frac{20}{24}$$

$$4\frac{27}{24}$$

Borrow  $\frac{24}{24}$  from the 5

$$-3\frac{20}{24}$$

and add to  $\frac{3}{24}$ .

$$1\frac{7}{24}$$

14. **J** Use the Pythagorean Theorem to first find the length of  $\overline{AC}$ .

$$(\overline{AC})^2 = 1^2 + 1^2$$

$$\overline{AC} = \sqrt{2}$$

Then  $\overline{AC}$  is a leg of  $\triangle ACD$ . Another application of the Pythagorean Theorem yields

$$(\overline{AC})^2 + (\overline{CD})^2 = (\overline{AD})^2$$

$$(\sqrt{2})^2 + 1^2 = (\overline{AD})^2$$

$$2 + 1 = (\overline{AD})^2$$

$$\overline{AD} = \sqrt{3}$$

Repeating this process two more times gives  $\overline{AF} = \sqrt{5}$ .

15. **B** The last digit must be in the ten thousandths position.



$$\begin{aligned}
 16. \text{ H } \quad & 3 - (x - 5) = 2x - 3(4 - x) \\
 & 3 - x + 5 = 2x - 12 + 3x \\
 & 8 - x = 5x - 12 \\
 & 8 = 6x - 12 \\
 & 20 = 6x \\
 & x = \frac{20}{6} = \frac{10}{3}
 \end{aligned}$$

17. D An arithmetic sequence is one whose successive terms differ by a constant. Only in D is there a constant difference between terms.
18. G If the exponent on  $i$  is a multiple of 4, the result is 1. But if there is a remainder when the exponent is divided by 4, then it has the following values:

rem	$i^n$
1	$i$
2	$-1$
3	$-i$
0	1

$$53 \div 4 = 13 \text{ rem } 1, \text{ so } i^{53} = i.$$

19. C This is a combination problem. The number of combinations of  $n$  things taken  $r$  at a time is given by the formula:

$${}_nC_r = \frac{n!}{(n-r)!r!}$$

The number of 4-person committees is

$$\begin{aligned}
 {}_{10}C_4 &= \frac{10!}{(10-4)!4!} \\
 &= \frac{10!}{6!4!} \\
 &= \frac{10 \cdot 9 \cdot 8 \cdot 7 \cdot 6!}{6! \cdot 4 \cdot 3 \cdot 2 \cdot 1} \\
 &= \frac{10 \cdot 3 \cdot 7}{1} = 210
 \end{aligned}$$

20. H Since  $\frac{\sqrt{3}}{4} < 1$  and the range of the secant function is  $\{x/x > 1 \text{ or } x < -1\}$ , there are no angles for which  $\sec x = \frac{\sqrt{3}}{4}$ .

21. B If two chords intersect in a circle, the product of the segments of one chord equals the product of the lengths of the segments of the other.

$$\begin{aligned}
 3x &= (5)(2) \\
 &= 10 \\
 x &= 3\frac{1}{3}
 \end{aligned}$$

22. F The sample space consists of all 52 cards in the deck. The event "drawing a heart" can be satisfied by any one of the 13 hearts.

$$P(\text{Heart}) = \frac{13}{52} = \frac{1}{4}.$$

$$\begin{aligned}
 23. \text{ B } \quad & x - [3x - (1 - 2x)] = x - [3x - 1 + 2x] \\
 & = x - 3x + 1 - 2x \\
 & = -4x + 1
 \end{aligned}$$

$$\begin{aligned}
 24. \text{ J } \quad & \text{If } g(x) = 1 + x^2, \text{ then} \\
 & g(3) = 1 + 3^2 = 1 + 9 = 10. \text{ So} \\
 & f(g(3)) = f(10) = 2(10) - 5 = 20 - 5 = 15
 \end{aligned}$$

25. **B** Let  $x$  = width of the rectangle.

Then  $2x - 1$  = length.

The perimeter of a rectangle is found by the formula  $P = 2w + 2\ell$ . The equation is

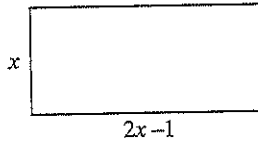
$$34 = 2x + 2(2x - 1)$$

$$34 = 2x + 4x - 2$$

$$34 = 6x - 2$$

$$36 = 6x$$

$$x = 6$$



But  $x = 6$  is the width. The question is "What is the length?"

$$2x - 1 = 2(6) - 1 = 12 - 1 = 11$$

$$\begin{aligned} 26. \text{ F } & 2 \log_3 x - \frac{1}{2} \log_3 y + \log_3 z \\ &= \log_3 x^2 - \log_3 \sqrt{y} + \log_3 z \\ &= \log_3 \frac{x^2 z}{\sqrt{y}} \end{aligned}$$

27. **C** By the commutative property of addition

$$5(3 + 0) = 5(0 + 3)$$

28. **H** The number of male students receiving a grade of

C is  $\frac{5}{6}$  of  $\frac{2}{3}$  of 27.

$$\begin{aligned} \frac{5}{6} \cdot \frac{2}{3} \cdot 27 &= \frac{5}{6} \cdot 18 \\ &= 15 \end{aligned}$$

29. **A** An equation of an ellipse with center at the origin,  $x$ -intercepts 3 and  $-3$ , and  $y$ -intercepts 2 and  $-2$  is

$$\frac{x^2}{9} + \frac{y^2}{4} = 1$$

30. **G** Solve the bottom equation for  $z$ .

$$z = 4$$

Substitute into the top two equations:

$$x + 4 = 6$$

$$x = 2$$

and

$$y + 4 = 1$$

$$y = -3$$

The solution set is  $\{(2, -3, 4)\}$ .

31. **B** Square both sides of the radical equation.

$$(\sqrt{x+1})^2 = (x-1)^2$$

$$x+1 = x^2 - 2x + 1$$

$$x^2 - 3x = 0$$

$$x(x-3) = 0$$

$$x = 0 \quad x - 3 = 0$$

$$x = 3$$

Both potential solutions must be checked in the original equation.

$$\text{Check 0: } \sqrt{0+1} \stackrel{?}{=} 0-1$$

$$1 \neq -1$$

0 is not in the solution set.

$$\text{Check 3: } \sqrt{3+1} \stackrel{?}{=} 3-1$$

$$\sqrt{4} \stackrel{?}{=} 2$$

$$2 = 2 \quad \text{The solution set is } \{3\}.$$

32. H  $\sqrt[3]{-12a^4b^2} \sqrt[3]{-6a^2b^2} = \sqrt[3]{72a^6b^4}$

Now separate the radicand into cube and noncube factors.

$$= \sqrt[3]{8a^6b^3 \cdot 9b} \\ = 2a^2b \sqrt[3]{9b}$$

33. A If  $m\angle ABD = 62^\circ$ , then the measure of arc  $AD = 124^\circ$ . If  $m\angle BDC = 28^\circ$ , then the measure of arc  $BD = 56^\circ$ . So the measure of arc  $ADB = (56 + 124)^\circ = 180^\circ$ , and the measure of an angle inscribed in a semicircle  $= 90^\circ$ .

34. H Multiply the top equation by 2 and the bottom equation by 5.

$$2(2x - 5y) = 13$$

$$5(3x + 2y) = 10$$

This gives

$$4x - 10y = 26$$

$$\underline{5x + 10y = 50}$$

$$19x = 76$$

$$x = \frac{76}{19} = 4$$

Substitute  $x = 4$  into the top equation:

$$2(4) - 5y = 13$$

$$8 - 5y = 13$$

$$-5y = 5$$

$$y = -1$$

35. D Use the substitution method.

$$\begin{cases} 2x + 3y = 12 \\ y = -\frac{2}{3}x + 5 \end{cases}$$

Substitute for  $y$  in the first equation.

$$2x + 3\left(-\frac{2}{3}x + 5\right) = 12$$

$$2x - 2x + 15 = 12$$

$$15 = 12$$

False. The solution is empty,  $\{ \}$ .

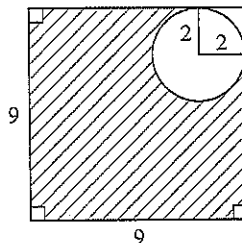
36. H The measure of

$$\angle ABC = \frac{1}{2}(200 - 160)^\circ = 20^\circ.$$

$\triangle ABC$  is an isosceles triangle, so  $\angle ACB = 80^\circ$ . Since a radius is perpendicular to a tangent at the point of tangency,  $\angle OCA = (90 - 80)^\circ$ .

37. B In reality the shaded portion represents the big square minus  $\frac{3}{4}$  of the circle minus a small  $2 \times 2$  square.

$$9^2 - \frac{3}{4}(\pi 2^2) - 2^2 = 81 - 3\pi - 4 \\ = 77 - 3\pi$$



38. J There can be only one obtuse angle in a triangle.

39. **C** Multiply the numerator and denominator by  $xy$ :

$$\begin{aligned}\frac{xy\left(\frac{x}{y} - \frac{y}{x}\right)}{xy\left(\frac{1}{x} - \frac{1}{y}\right)} &= \frac{x^2 - y^2}{y - x} \\ &= \frac{(x - y)(x + y)}{y - x} \\ &= -(x + y) \text{ because } y - x \text{ and } x - y \text{ are opposites.}\end{aligned}$$

40. **K** All four statements are false.

41. **D**  $|x - 3| > 2$  is equivalent to

$$\begin{aligned}x - 3 > 2 \text{ or } x - 3 < -2 \\ x > 5 \text{ or } x < 1\end{aligned}$$

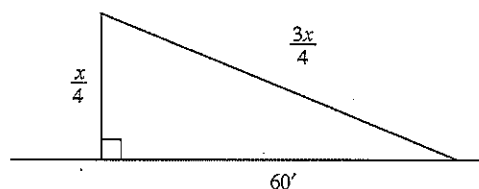
42. **F** First find  $AE$ .

$$\begin{aligned}(BE)(ED) &= (AE)(EC) \\ (1)(2) &= AE\left(\frac{1}{2}\right) \\ AE &= 4\end{aligned}$$

Then use the Pythagorean Theorem.

$$\begin{aligned}4^2 + 1^2 &= (AB)^2 \\ 16 + 1 &= (AB)^2 \\ AB &= \sqrt{17}\end{aligned}$$

43. **D** If two lines are cut by a transversal in such a way that a pair of alternate interior angles are equal, the lines are parallel.
44. **H** The binomial expansion of  $(a + b)^n$  has  $n + 1$  terms.
45. **C** The only one of these numbers that cannot be written as a fraction is  $\sqrt{48}$ . Note that  $0.\bar{5} = 0.5555 \dots$  is a nonterminating repeating decimal, which is rational.
46. **H** The period of the function  $y = a \tan b(x - c)$  is  $\frac{\pi}{|b|}$ . So the period of the given function is  $\frac{\pi}{3}$  since this function can be rewritten as  $y = 2 \tan 3\left(x - \frac{\pi}{6}\right)$ .
47. **C** Let  $x$  = height of the tower. Then the distance from the ground to the bend is  $\frac{x}{4}$ , and the slanted part is  $\frac{3x}{4}$ .



Use the Pythagorean Theorem:

$$\begin{aligned}\left(\frac{x}{4}\right)^2 + 60^2 &= \left(\frac{3x}{4}\right)^2 \\ \frac{x^2}{16} + 60^2 &= \frac{9x^2}{16} \\ \frac{8x^2}{16} &= \frac{x^2}{2} = 60^2 \\ x^2 &= 2(60^2) \\ x &= 60\sqrt{2}\end{aligned}$$

48. **H** Exponential functions do not represent conic sections.

49. C If  $\cos \theta = \frac{-1}{2}$  and  $\theta$  is in quadrant III, then

$$\begin{aligned}\sin \theta &= -\sqrt{1 - \cos^2 \theta} \\ &= -\sqrt{1 - \left(\frac{-1}{2}\right)^2} = -\sqrt{1 - \frac{1}{4}} \\ &= -\sqrt{\frac{3}{4}} = -\frac{\sqrt{3}}{2} \\ \sin 2\theta &= 2 \sin \theta \cos \theta \\ &= 2\left(\frac{-\sqrt{3}}{2}\right)\left(\frac{-1}{2}\right) \\ &= \frac{\sqrt{3}}{2}\end{aligned}$$

50. K None of these choices is enough to prove that  $ABCD$  is a parallelogram.

51. C The slope of the given line can be found from the slope-intercept form:

$$y = \frac{-2}{3}x + \frac{7}{3}$$

Since the slope is  $\frac{-2}{3}$ , the slope of the line perpendicular to it is  $\frac{3}{2}$ . Using the point-slope form of the equation of the line, we have

$$\begin{aligned}y - 1 &= \frac{3}{2}(x - 2) \\ 2y - 2 &= 3x - 6 \\ 3x - 2y &= 4\end{aligned}$$

52. K Square roots of negative numbers are imaginary.

53. C Degree concerns itself only with the exponents on the *variables*. The degree of a polynomial is the greatest of the degrees of its terms. The degree of the first term is 4; of the second term, 5; and of the third, 0.

54. J The measure of arc  $AC = (360 - 220)^\circ = 140^\circ$ . The angle formed by a chord and a tangent line is measured by half of the intercepted arc. The measure of  $\angle CAD = 70^\circ$ .

55. E

- A. 0.015  
B.  $1.5 \times 10^{-2} = 0.015$   
C.  $1.5\% = 0.015$   
D.  $\frac{3}{200} = 0.015$   
E.  $(0.3)(0.005) = 0.0015$

56. J Multiply the numerator and denominator by the conjugate of the denominator.

$$\begin{aligned}\frac{6(4 + \sqrt{2})}{(4 - \sqrt{2})(4 + \sqrt{2})} &= \frac{6(4 + \sqrt{2})}{16 - 2} = \frac{6(4 + \sqrt{2})}{14} \\ &= \frac{3(4 + \sqrt{2})}{7} = \frac{12 + 3\sqrt{2}}{7}\end{aligned}$$

57. D  $|x - 5| > 2$  is equivalent to

$$\begin{aligned}x - 5 &> 2 \quad \text{or} \quad x - 5 < -2 \\ x &> 7 \quad \text{or} \quad x < 3\end{aligned}$$

58. F The altitude to the hypotenuse of a right triangle is the mean proportional between the two segments of the hypotenuse.

$$\begin{aligned}\frac{AD}{DC} &= \frac{DC}{BD} \\ \frac{3}{DC} &= \frac{DC}{12} \\ (DC)^2 &= 36 \\ DC &= 6\end{aligned}$$

59. **D**  $\cos(-512^\circ) = \cos(208^\circ)$   
 Add  $2(360^\circ)$  to the angle: The reference angle is  $(208 - 180)^\circ$ . Cofunctions of complementary angles are equal.  $-62^\circ$  is in Quadrant IV, where the sine is negative.  $152^\circ$  is in Quadrant II with the same reference angle  $(180 - 152^\circ) = 28^\circ$ , but in Quadrant II the sine is positive.
60. **K**  $g = \frac{k}{d^2}$   
 $64 = \frac{k}{9^2}$   
 $k = 64(81)$   
 $g = \frac{64(81)}{24^2}$   
 $= \frac{8 \cdot 8(9 \cdot 9)}{(8 \cdot 3)(8 \cdot 3)}$   
 $= 9$  This can be obtained easily by canceling.

### Answer Explanations: Reading Test

- C** Gaspar explains to the sergeant that he had “remained behind . . . to keep the enemy back while the detachment was running away.” The sergeant later alludes to Gaspar’s failure to rejoin the detachment after dark (lines 23–24). Nothing in the passage suggests that Gaspar ran away (A) or stayed up all night (B). Choice D states the opposite of what actually occurred; it was Gaspar who was lassoed by a mounted soldier.
- H** The first paragraph lists Gaspar’s agreeable qualities, including “mildness of character,” and an “acquiescent soul.” He may well have possessed the traits listed by the other choices, but they are not mentioned.
- C** Lines 20–21 find the sergeant addressing Lieutenant Santierra with “a superior smile.” Later, given the order to provide water to the prisoners, the sergeant questions the need (lines 61–63). Still later he sneers at the decision to keep the prisoners alive, and D overstates the sergeant’s antipathy.
- G** It’s safe to infer that the *Commandante* orders the soldiers’ execution to deter other troops from deserting. Choice F cannot be correct because the troops’ morale is likely to suffer as a consequence of an execution of one of their fellow soldiers. H is an equally poor choice. If anything, the *Commandante*’s uncertainty would be more likely to save Gaspar and the others from execution instead of condemning them to death. G is totally illogical. What lesson can you teach men by killing them?
- A** According to lines 88–91, the favor had been granted in consideration of the high position of Santierra’s father and the lieutenant’s distinguished family. If any of the other choices (B, C, or D) influenced the *Commandante*, they are not mentioned in the passage.
- G** In line 14, Santierra is described as “little more than a boy.” Later, he wishes to give the prisoners a drink of water. We learn at the end of the passage that he tried to gain pardons for some of the condemned men. On the other hand, Esteban, the sergeant, hits Gaspar with a stick and herds the prisoners into the guardhouse “with alacrity and zeal” (lines 41–42). The adjutant looks “savagely” around the courtyard and orders the prisoners, whom he calls “scoundrels,” to be locked up in a stifling cell. In condemning the prisoners to death “for an example” (lines 17–18), the *Commandante* shows his lack of human decency.
- B** The text of lines 49–51 shows the guards lying around in the shade unconcerned about the welfare of the prisoners. Choice A is not mentioned in the passage. Both C and D may be true but neither is discussed.
- J** If anything, Santierra is a misfit. Unlike the other men in his unit, he shows compassion for Gaspar and the other prisoners. Furthermore, he is still not used to “sanguinary imbecilities of a state of war” (lines 15–16). In other words, he has not yet grown accustomed to war’s bloody insanity. Rule out F because of Santierra’s aversion to the inhumane treatment of the prisoners. Eliminate G because the *Commandante* respects only Santierra’s prestigious family, not the lieutenant himself. H is irrelevant to the passage.
- A** Realizing that his meddling was “futile” (line 97), Santierra regrets having prolonged the men’s agony. Had he not interfered, they would have been shot early in the day and avoided their incarceration in the guardhouse. B may seem like the answer, but Santierra does next to nothing to win a pardon for the prisoners. His loss of temper (C) appears not to bother him, and, if he feels inadequate (D), the passage neither says nor implies it.
- G** As we learn only at the end of the passage, Santierra hurried after the *Commandante* in order to ask for the execution to be delayed. Eliminate F because the sergeant laughs out loud *before* Santierra leaves. H and J occur subsequent to Santierra’s departure but are not the immediate result of the lieutenant’s talk with the *Commandante*.



11. **B** The sentence expresses the author's wonderment that history's third most serious worldwide plague is hardly remembered today. It has been reduced to a "folk-memory."
12. **H** In context, the phrase suggests that Americans took in stride the tragic consequences of the epidemic. Many thousands died, but the country's overall reaction was dispassionate. The remainder of the passage explores the reasons why.
13. **D** In the second paragraph the author begins to analyze America's tepid response to the epidemic. She describes the response as a "mystery" and as a "paradox."
14. **F** Through much of the passage, the author speculates on the reasons for America's complacency: the war, the brevity of the illness that preceded death, the social and political scene at the time of the epidemic, and so forth. Only the "acceptance of epidemics as a part of life" (lines 27–28) is cited as a certainty.
15. **C** The author claims that a lethal epidemic would have a significant impact on contemporary Americans because technological advances have made epidemics a rarity today.
16. **J** The fourth paragraph consists of a single transitional sentence that reinforces the idea that America's ho-hum response can be partially explained by the people's fatalistic acceptance of the epidemic. The sentence further states that additional explanations are speculative rather than factual. Overall, the sentence suggests that the author is groping for answers rather than declaring outright that she knows exactly why America responded as it did. J is the best answer because there is nothing in the sentence that contradicts earlier material.
17. **C** At one point in the passage, the author comments that Americans failed to grant the epidemic "the notoriety it deserved" (lines 32–33), suggesting that America's reaction ought to have been more forceful. In addition, lines 60–69 hint that the author doesn't quite understand how Americans could have been more consumed by daily headlines, including the results of a baseball game, than by the deadly consequences of the flu epidemic. Then, too, the author calls the enlistment of millions of men into the armed forces after the flu arrived in Washington a "pattern of insanity" (line 71).
18. **H** The author makes the point in lines 44–46 that the disease spread and disappeared swiftly—usually within a few days. Choices F and G are not valid because the passage does not discuss the manner in which the disease spread, nor its resemblance to previous epidemics. As for the age of victims, the passage indicates that most deaths occurred in the young adult population, mostly 18–21 year olds.
19. **A** The last paragraph states that the epidemic spurred "great activity among medical scientists and their institutions." Although the epidemic inspired enlistments into the armed forces, the author makes no claim that the increase of military volunteers was beneficial in any way. On the contrary, she describes an event in Boston where 96,000 new registrants "sneezed and coughed on one another" (lines 78–79).
20. **H** In terms of the entire passage, the two final paragraphs argue that the epidemic left a lackluster legacy because it killed almost no famous or powerful people. Also, "it affected all sides equally" (line 94). To put it another way, had well-known people succumbed, or if it had appeared to single out a specific group or nationality, the epidemic might have become more memorable. Its randomness, in short, doomed it to near oblivion.
21. **B** The author devotes virtually the entire passage to an adulation of various aspects of the French theater. Choice A is too broad; the author is fond of Paris but writes only about the theater. Eliminate C; in this passage James is neither detailed nor objective. Reject D; although James is clearly a fan of Molière's plays, he doesn't analyze them.
22. **H** Because the author *listened* to Delauney and *watched* Got (see lines 21–22), both must be performers. Likewise, Reichemberg is described in lines 78–79 as a "divinely ingenuous ingénue." Only de Musset (see lines 72–75) is not an actor but, as the creator of *Il ne Faut Jurer*, a playwright.
23. **C** To one degree or another, all the other choices merely support the idea that French theater exemplifies the best of French thought and culture, but only C conveys the substance of the passage.
24. **F** The epithet "poor man" is applied to the poet Gray because he never had the opportunity to sit in the theater and enjoy performances by Delauney, Got, and others. Instead, he was stuck reading novels such as *Clarissa Harlowe*.
25. **C** The phrase "charred ruins" suggests a recent fire (D), but other phrases such as "aftertaste of gunpowder" and "blood-stained pavements" indicate that the city had been ravaged by war. Neither A nor B is supported by evidence in the passage.
26. **J** There is no indication in the passage that Molière founded the *Théâtre Français*. Choice F is incorrect because de Musset's play is based on Molière's farce (lines 73–74). Because Molière wrote comedies and farces, G is wrong. Nor is H a good answer because lines 63–65 suggest that Molière, although he's very, very good, is not Shakespeare's equal.

27. **D** What attracted James to the theater is “finding it a copious source of instruction as to French ideas, manners, and philosophy” (lines 4–5). It’s true that B is appealing, but the theater was a refuge from the busy and dusty streets only one “certain evening in early summer” (lines 45–46). Choice A is wrong because the author enjoys the sensual rewards of a play (lines 24–26), and C is contradicted by the observation that the seats ought to be “better stuffed” (lines 20–21).
28. **G** In line 54, the author admires the “tender flower of poetry.” Choice F is contradicted by the author’s assertion in line 73 that Musset “need fear no neighborhood,” suggesting that his work stacks up quite favorably against that of Molière. H is also invalid in light of the author’s statement in lines 80–82 that the actors’ performance could not be “mistaken for real life.” J is not a good choice because the author, ignoring the rest of the audience, writes solely about his own reactions.
29. **A** Earlier in the passage (lines 29–30) the author calls the *Théâtre Français* “not only the most amiable but the most characteristic of French institutions.” Molière, the premier French playwright, therefore, “deserves” to be performed there. There is no evidence in the passage to support the other choices.
30. **H** The author envisions the foreigner leaving the theater saying “Ah, France is the civilized nation *par excellence*” (line 34). Choice F may be valid to some extent, but there is nothing about international envy in the passage. G describes the foreigner’s experience but not his reaction. Likewise, J sums up what happened to the foreigner but fails to describe his reaction.
31. **C** The FDA’s legal powers are implied throughout the passage. Choice A states one of the agency’s functions, but making rules governing caffeine is by no means its main function. Likewise, B and D fail to identify the FDA’s primary function.
32. **J** *Adulterated* usually means impure. In the context of the third paragraph, however, the use of such words as “poisonous” and “hazardous” suggests that a stronger meaning is intended, but not as strong as H, “lethal.”
33. **C** According to lines 19–23, caffeine in small amounts poses no threat to health. Adverse effects come only from high doses. A is a weak answer because 21st century food regulations cannot be based on obsolete data from the past. B is wrong because the FDA is supposed to protect consumers, not advise them to read ingredient labels in order to assess the safety of a product. D is not mentioned in the passage.
34. **G** In line 25, the GRAS is identified as a “regulatory” designation. It comes from FDA policy via the Federal Food, Drug, and Cosmetic Act, a measure that regulates the ingredients of all processed food. The other choices—F, H, and J—misrepresent the purpose and meaning of GRAS.
35. **D** Lines 56–59 state that this action “would require food processors to gather additional scientific evidence to prove caffeine is safe.” Choices A, B, and C do not name an effect that would follow if caffeine were removed from the GRAS list.
36. **F** The concerns and interests of pharmacists are not mentioned in the passage. Choice G is not a good choice because lines 58–59 and 70–76 deal with the impact of FDA decisions on manufacturers. H is discussed in lines 51–52. J is covered by lines 52–56.
37. **A** Lines 62–64 make the point that caffeine found naturally in cola nuts is the “chief flavoring agent” of soft drinks. Choices B, C, and D are accurate descriptions of caffeine but are not discussed in the passage.
38. **H** Lines 5–6 say that previous attempts to ban or restrict the use of beverages containing caffeine “lacked scientific credibility.” The issues raised by the other choices are not discussed in the passage.
39. **A** The addictive quality of caffeine is not stated anywhere in the passage. That caffeine can be harmful to animals is stated in lines 7–9. That it is found in nature is suggested by its presence in coffee and tea (line 13), and its presence in pain killers and cold remedies (lines 36–37) implies its salutary effects.
40. **G** The passage concentrates on what will happen if regulations governing the use of caffeine are changed. The matters mentioned by choices F, H, and J play little or no part in the passage.

### Answer Explanations: Science Reasoning Test

1. **C** The intake chart shows that the recommended carbohydrate is more than the carbohydrate consumed, and the recommended fat is less than the fat consumed. The other choices are wrong because there is no recommendation for a change in the protein.
2. **H** The energy chart (II) shows that fiber supplies no energy at all. F is wrong because the energy chart shows much less energy from protein than from carbohydrates or fats. Since the chart shows about equal amounts of energy now obtained from fats and carbohydrates, G is wrong. J deals with quantity, not energy, and the intake chart (I) shows that the quantity of carbohydrates is far greater than the amount of fat.

3. **D** In all these charts the two bars match perfectly for protein intake. A is wrong because the bar for recommended carbohydrate is longer than that for actual intake. Similarly, more, not less, fiber is recommended, so B is wrong. C is wrong because the recommended diet is reduced in fat.
4. **F** The bars for recommended intake (chart I) show about 80 g of fat and 330 g of carbohydrate.
5. **A** When the values for present diet are used, fats are about 23% of our diet by weight, and supply 43% of our energy; carbohydrates constitute 58% of our food, but give us only 45% of our energy. B is wrong because the ratio of percent by weight to energy for carbohydrates (58%/45%) is about the same as the ratio for proteins (16%/13%). C is wrong because fiber supplies no energy at all, and 3 times 0 is 0. D is the opposite of A.
6. **G** In Experiment 2, where there was little glucose, the bacteria were unable to form spores. F is wrong because no data about growth were presented. H is wrong because Experiments 1 and 2 have nothing to do with the usefulness of spores. J is wrong because Experiment 1 shows that glucose actually promotes spore formation.
7. **C** Since Experiment 1 shows that glucose is needed, and there is none in distilled water, it is quite likely that the bacterial cells stored glucose when it was available. A and D are wrong because Experiment 1 shows that the bacteria need glucose to form spores. B is wrong because we have no data indicating how long it took to form spores when there is plenty of glucose.
8. **G** Experiment 4 shows that if glucose is added in less than 5 hours spore formation is prevented, but if it is added after 10 hours spores form anyway.
9. **D** In Experiment 3, spores formed 13 hours after the cells were put into distilled water; in Experiment 4, the same thing happened, even though glucose was added after 10 hours.
10. **G** Bread mold spores are entirely different from bacterial spores, and there is no reason to believe that any similarity exists in the way they are formed.
11. **A** In both Experiment 1 and Experiment 3, spores were formed when a period of growth in an ample supply of glucose was followed by glucose deprivation. B is wrong because no spores are formed as long as there is plenty of glucose in the medium. Experiment 2 shows that no spores can be formed unless there is first an ample supply of glucose, so C is wrong. There is no evidence anywhere to support D.
12. **F** Adding male births (1063) and female births (1000) gives a total of 2063; males are 1063 of this total.
13. **B** Although the sex ratio went down, it then went up, and was always more than 0.5, which would indicate equal numbers of boys and girls. No information was given about total numbers.
14. **H** While parents are in their twenties, the sex ratio decreases by only about 1 or 2 parts per thousand, not enough to take into account.
15. **C** A is wrong because it is not an explanation, since it fails to suggest a mechanism by which the result is brought about. B is wrong because the second graph indicates that older men produce a smaller fraction of boys, not a larger one. D is wrong; you are told that this effect has been noticed in many wars and many countries, so it is unlikely that this result is coincidental. By elimination, C is the only feasible answer of those offered.
16. **J** Since spouses are generally only a little different in age, there is no way that the graphs can distinguish the effect of the mother's age from that of the father's.
17. **C** In 1960 it was about 1.5 million; in 1980, about 5.5 million.
18. **G** The difference between the 1990 bar and the 1991 bar is more than one million, larger than any of the other yearly jumps. The 1973 bar is longer than the 1968 bar by the same amount, but the intervening years are missing.
19. **D** If the present trend continued for another 5 years, the number of diagnosed cases would be about 10 million in the year 2000. Since the total for that year was expected to be 15 million, 5 million will be undiagnosed.
20. **G** It is possible that part, or even all, of the increase is simply because more cases are being found. F is wrong; the steady increase is apparent even without those years. H is wrong because the minor fluctuations do not negate the overall trend. J is wrong because the only function of the graph is to show the trend, without ascribing any cause.
21. **B** The chart predicted 22 million cases by 2025, but only 15 million in 2000. A is wrong because the chart makes no statement as to the cause of the increase. C is a valid conclusion from the chart, not an assumption. D is wrong because there is nothing in the yearly data that gives any indication of the number of undiagnosed cases.
22. **H** On the pressure-temperature chart, the actual pressures are always a little higher than those predicted by the ideal gas law; using this law will give an underestimation, so G is wrong. F is wrong because the error is small and the value calculated would be good enough for many purposes. J is wrong because the error is not unpredictable once the special properties of each gas are known.

23. **C** Of all the gases, sulfur dioxide shows the largest difference from the ideal value in both experiments.
24. **H** It is probable that the pressure rose to, say, 20.001 atmospheres, which would not have been detected at the level of accuracy to which the experiment was done. **F** is wrong because the pressure actually doubled when the volume dropped to half. Don't insult the experimenter by answering **G**. It is never safe to conclude that additional accuracy would not reveal something different, so **J** is wrong.
25. **B** At all volumes, helium and nitrogen had higher pressures than predicted; and carbon dioxide, xenon, and sulfur dioxide had lower pressures. The result can be predicted once you know which gas is being studied.
26. **F** You have to start the experiment with some gas in the cylinder, and the experimenter decides how much and at what pressure and temperature. Why bother to use anything but what is already there?
27. **D** The pressure-temperature chart shows no detectable deviation for the smallest molecules (helium) and successively more for each of the larger molecules. Deviations from the ideal gas law get larger, not smaller, as the pressure goes up. **C** expresses the ideal gas law; the whole burden of this experiment is to test deviations from this law.
28. **H** Experiments 1 and 2 show that the angle of repose increases with grain size. Comparison of these two experiments shows that sharp-angled fragments have a larger angle of repose than rounded ones. The soil samples of Experiment 3 show that water content is also involved.
29. **A** The two experimental materials differ in both shape and composition of the particles, and no effort was made to distinguish between these two possible causes of the difference found. **B** and **C** are wrong because the evidence from particles from 1.0 to 2.5 mm, in both experiments, provides a clear contrast. **D** is wrong because the differences are of several degrees and are consistent, so accuracy of 1 degree is sufficient to produce an answer.
30. **J** The angle of repose for the mixed sample of crushed marble is the same as for the largest size of the screened samples. **F** is wrong because the angle of repose is smaller for wet than for dry sand, so the pile of wet sand will be lower than the pile of dry. **G** is wrong because the angle of repose is smaller for the saturated soil; the pile becomes more stable as it dries out. **H** is wrong because no information is available to compare sand grains of various sizes if they are mixed with water.
31. **B** The soil is piled up, possibly to its angle of repose when dry. When it gets wet, the angle of repose decreases, so the angle of the hill is larger than the new angle of repose. **A** is wrong because the experiments do not deal with the effects of running water. **C** is wrong because the particles are not abraded as they rest during the dry season. **D** is surely true, but it says nothing about the effect of rain.
32. **H** Since there is no difference between 3.5 mm and 4.0 mm, it could be hypothesized that the angle of repose does not increase for particles beyond 3.5 mm, and this can be tested by trying larger particles.
33. **A** The experiments show that small, rounded particles have the smallest angle of repose. They will form lower, flatter piles and thus will spread out more on the ground.
34. **G** Both scientists agree that there is acrylamide in our food, but **J** is wrong because they differ on whether the amount represents a danger. **F** is wrong because Scientist 1 does not discuss the presence of other dangerous substances in our food. **H** is wrong because neither scientist discusses the EPA standard.
35. **D** Scientist 2 believes that the current state of knowledge does not justify taking any action with our diet. The other points are made by Scientist 1, but Scientist 2 does not dispute any of them.
36. **G** This is the recommendation made by Scientist 1. The other choices are wrong because Scientist 2 says we do not know what constitutes a dangerous level of acrylamide in the diet.
37. **A** This is the main crux of Scientist 1's argument. **B** is wrong because this information is already available. **C** is wrong because information about other chemicals is not pertinent. **D** is wrong because any conclusions must apply to everyone, not just to the average person.
38. **H** Scientist 2 cites these foods as examples of natural poisons in food in negligible quantities. **F** is wrong because the poison in these foods is not acrylamide. **G** and **J** are wrong because Scientist 2 believes that the amount of these substances in food is negligibly small.
39. **B** The other choices are wrong because Scientist 2 believes that there is not enough information to ban acrylamide, any more than many other substances as well.
40. **G** As a result of the hearings, some legislators might feel that the topic deserves further study. **F** and **J** are wrong because none of them is likely to take such drastic action until there is more information available. **H** is wrong; there is no shame for a scientist to hold a contrary opinion.

### Essay Self-Assessment

Before evaluating your own essay, read pages 433–434 on the scoring of ACT essays. Then complete the following checklist. Focus on both the strengths and weaknesses of your essay.

	Yes!	Mostly	Hardly	No
Does the essay address the ACT prompt?	_____	_____	_____	_____
Is the topic sufficiently narrowed?	_____	_____	_____	_____
Is the essay's main idea clear?	_____	_____	_____	_____
Have you written an introduction?	_____	_____	_____	_____
Does the essay sound natural?	_____	_____	_____	_____
Have you used plain words?	_____	_____	_____	_____
Have you used precise language?	_____	_____	_____	_____
Does your essay have a clear focus?	_____	_____	_____	_____
Do all parts fit together coherently?	_____	_____	_____	_____
Is each sentence accurately worded?	_____	_____	_____	_____
Have you trimmed needless words?	_____	_____	_____	_____
Do you show more than tell?	_____	_____	_____	_____
Have you used active verbs?	_____	_____	_____	_____
Is the language fresh?	_____	_____	_____	_____
Do you include verbal surprises?	_____	_____	_____	_____
Are the sentences varied?	_____	_____	_____	_____
Is sentence length balanced?	_____	_____	_____	_____
Does the essay have a conclusion?	_____	_____	_____	_____
Is the essay mostly error-free?	_____	_____	_____	_____

Identify the three greatest strengths of your essay:

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_

Name three specific things that you could do to improve your essay:

- 1) \_\_\_\_\_
- 2) \_\_\_\_\_
- 3) \_\_\_\_\_

Circle the score your essay deserves: 6 5 4 3 2 1

**Table for Calculating the Combined English/Writing Test Score****Instructions:**

1. Find your Writing Test subscore (2–12) along the top of the table.
2. Find your English Test score on the left or right side.
3. Your combined score will appear in the table where the two scores intersect. For instance, a 10 on the Writing Test and a 25 on the English Test will yield a Combined English/Writing Test score of 26.

English Test Score	Writing Test Subscore											English Test Score
	2	3	4	5	6	7	8	9	10	11	12	
1	1	2	3	4	5	6	7	8	9	10	11	1
2	2	3	4	5	6	6	7	8	9	10	11	2
3	2	3	4	5	6	7	8	9	10	11	12	3
4	3	4	5	6	7	8	9	10	11	12	13	4
5	4	5	6	7	8	9	10	11	12	12	13	5
6	5	6	7	8	8	9	10	11	12	13	14	6
7	5	6	7	8	9	10	11	12	13	14	15	7
8	6	7	8	9	10	11	12	13	14	15	16	8
9	7	8	9	10	11	12	13	13	14	15	16	9
10	8	9	9	10	11	12	13	14	15	16	17	10
11	8	9	10	11	12	13	14	15	16	17	18	11
12	9	10	11	12	13	14	15	16	17	18	19	12
13	10	11	12	13	14	14	15	16	17	18	19	13
14	10	11	12	13	14	15	16	17	18	19	20	14
15	11	12	13	14	15	16	17	18	19	20	21	15
16	12	13	14	15	16	17	18	19	20	20	21	16
17	13	14	15	16	16	17	18	19	20	21	22	17
18	13	14	15	16	17	18	19	20	21	22	23	18
19	14	15	16	17	18	19	20	21	22	23	24	19
20	15	16	17	18	19	20	21	21	22	23	24	20
21	16	17	17	18	19	20	21	22	23	24	25	21
22	16	17	18	19	20	21	22	23	24	25	26	22
23	17	18	19	20	21	22	23	24	25	26	27	23
24	18	19	20	21	22	23	23	24	25	26	27	24
25	18	19	20	21	22	23	24	25	26	27	28	25
26	19	20	21	22	23	24	25	26	27	28	29	26
27	20	21	22	23	24	25	26	27	28	28	29	27
28	21	22	23	24	24	26	26	27	28	29	30	28
29	21	22	23	24	25	26	27	28	29	30	31	29



Table for Calculating the Combined English/Writing Test Score (cont.)

English Test Score	Writing Test Subscore											English Test Score
2	3	4	5	6	7	8	9	10	11	12		
30	22	23	24	25	26	27	28	29	30	31	32	30
31	23	24	25	26	27	28	29	30	30	31	32	31
32	24	25	25	26	27	28	29	30	31	32	33	32
33	25	25	26	27	28	29	30	31	32	33	34	33
34	26	26	27	28	29	30	31	32	33	34	35	34
35	26	27	28	28	30	31	31	32	33	34	35	35
36	26	27	28	29	30	31	32	33	34	35	36	36

## Calculating Your Combined English/Writing Test Score

English Test Score \_\_\_\_\_

Essay Score \_\_\_\_\_ multiply by 2 = \_\_\_\_\_

Combined Score (See table): \_\_\_\_\_