12/27/01

ACT ASSESSMENT TEST INFORMATION RELEASE REPORT

TEST DATE = 12/01 TEST FORM = 58E TEST CENTER = 00012

ITEM NUMBER	1 1234567890	1111111112 1234567890	2222222223 1234567890	3333333334 1234567890	4444444445 1234567890	5555555556 1234567890	6666666667 1234567890	77777 12345
ENGLISH								
CORRECT ANSWER	CJCJDGCGCJ	AGAFAHBHCH	BFAJDJAFCF	CHBFDJAJCF	BJAHDHDGCF	DGBJAGCJAJ	BFBFDFBHDG	DGCGC
YOUR ANSWER	++A+CF++++	+++++F++D+	CHC++FD+++	++++B++++G	A+BF+GA+++	AFDHDJDF+F	+++++++JCF	+++FA
SUBSCORE	URUURUUURU	RURRRRRURU	UURRUUURUR	UURRURURUU	RRURRURUUU	RRUURRRUUR	URURUURURU	URRUU
MATHEMATICS								
CORRECT ANSWER	BGCKEFBJBH	EHBJDFEHBH	CGAHDHEJCG	BJBHAKBJCF	EJAJAJAKEF	EJAHAKAHEJ		
YOUR ANSWER	+K++B+A+++	A+CH+HA+C+	EK++C+BH+H	AKC++HCH+H	CHBGDH+HC+	CFC+CHC+CH		
SUBSCORE	GTTAAAAAAA	AATTAGAAAT	ATAGAAATTG	GAGTGATGGG	GTTGGGAGGA	ATATGGTTTT		
READING								
CORRECT ANSWER	CHBGBFDJAH	CFAHAJCJBG	DFBFCHAGDG	DJBGAFCHCH				
YOUR ANSWER	B+CF+JA+++	D+D++G++++	CJ+-AF++AH	CHCHCH++++				
SUBSCORE	LLLLLLLLLL	SSSSSSSSSS	LLLLLLLLLL	SSSSSSSSSS				
SCIENCE REASONING								
CORRECT ANSWER	AJBFDFAHAG	DJBJCJAJAH	CGAGCGCJBJ	AHAJBHCGAJ				
YOUR ANSWER	CHCHCH++DF	++++++CHCF	+++++H+FCH	C+D++F++C+				

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

ENGLISH TEST

45 Minutes—75 Questions

DIRECTIONS: In the five passages that follow, certain words and phrases are underlined and numbered. In the right-hand column, you will find alternatives for the underlined part. In most cases, you are to choose the one that best expresses the idea, makes the statement appropriate for standard written English, or is worded most consistently with the style and tone of the passage as a whole. If you think the original version is best, choose "NO CHANGE." In some cases, you will find in the right-hand column a question about the underlined part. You are to choose the best answer to the question.

You will also find questions about a section of the passage, or about the passage as a whole. These questions do not refer to an underlined portion of the passage, but rather are identified by a number or numbers in a box.

For each question, choose the alternative you consider best and fill in the corresponding oval on your answer document. Read each passage through once before you begin to answer the questions that accompany it. For many of the questions, you must read several sentences beyond the question to determine the answer. Be sure that you have read far enough ahead each time you choose an alternative.

PASSAGE I

The following paragraphs may or may not be in the most logical order. Each paragraph is numbered in brackets, and question 14 will ask you to choose where Paragraph 3 should most logically be placed.

Jersey Shore Hometown

[1]

I live in southern New Jersey, it is just (1) two blocks from the Atlantic Ocean. Being a resort in most people's (2) minds, I call my town home. (2) Vacationers know the town only in its lively, boisterous summer phase, but I know it's (3) leisurely "off-season" mood too. During the fall, winter, and spring, when the tourists aren't there. The (4) town is quiet, intimate, peaceful. When I go to the corner grocery store, Mr. Williams, the proprietor, puts his book aside and

1. A. NO CHANGE
   B. it just is
   C. just
   D. it is

2. F. NO CHANGE
   G. My calling my town home is unlike most people who call it a resort.
   H. My town is a resort to most people, in my view being home.
   J. To most people my town is a resort, but to me it is home.

3. A. NO CHANGE
   B. its'
   C. its
   D. that's

4. F. NO CHANGE
   G. there in the
   H. there: the
   J. there, the

inquires about my family. [5]

[2]

Then, in late May, everything began to change. [6]
Walking my dog, I find the beach is no longer deserted: dedicated sunbathers lie on towels or sit in chairs, read, slept, or talked. [7] I know the season is beginning then.

The town itself seems it has been held in [8] its breath in expectation of summer activity.

[3]

During the summer months, the streets and shops and boardwalk are crowded with tourists buying sunscreen, postcards, and souvenirs. It is pleasant to see [9] vacationers enjoying my hometown so much, and yet there is a part of me that feels they are invading it. Everywhere I go, it is noisy and crowded: the beach, the grocery store, the movie theater. I find myself looking forward to the time when my dog and I will be the only one's [10] on the beach again. I can't wait to hear sea gulls crying and waves crashing instead of people shouting and laughing. I want nothing more than to sit alone on the beach and watch the sunset. I want nothing less than to feel my home is someone else's "getaway."

[4]

Then, after Labor Day weekend, all the tourists are suddenly gone, and the town seems strangely deserted. Once school starts [11] again, my

5. The writer wishes to connect the example of Mr. Williams's friendliness to the more general idea that the town is friendly. Which of the following sentences, if added here, would best serve this purpose?
   - A. He is seldom friendly to everyone who comes in; people just mind their own business.
   - B. As friendly as he is, he never tells me anything about himself.
   - C. Even now, I remember his friendliness well.
   - D. At such times, I appreciate the intimacy of the town.

6. F. NO CHANGE
   G. begins
   H. has begun
   J. has began

7. A. NO CHANGE
   B. to read, sleep, or talking.
   C. reading, sleeping, or talking.
   D. read, sleep, or to talk.

8. F. NO CHANGE
   G. to be holding
   H. to be held with
   J. it will have been holding

9. Which of the following alternatives to the underlined portion would be LEAST acceptable here?
   - A. notice
   - B. observe
   - C. enjoy
   - D. watch

10. F. NO CHANGE
    G. ones'
    H. one
    J. ones

11. A. NO CHANGE
    B. school begins to start
    C. classes reassemble at school
    D. more

classmates and their parents, are just about the only people
12
I see in town. Although I have craved solitude, after the lively pace of summer the autumn stillness seems too
13
great, the silence almost oppressive. It will be weeks
13
before I feel at peace with the silence again.

12. F. NO CHANGE
G. classmates and their parents
H. classmates, and their parents
J. classmates' and their parents'

13. Given that all of the choices are true, which one best supports the point being made about how difficult it is to make this adjustment?
A. NO CHANGE
B. the temperature begins to drop and the wind shifts direction.
C. all of the tourists return to their homes in distant places.
D. things slow down to a pace that most people can easily handle.

Questions 14 and 15 ask about the preceding passage as a whole.

14. For the sake of the logic and coherence of this essay, Paragraph 3 should be placed:
F. where it is now.
G. before Paragraph 1.
H. after Paragraph 1.
J. after Paragraph 4.

15. Suppose the writer had chosen to write a brief essay on the history of a small town. Would this essay successfully fulfill the writer's goal?
A. No, because the events the essay describes do not form the historical record of this small town.
B. No, because the essay considers the history of the town, but it is not a small town.
C. Yes, because this essay is brief and it focuses on a small town in New Jersey.
D. Yes, because the point of view is objective and the historical approach is evident.

PASSAGE II

Repaving Traditions

When I turned fifteen, my father and I traveled to Mexico to visit my grandparents in Jungapeo, Michoacán. I had not seen Grandma and Grandpa in three years, and I was eager to see them again and hear their stories about their lives. At the same time, I felt apprehensive about the
16
visit. My friends had often talked about how their relatives in Mexico chastised them for their dress and behavior. I worried that my grandparents would be freaked by the
17
ways I'd changed in the past three years, or critical of the generous amount of freedom to which my father had accustomed me. Even though I was anxious, I traveled eagerly with my father.

16. Which of the following alternatives to the underlined portion would NOT be acceptable here?
F. Nevertheless,
G. Still,
H. Although
J. Yet

17. A. NO CHANGE
B. upset
C. blown away
D. weirded out

Eventually my father and I arrived in Jungapeo, we
18
noticed that something had changed. The cobblestone road that had been etched in our minds as a unique element of my grandparents' town had been replaced by the gray monotony of recently laid pavement. [19] We walked down the smooth street to my grandparents' house in silence.

During dinner, my father asked about the loss of the cobblestone road, which Grandpa and him had
20
help lie and maintain.
21

Its removal, my father said,
22
was like the erasure of a memory—the discarding of a traditional landmark. Grandpa said that, in their old age, he and Grandma had often
23
stumbled on those rough-hewn cobblestones. If my father had had to walk down that street every day, most likely he might not remember the cobblestones so
24
fondly. Grandma agreed. Fixing the road every year had become a kind of tradition in the family, she said, but traditions should not be kept, if their only purpose, is to
25
help people live in the past.

While I did not know if my grandparents had always
26

18. F. NO CHANGE
G. However
H. When
J. So

19. At this point, the writer is considering adding the following sentence:

> In contrast to cobblestone, pavement is made of asphalt or concrete and forms a firm level surface for travel.

Should the writer make this addition?

A. Yes, because the sentence adds more details about the difference between cobblestone and pavement.
B. Yes, because the sentence provides a contrast to the information given in the previous sentence.
C. No, because the information distracts from the purpose of the paragraph.
D. No, because this information is provided elsewhere in the essay.

20. F. NO CHANGE
G. Grandpa and himself
H. he and Grandpa
J. himself and Grandpa

21. A. NO CHANGE
B. helped lay
C. helped lie
D. help lay

22. F. NO CHANGE
G. There
H. It's
J. Its'

23. Which of the following alternatives to the underlined portion would be LEAST acceptable here?

A. recited
B. explained
C. pointed out
D. stated

24. F. NO CHANGE
G. it could possibly be stated that
H. it is possible that
J. OMIT the underlined portion.

25. A. NO CHANGE
B. kept if, their only purpose,
C. kept if their only purpose,
D. kept if their only purpose

26. F. NO CHANGE
G. As
H. Although
J. OMIT the underlined portion.

thought that way. I also did not know, yet, whether they [27] would approve of my clothing or the apparent lack of authority my father had over me. However, [28] I was certain that my grandparents had once again taught me something important, and with that, some of my misgivings about, the visit, [29] began to disappear.

27. A. NO CHANGE
    B. know, yet whether,
    C. know yet whether,
    D. know, yet whether

28. F. NO CHANGE
    G. Subsequently,
    H. Consequently,
    J. Moreover,

29. A. NO CHANGE
    B. misgivings about the visit,
    C. misgivings about the visit
    D. misgivings, about the visit

Question 30 asks about the preceding passage as a whole.

30. Suppose the writer had chosen to write about a time when he learned an important lesson from an elder. Would this essay successfully fulfill that goal?
    F. Yes, because in the essay the narrator clearly learns an important lesson about the relative value of traditions from his grandparents.
    G. Yes, because in the essay the narrator clearly learns from his father the importance of respect for his grandparents and their views.
    H. No, because the narrator states that traditions should be discarded when they've outlived their usefulness, and his grandparents merely agree with this opinion.
    J. No, because the essay primarily focuses on the ways in which the narrator's relationship with his father improved when they went together to Jungapeo.

PASSAGE III

Growing Older *and* Getting Better

What will you be doing when you are seventy years old? If you're like as [31] most people, and imagine [32] yourself enjoying the relaxed pace of retirement. Consequently, [33] growing old doesn't

31. A. NO CHANGE
    B. your like as
    C. you're like
    D. your like

32. F. NO CHANGE
    G. imagining
    H. you imagine
    J. who imagine

33. A. NO CHANGE
    B. However,
    C. On the one hand,
    D. Besides,

necessarily mean slowing down. [34] She is just one of those whom continued to be active well past the traditional age of retirement. Scientific research indicates that people live longer today than ever before.

Leo Tolstoy, the author of *War and Peace*, learned to ride a bicycle when he was sixty-seven, and his secretary's disapproval didn't diminish his fun. Tolstoy celebrated his seventieth birthday by taking a two-hour bicycle ride.

Grandma Moses didn't begin to paint seriously until she was in her seventies. At the age of eighty, she had her first solo art show. She painted for another twenty years. Her paintings are widely known and loved, and have been exhibited throughout the United States and Europe.

34. The writer would like to provide information about political activist Elizabeth Cady Stanton to support the claim made in the preceding sentence. Given that all are true, which of the following sentences, if added here, would best achieve this purpose?
    - F. While in her late sixties, Elizabeth Cady Stanton, a political activist during the 1800s, co-wrote *History of Woman Suffrage*, a four-volume document that took nearly four years to complete.
    - G. Elizabeth Cady Stanton lived a full life as a political activist during the 1800s and died in her sleep on October 26, 1902, at the age of eighty-seven.
    - H. In a letter to her sister describing a frightful thirty-mile ride in an open wagon, political activist Elizabeth Cady Stanton wrote: "I enjoy life under the most adverse circumstances."
    - J. On her eightieth birthday, Elizabeth Cady Stanton's friends showed her their appreciation by renting an opera house and conducting an evening of tributes to this remarkable woman.

35. A. NO CHANGE
    - B. whom
    - C. of which
    - D. of many who

36. F. NO CHANGE
    - G. Many scientists have studied the physical and mental effects of aging.
    - H. An array of factors have led to increased longevity among humans.
    - J. OMIT the underlined portion.

37. A. NO CHANGE
    - B. Her first solo art show at the age of eighty was held.
    - C. Her art at the age of eighty was first given a solo showing.
    - D. It was at eighty when she had her first solo art show.

38. At this point, the writer wants to provide specific information about the subject matter of Grandma Moses' paintings. Assuming all of the choices are true, which one would best accomplish this?
    - F. NO CHANGE
    - G. As a child, Grandma Moses used the colored juices of berries and grapes as her paints.
    - H. She used to do embroidery work, but as her arthritis grew worse, handling a needle became too difficult, and she turned to painting.
    - J. Such nostalgic paintings of country life as *Catching the Thanksgiving Turkey* made her a great success.

When he was fifty-one, Claude Pepper was defeated in his bid to reelecting (39) to the U.S. Senate. More than ten years later he made a political comeback, winning (40) a seat in the U.S. House of Representatives. There he devoted much of his energy to helping the elderly and the ill. Pepper's most influential years in Congress came after he was elected chairman of the House Rules Committee at eighty-two.

[41] When she turned one hundred, (42) Daisy Farrington celebrated her one-hundredth birthday by taking (43) her first plane ride. Pearl Taylor of California enrolled in Long Beach City College when she was eighty-eight. [44]

39. A. NO CHANGE
    B. being reelected
    C. be reelected
    D. reelect

40. F. NO CHANGE
    G. he won
    H. he had won
    J. and winning

41. Which of the following sentences, if added here, would best introduce the essay's shift in focus in this paragraph?
    A. Many things can be accomplished, regardless of age.
    B. You don't have to be famous, though, to break age barriers.
    C. People encounter more obstacles, though, as they get older.
    D. The main challenge the elderly face is staying healthy.

42. F. NO CHANGE
    G. At one hundred,
    H. Turning one hundred,
    J. OMIT the underlined portion.

43. A. NO CHANGE
    B. birthday, by taking
    C. birthday; by taking
    D. birthday by taking:

44. The writer is considering adding here the following sentence:

    In increasing numbers, adults are returning to school to finish their degrees.

    Should the writer make this addition?
    F. Yes, because it provides an interesting detail about adult education.
    G. Yes, because it explains why Pearl Taylor returned to school.
    H. No, because it detracts from the main focus of the essay.
    J. No, because it contradicts information provided elsewhere in the essay.

Two years later, she won the vote and was elected Campus Queen.

45. A. NO CHANGE
B. was elected and voted in as
C. won an election in which the students voted for
D. was elected

Shortly before his death at ninety-six, cellist Pablo Casals reflected upon his life, saying, "For me, life grows more fascinating." The ability of fascination with what life has to offer and to be willing to try new things may be what keeps some of us active during what is often considered our "declining" years.

46. F. NO CHANGE
G. for fascination of
H. to be fascinated by
J. to be fascinated for

PASSAGE IV

Sad Journeys, Brave Exiles

Two authors of young-adult fiction have taken the tragic events of their lives and created powerful stories for us to learn from. During World War II, the United States and Canadian governments, whose countries border each other, unjustly relocated many people, of Japanese descent. They were uprooted from their homes and imprisoned in distant internment camps.

47. A. NO CHANGE
B. governments, who share a national border,
C. governments, geographically linked by a joint border,
D. governments

48. F. NO CHANGE
G. many people
H. many, people
J. many people;

Yoshiko Uchida was born in 1921 in Alameda, California. She is studying at the University of California when war between the United States and Japan was declared. The internment of some 120,000 Japanese Americans began soon after that. Uchida and her family were temporarily housed in a horse stall at Tanforan

49. A. NO CHANGE
B. has been studying
C. was studying
D. studies

50. F. NO CHANGE
G. Beginning soon after that, the internment of some 120,000 Japanese Americans.
H. Soon after that, beginning the internment of some 120,000 Japanese Americans.
J. The internment of some 120,000 Japanese Americans beginning soon after that.

Racetrack and then finalized their journey at Topaz, a bleak internment camp in the Utah desert. Uchida's award-winning novel *Journey to Topaz* describes this experience that took place during the course of World War II. This book portrays both the persecution experienced by Japanese Americans and it's determination to maintain their pride and traditions.

Joy Kogawa was born in 1935 in Vancouver, British Columbia. Like Uchida, Kogawa, and her family were removed from their home and relocated by the government, first to the interior of British Columbia, then to a farm in Alberta. Kogawa has woven these experiences into an intense and beautifully written novel. *Obasan* depicts a family fractured by war and by the loss of home, property, community, and civil rights. As with Uchida, Kogawa's have the strength to embrace hope and understanding until the end of World War II.

The internment of American and Canadian citizens of Japanese ancestry represent a low point in the history of those countries—a sad combination of racial prejudice,

51. A. NO CHANGE
    B. toted off to
    C. met the target of their trip at
    D. transported to

52. Given that all of the choices are true, which one would provide the most significant new information about the novel *Journey to Topaz* ?
    F. NO CHANGE
    G. as seen through the eyes of eleven-year-old Yuki Sakane.
    H. in a moving and insightful piece of historical fiction.
    J. as it occurred on the United States mainland.

53. A. NO CHANGE
    B. their
    C. there
    D. its

54. F. NO CHANGE
    G. Kogawa, and her family,
    H. Kogawa and her family,
    J. Kogawa and her family

55. A. NO CHANGE
    B. interior within
    C. internal part of
    D. inside of

56. F. NO CHANGE
    G. Like Uchida's characters,
    H. As in Uchida's books,
    J. Like Uchida,

57. Which choice completes this sentence and this paragraph in a way that most effectively summarizes one of the key points of this essay?
    A. NO CHANGE
    B. in their newfound home in the province of Alberta.
    C. in the face of such loss, hardship, and prejudice.
    D. and the everlasting dream for world peace.

58. F. NO CHANGE
    G. have represented
    H. are representing
    J. represents

war hysteria, and failure of leadership. As Yoshiko Uchida writes in her autobiography *Desert Exile:* "I ask [each new generation] to be vigilant so that such a tragedy will never happen to any group of people in America again."

59. A. NO CHANGE
    B. there was war hysteria,
    C. people experiencing war hysteria,
    D. war hysteria was a big problem,

Question 60 asks about the preceding passage as a whole.

60. Suppose the writer had chosen to write a short historical essay on the internment camps that existed in the United States and Canada during World War II. Would this essay successfully fulfill the writer's purpose?
    F. Yes, because the essay refers to internment camps that existed in the state of Utah and the province of Alberta.
    G. Yes, because the essay describes the experiences of people who were interned in camps in Canada and the United States during World War II.
    H. No, because the essay fails to provide enough information about the success of Uchida's and Kogawa's books to support their depictions of the internment camps.
    J. No, because although some historical detail about the internment camps is included, the essay focuses on two authors who translated their experiences into literature.

PASSAGE V

The Beginnings of Vegetarianism in the United States

Vegetarianism has increased in popularity recently in the United States, however, it is by no means new. In the nineteenth century, vegetarianism was closely allied to the temperance movement. Temperance advocates believed that meat, like alcohol, was overstimulating and that its consumption could led to degradation. [64] Many vegetarians believed that participation in the slaughter and consumption of animals promoted

61. A. NO CHANGE
    B. but
    C. nevertheless,
    D. OMIT the underlined portion.

62. F. NO CHANGE
    G. Some of them
    H. More than a few of them
    J. They

63. A. NO CHANGE
    B. its consumption could lead
    C. it's consumption could lead
    D. it's consumption could led

64. The writer is considering deleting the preceding sentence. If the writer did this, the paragraph would primarily lose:
    F. an explanation for a point previously stated.
    G. an irrelevant digression.
    H. a statement of the paragraph's main idea.
    J. a statement that contrasts with an earlier point.

aggression, of humans. The ideas and

65. A. NO CHANGE
B. aggression, in
C. aggression of
D. aggression in

principles of both movements emphasized moral and physical improvement. This limited focus contrasts with the varied concerns of many of today's vegetarians, which include animal rights, world hunger, the environment, and personal health.

66. F. NO CHANGE
G. principle's
H. principals
J. principal's

A more influential figure in the early phase of American vegetarianism was Sylvester Graham, who created the still-popular graham cracker. Graham, an advocate of temperance, and vegetarianism, raw foods, and whole-grain flour, rose to fame during a cholera epidemic in 1832. [69] His credibility established, dietary principles were the focus of his many lectures. In New York City and Boston, he opened boarding houses. Residents there practiced his theories about diet and lifestyle. By the late 1830s, vegetarian "Graham

67. A. NO CHANGE
B. Perhaps the most
C. However, a more
D. Still, the most

68. F. NO CHANGE
G. temperance and vegetarianism, raw foods, and whole-grain flour
H. temperance, vegetarianism, raw foods, and whole-grain flour,
J. temperance, vegetarianism, raw foods, and whole-grain flour

69. Which of the following true statements, if added here, would serve as the best transition, or link, between the preceding and following sentences?
A. On his own, Graham maintained a strict vegetarian diet during the epidemic.
B. Graham regularly advised his family about the possible health benefit of a meatless diet.
C. During that time, he was careful to see that his meals were made with only fresh ingredients.
D. Some of the people that he treated with a strict vegetarian diet recovered from the disease.

70. F. NO CHANGE
G. Graham lectured widely on his dietary principles.
H. the theories of diet he had developed were the subject of his lectures.
J. people were interested in hearing about Graham's dietary principles.

71. Which of the following alternatives to the underlined portion would NOT be acceptable here?
A. houses where residents
B. houses; residents there
C. houses, and residents there
D. houses, residents there

clubs" began to manifest themselves into college campuses. In addition, Graham was pivotal in the formation of the American Vegetarian Society.

Attention to vegetarianism declined during the Civil War. Following the war, furthermore, interest in vegetarianism resumed. This time in connection with a rising public concern over the adulteration of processed foods with unpalatable and sometimes toxic substances. Health spas, especially cereal king, John Harvey Kellogg, strictly vegetarian Battle Creek Sanitarium in Michigan, rose in popularity, catering to the nation's rich and famous. Like its modern counterpart, nineteenth-century vegetarianism reflected contemporary concerns and values.

72. F. NO CHANGE
G. appear on
H. materialize onto
J. stick out on

73. A. NO CHANGE
B. moreover,
C. however,
D. consequently,

74. F. NO CHANGE
G. resumed, this
H. resumes. This
J. resumes, this

75. A. NO CHANGE
B. king, John Harvey Kellogg's,
C. king John Harvey Kellogg's
D. king John Harvey Kellogg

END OF TEST 1

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

MATHEMATICS TEST

60 Minutes—60 Questions

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

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

You are permitted to use a calculator on this test. You may use your calculator for any problems you choose, but some of the problems may best be done without using a calculator.

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

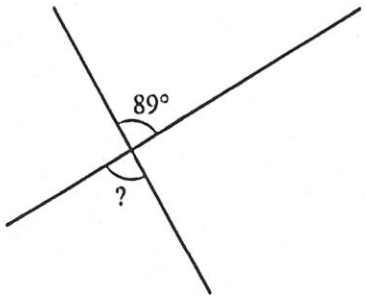
1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word *line* indicates a straight line.
4. The word *average* indicates arithmetic mean.

DO YOUR FIGURING HERE.

1. If $3^x = 81$, then $x = ?$

   A. 3
   B. 4
   C. 5
   D. 8
   E. 27

2. Two lines intersect at an angle of 89°, as shown below. What is the measure of the angle indicated with a question mark?



   F. 1°
   G. 89°
   H. 90°
   J. 91°
   K. Cannot be determined from the given information

3. In $\triangle ABC$, the sum of the measures of $\angle A$ and $\angle B$ is 68°. What is the measure of $\angle C$?

   A. 44°
   B. 68°
   C. 112°
   D. 122°
   E. 136°

4. What is the value of $3x^2 - 5x$ when $x = -2$?

   F. −14
   G. −2
   H. 2
   J. 5
   K. 22

DO YOUR FIGURING HERE.

5. On a particular road map, $\frac{1}{2}$ inch represents 18 miles. About how many miles apart are 2 towns that are $2\frac{1}{2}$ inches apart on this map?

   A. 18
   B. $22\frac{1}{2}$
   C. 36
   D. 45
   E. 90

6. If a, b, c, and d are any 4 integers, then $a + b + c = a + c + d$ is true only if which of the following is true?

   F. $d = b$
   G. $c = a$
   H. $c = b$
   J. $c = d$
   K. $a = d$

7. Suppose that replacing an old electric water heater with a new, energy-efficient electric water heater will reduce a home's average monthly electric bill by 20%. If the old electric water heater in a home with a current average monthly electric bill of $110 is replaced by a new energy-efficient one, what will be the home's new average monthly electric bill?

   A. $ 22.00
   B. $ 88.00
   C. $ 90.00
   D. $104.50
   E. $109.80

8. How many bottles can be filled with 0.35 ounces of perfume each, using 41.5 ounces of perfume?

   F. 12
   G. 14
   H. 15
   J. 118
   K. 119

9. You have agreed with an automobile dealership to purchase a car for $3,400, which includes tax and all miscellaneous costs. You give the dealership $400 as a down payment and get a car loan for the rest. If you pay off your loan by making 24 monthly payments of $150 each, the total of all your payments will be how much more than the actual purchase price of the car?

   A. $ 200
   B. $ 600
   C. $3,000
   D. $3,600
   E. $4,000

DO YOUR FIGURING HERE.

10. The monthly rents for single rooms at 5 colleges are \$350, \$310, \$360, \$320, and \$310, respectively. What is the mean of these monthly rents?

F. \$310
G. \$320
H. \$330
J. \$335
K. \$360

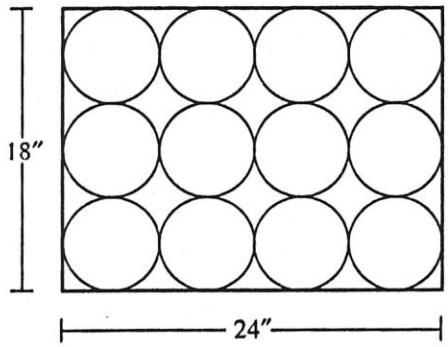
11. What is the value of $2|4 - 13| - 3(5 + 2)$?

A. −39
B. −35
C. −27
D. −26
E. −3

12. If $9m + 57 = 87$, then $9(m + 6) = ?$

F. 36
G. 66
H. 84
J. 93
K. 141

13. If identical cylindrical cans are packed 12 cans to an 18″ × 24″ rectangular carton, as shown below, what is the approximate radius, in inches, of each of the cans?



A. 2
B. 3
C. 12
D. 6π
E. 9π

14. Points A, B, C, and D are collinear such that A is between C and B, and D is between A and B. Which of the following statements about the distances between these points *must* be true?

F. $AB + BC = AC$
G. $BA + AD = BD$
H. $BC + CD = BC$
J. $CA + AD = CD$
K. $CB + BD = CD$

DO YOUR FIGURING HERE.

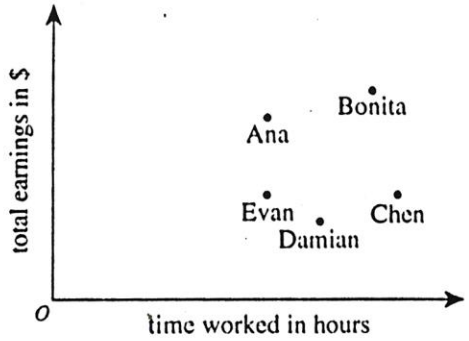
15. The power that a hydroelectric dam generates can be modeled using the formula

$$P = \frac{Qh\gamma}{1{,}000{,}000}$$

where P is the power the dam generates, in megawatts; Q is the flow rate of the river, in cubic meters per second; h is the height of the dam, in meters; and γ is the weight per unit volume of water, in newtons per cubic meter. According to this model, which of the following is closest to the power, in megawatts, generated by a dam that is 25 meters high if the flow rate is 8.0 cubic meters per second and the weight of water is 9,790 newtons per cubic meter?

A. 0.18
B. 0.20
C. 1.8
D. 2.0
E. 4.0

16. Kay collected data from 5 friends who have jobs. She plotted the data on a graph to compare the number of hours her friends worked to their total earnings in dollars, as shown below. According to the graph, which of her 5 friends earned the most *per hour* ?



F. Ana
G. Bonita
H. Chen
J. Damian
K. Evan

17. On the lot at Quality Used Cars, there are only 15 cars with automatic transmission and only 12 cars with bucket seats. The number of cars on the lot with both automatic transmission and bucket seats is:

A. exactly 27.
B. exactly 3.
C. at least 3.
D. no more than 3.
E. no more than 12.

18. Which of the following describes the solutions to the equation $x^2 - 8x - 48 = 0$?

F. 2 negative numbers
G. 2 positive numbers
H. 1 negative number and 1 positive number
J. 1 real number and 1 imaginary number
K. 2 imaginary numbers

DO YOUR FIGURING HERE.

19. Lee walked for 20 minutes on a motorized treadmill that was set at a constant speed of 4 miles per hour. About how many miles did Lee walk on the treadmill?

A. Between $\frac{1}{2}$ and 1

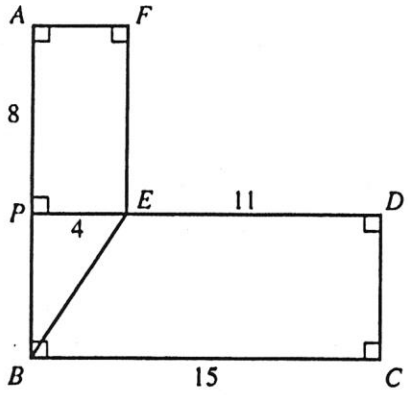
B. Between 1 and $1\frac{1}{2}$

C. Between $1\frac{1}{2}$ and 2

D. Between 2 and $2\frac{1}{2}$

E. More than $2\frac{1}{2}$

20. In the figure below, P is on $\overline{AB}$, and E is on $\overline{PD}$. Polygon $ABCDEF$, with dimensions in inches as marked, has an area of 122 square inches. What is the area of $\triangle PEB$, in square inches?



F. $3\frac{13}{15}$

G. 6

H. 12

J. $13\frac{11}{13}$

K. 15

21. $(3xy + 21xy^2 - 7y) - (5xy + 12xy^2 - 3y)$ is equivalent to:

A. $-8xy + 9xy^2 - 4y$
B. $-8xy + 33xy^2 - 10y$
C. $-2xy + 9xy^2 - 4y$
D. $-2xy + 9xy^2 - 10y$
E. $-2xy + 33xy^2 - 10y$

DO YOUR FIGURING HERE.

22. Chase City is 12 miles directly east of Red Oak, and Wylliesburg is 8 miles directly north of Red Oak. If you could travel in a straight line from Wylliesburg directly to Chase City, about how many miles would you travel?

F. 10
G. 14
H. 16
J. 18
K. 20

23. In which of the following are $\frac{1}{2}$, $\frac{5}{6}$, and $\frac{5}{8}$ arranged in ascending order?

A. $\frac{1}{2} < \frac{5}{8} < \frac{5}{6}$
B. $\frac{5}{6} < \frac{1}{2} < \frac{5}{8}$
C. $\frac{5}{6} < \frac{5}{8} < \frac{1}{2}$
D. $\frac{5}{8} < \frac{1}{2} < \frac{5}{6}$
E. $\frac{5}{8} < \frac{5}{6} < \frac{1}{2}$

24. The area of an ellipse may be found by using the expression πab, where a is $\frac{1}{2}$ the length of the major axis and b is $\frac{1}{2}$ the length of the minor axis. What is the area, in square units, of the largest ellipse that can be inscribed in a rectangle with length 10 units and width 6 units?

F. 6π
G. 10π
H. 15π
J. 30π
K. 34π

25. If $\frac{2x-5}{8} = \frac{1}{6}$, then $x = ?$

A. $-1\frac{5}{6}$
B. $1\frac{1}{12}$
C. $1\frac{1}{2}$
D. $3\frac{1}{6}$
E. $5\frac{2}{3}$

DO YOUR FIGURING HERE.

26. Erin had 6 slips of paper, numbered 1 through 6. Erik renumbers them once by adding 3 to each odd number and subtracting 1 from each even number. When 2 renumbered slips of paper are chosen at random, what is the highest sum possible?

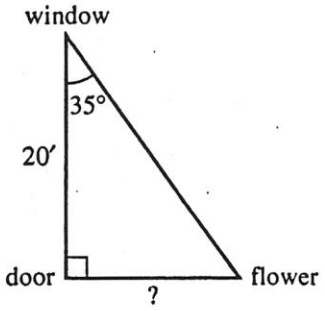
F. 11
G. 13
H. 14
J. 16
K. 17

27. Water drips from 2 faucets at different rates. The first faucet drips 1 drop every 12 seconds, and the second faucet drips 1 drop every 18 seconds. If you see these faucets drip simultaneously, the next time they drip simultaneously will be in how many seconds?

A. 6
B. 12
C. 18
D. 30
E. 36

28. Looking out his apartment window that is 20 feet above the ground and directly over the front door, Han could see a red flower on the sidewalk. As shown below, the angle formed by the building and Han's line of sight to the flower is 35°. Approximately how many feet from the front door is the flower?

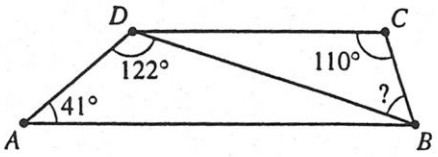
(Note: tan 35° ≈ .70
cos 35° ≈ .82
sin 35° ≈ .57)



F. 6
G. 8
H. 11
J. 14
K. 16

DO YOUR FIGURING HERE.

29. In the figure below, $\overline{AB} \parallel \overline{DC}$, $\angle A$ measures 41°, $\angle C$ measures 110°, and $\angle ADB$ measures 122°. What is the measure of $\angle CBD$?



A. 17°
B. 41°
C. 53°
D. 63°
E. 69°

30. The coordinates of the endpoints of $\overline{JK}$, in the standard (x,y) coordinate plane, are $(-2,-6)$ and $(4,6)$. What is the x-coordinate of the midpoint of $\overline{JK}$?

F. 0
G. 1
H. 2
J. 3
K. 6

31. What is the exponent on a in the product $2a^x \cdot a^3 \cdot 3a^y$?

A. 6
B. $3 + x + y$
C. $3 + xy$
D. $3x + y$
E. $3xy$

32. For all x and y, $x^2y^2 - 16 = ?$

F. $(xy - 16)(xy + 1)$
G. $(xy - 8)^2$
H. $(xy - 8)(xy + 8)$
J. $(xy - 4)(xy + 4)$
K. $(xy - 4)^2$

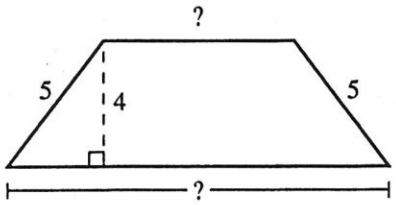
33. A high school sells student tickets for a band concert for \$2 each and nonstudent tickets for \$4 each. How many student tickets did the high school sell if the high school sold 220 tickets worth a total of \$640 ?

A. 180
B. 120
C. 110
D. 100
E. 40

DO YOUR FIGURING HERE.

34. The trapezoid below, with dimensions given in inches, has an area of 36 square inches. What are the lengths, in inches, of the bases of the trapezoid?

(Note: $A = \frac{1}{2}h(b_1 + b_2)$ is a formula for the area of a trapezoid.)



F. 4 and 14
G. 6 and 9
H. 6 and 12
J. 8 and 10
K. 9 and 9

35. What is the value of x in the solution to the system of equations below?

$$2x + y = 2a$$
$$2x - y = 2b$$

A. $\frac{a}{2} + \frac{b}{2}$

B. $a + b$

C. $a - b$

D. $-a + b$

E. $-a - b$

36. Every integer is in 1 and only 1 of the following sets:

{···, −15, −10, −5, 0, 5, 10, 15, ···}, denoted [0]
{···, −14, −9, −4, 1, 6, 11, 16, ···}, denoted [1]
{···, −13, −8, −3, 2, 7, 12, 17, ···}, denoted [2]
{···, −12, −7, −2, 3, 8, 13, 18, ···}, denoted [3]
{···, −11, −6, −1, 4, 9, 14, 19, ···}, denoted [4]

The integer 239 is in which of these sets?

F. [0]
G. [1]
H. [2]
J. [3]
K. [4]

DO YOUR FIGURING HERE.

37. The average density of an object is defined as the object's average weight per unit volume. A slab of building material is a rectangular solid that is 8 feet long, 2 feet wide, and $\frac{1}{4}$ foot high. If the slab weighs 250 pounds, about what is its average density in pounds per cubic foot?

A. 1,000
B. 62.5
C. 24.4
D. 0.041
E. 0.016

38. Consider two geometric sequences, denoted S_1 and S_2. S_1 has 40 as its 1st term, and S_2 has 100 as its 1st term. For both S_1 and S_2, each term after the 1st term is $\frac{2}{5}$ of the term preceding it. Which term of S_2 will have the same value as the 4th term of S_1 ?

F. 2nd
G. 3rd
H. 4th
J. 5th
K. 10th

39. In the standard (x,y) coordinate plane, what is the perimeter, in coordinate units, of an isosceles triangle having vertices $A(-2,-1)$, $B(3,11)$, and $C(8,-1)$?

A. 23
B. 33
C. 36
D. 44
E. 55

40. In the standard (x,y) coordinate plane, a circle with its center at (6,9) and a radius of 5 units has which of the following as its equation?

F. $(x-6)^2+(y-9)^2=25$
G. $(x+6)^2+(y+9)^2=25$
H. $(x+6)^2+(y+9)^2=5$
J. $(x+9)^2+(y+6)^2=25$
K. $(x-9)^2+(y-6)^2=5$

41. For all real $x \neq 0$, $\frac{3}{4}+\frac{5}{x}=?$

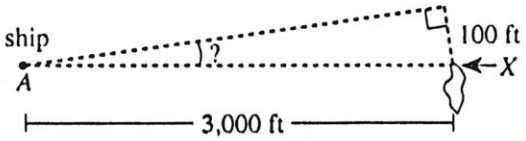
A. $\frac{8}{4x}$
B. $\frac{15}{4x}$
C. $\frac{8}{4+x}$
D. $\frac{5x+12}{4+x}$
E. $\frac{3x+20}{4x}$

DO YOUR FIGURING HERE.

42. What is the area, in square units, of a circle that has a circumference 18π units long?

F. 9π
G. 18π
H. 36π
J. 81π
K. 324π

43. If a ship continues on its current heading, it will hit a rock 3,000 feet ahead at point X, as shown below. Which of the following equations will give the angle of the course correction needed so the ship will clear point X by 100 feet?



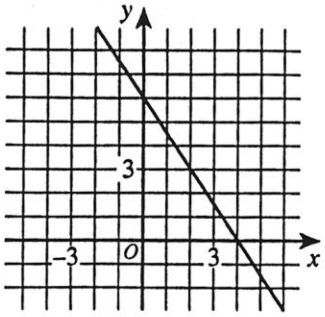
A. $\sin A = \frac{100}{3{,}000}$
B. $\cos A = \frac{100}{3{,}000}$
C. $\tan A = \frac{100}{3{,}000}$
D. $\sec A = \frac{100}{3{,}000}$
E. $\cot A = \frac{100}{3{,}000}$

44. What is the solution set for the equation $|x - 1| = 2$?

F. The empty set
G. {3}
H. {−1, 1}
J. {−1, 3}
K. {−3, 3}

DO YOUR FIGURING HERE.

45. The line graphed in the standard (x,y) coordinate plane below is also represented by one of the following equations. Which equation is it?



A. $y = -\frac{3}{2}x + 6$

B. $y = -\frac{2}{3}x + 6$

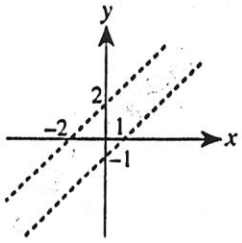
C. $y = \frac{2}{3}x + 6$

D. $y = \frac{3}{2}x + 6$

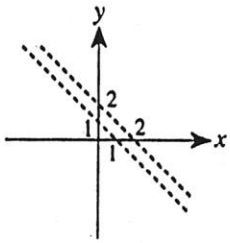
E. $y = 4x + 6$

46. Which of the following is the graph of the region $1 < x + y < 2$ in the standard (x,y) coordinate plane?

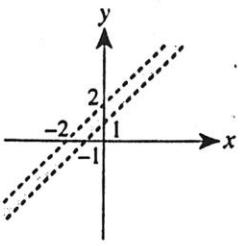
F.



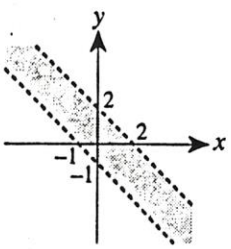
J.



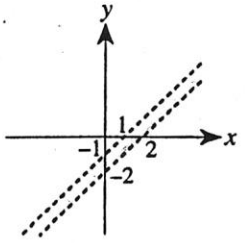
G.



K.



H.



DO YOUR FIGURING HERE.

47. What is the difference between the mean and the median of the set {3, 8, 10, 15} ?

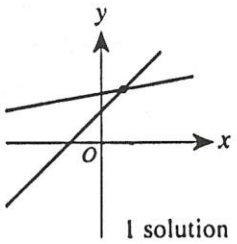
A. 0
B. 1
C. 4
D. 9
E. 12

48. Consider the following system of equations in x and y, where the values of m and n are NOT the same.

$$ax + by = m$$
$$ax + by = n$$

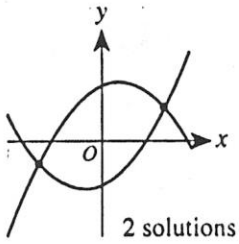
If you correctly graph this system, which of the following could be your graph?

F.



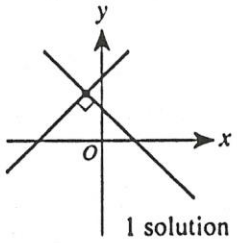
1 solution

J.



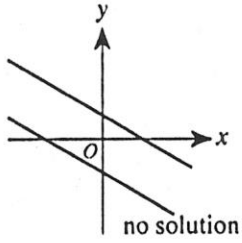
2 solutions

G.



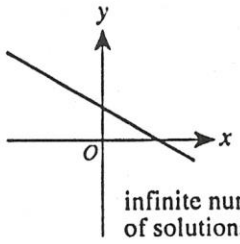
1 solution

K.



no solution

H.



infinite number of solutions

49. Given $f(x) = x - \frac{1}{x}$ and $g(x) = \frac{1}{x}$, what is $f\left(g\left(\frac{1}{2}\right)\right)$?

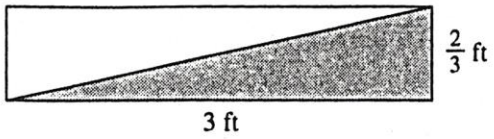
A. -3
B. $-\frac{3}{2}$
C. $-\frac{2}{3}$
D. 0
E. $\frac{3}{2}$

DO YOUR FIGURING HERE.

50. Casey paid \$8.56, which included sales tax of 7%, for a cassette. Which of the following, when solved, will give c, the before-tax price, in dollars, of the cassette?

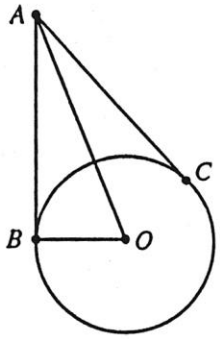
F. $c + .07c = 8.56$
G. $c + .07(8.56) = 8.56$
H. $c + .07 = 8.56$
J. $c(c + .07) = 8.56$
K. $.07c = 8.56$

51. For the rectangle below, with dimensions in feet, which of the following is an irrational number?



A. The ratio of the width of the rectangle to its length
B. The product of the length and width of the rectangle
C. The percent of the rectangle that is below the diagonal
D. The perimeter of the rectangle
E. The length of the diagonal of the rectangle

52. In the figure below, $\overline{AB}$ and $\overline{AC}$ are tangent to the circle at B and C, respectively, and O is the center of the circle. If $\angle BAC$ measures 40°, how many degrees does $\angle AOB$ measure?



F. 40°
G. 50°
H. 60°
J. 70°
K. 80°

53. Pat sells refrigerators and is paid \$200 per week plus \$125 commission for each refrigerator she sells. Which of the following is an expression for the number of refrigerators she would need to sell in a given week in order to earn a total of P dollars that week?

A. $\frac{P-200}{125}$
B. $\frac{P-125}{200}$
C. $\frac{P}{125} - 200$
D. $\frac{P}{200} - 125$
E. $\frac{P}{325}$

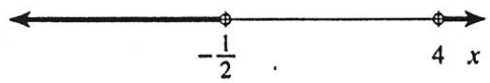
DO YOUR FIGURING HERE.

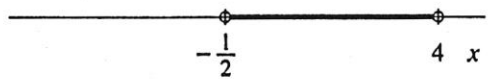
54. When x represents an integer, the statement "If x is divisible by 4, then x is even" is equivalent to which of the statements below?

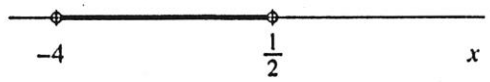
I. If x is not divisible by 4, then x is not even.
II. If x is even, then x is divisible by 4.
III. If x is not even, then x is not divisible by 4.

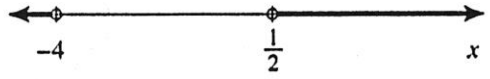
F. I only
G. II only
H. III only
J. II and III only
K. I, II, and III

55. Which of the following number line graphs represents the solution set of the inequality $2x^2 - 7x > 4$?

A.


B.


C.


D.


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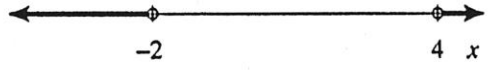
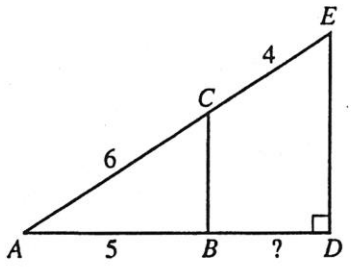


56. A line in the standard (x,y) coordinate plane passes through the points $(-1,3)$ and $(1,k)$. If the slope of the line is 2, what is the value of k ?

F. −1
G. 1
H. 5
J. 6
K. 7

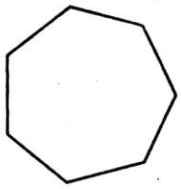
57. In right triangle $\triangle ADE$ shown below, C is on $\overline{AE}$, B is on $\overline{AD}$, and $\overline{BC}$ is parallel to $\overline{DE}$. The dimensions given are in centimeters. How many centimeters long is $\overline{BD}$?

A. $\frac{10}{3}$
B. $\frac{24}{5}$
C. $\frac{25}{3}$
D. 3
E. 5



DO YOUR FIGURING HERE.

58. In the regular heptagon shown below, what is the sum of the measures of the 7 interior angles?



F. 360°
G. 720°
H. 900°
J. 1,080°
K. 1,260°

59. The following identities are true whenever x is an angle measure such that $0° < x < 90°$: $\sin x \csc x = 1$, $\cos x \sec x = 1$, and $\tan x \cot x = 1$. For x such that $0° < x < 90°$ and $\sin x = \frac{4}{5}$, what is the value of $\sec x$?

A. $\frac{1}{5}$
B. $\frac{3}{5}$
C. $\frac{4}{5}$
D. $\frac{5}{4}$
E. $\frac{5}{3}$

60. If p is a positive real number and $2 \sin x = 2 \sin(x + p)$ for every real value of x, what is the smallest possible value for p, in degrees?

F. $\frac{1}{2}°$
G. 2°
H. 180°
J. 360°
K. 720°

END OF TEST 2

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

DO NOT RETURN TO THE PREVIOUS TEST.

READING TEST

35 Minutes—40 Questions

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

Passage I

PROSE FICTION: This passage is adapted from the novel *The Grass Dancer* by Susan Power (©1994 by Susan Power).

It was the winter of 1928, and I was eighteen years old. I had been snowbound for several days in my family's cabin and was desperate to be outdoors, where I could work the cramps out of my legs and fill my lungs with fresh air. I went for a long walk, fighting through high drifts.

I wandered onto the leased land of the Bauer ranch. I came to a shallow frozen pond. The ice was uneven, marred by tangled clumps of weeds, but I noticed a man skimming across it as if on a smooth pane of glass. He balanced on silver blades slim as butter knives, propelling his body forward and then magically backward. I had heard about ice-skating, but I'd never seen it done. I hunched beside a frozen bush, hoping he wouldn't notice me. But I was framed in white and difficult to miss. The graceful man skated toward me, and stopped so quickly his blades spit a spray of ice. He towered over me, smiling.

"You like to dance on water?" he asked me. I shook my head. I didn't know what else to do. "I'm Emery," he said. He waited, staring directly into my eyes, which made me uncomfortable.

"I'm Anna Thunder," I finally answered.

"Now *that's* a name to live up to." He clapped his large hands together. "Come here, this will be fun." Emery removed his skates, which I saw were metal blades screwed onto a pair of work boots. He donned the boots he'd been carrying and knelt in the snow.

"Give me your foot," he said. He was the only white man other than the doctor and the reservation priest I had ever spoken to. I watched him stuff one of his mittens in the toe of each boot and then fit the skates on my feet. He held my hands and pulled me across the ice. At first I was rigid and tottered on the slippery surface, but eventually I relaxed and pushed off, cutting the ice with confident strokes.

Our courtship was an ice dance, and Emery's wedding present to me was my own set of silver blades he'd ordered from the Sears catalogue.

Emery and I married despite disapproval from both sides. Joyce Blue Kettle protested the loudest, flapping her tongue so much I thought she might wear it thin as a hair ribbon.

"People will say you're greedy," Joyce confided to me the night before my wedding.

"What do you mean?" I only half listened, distracted as I was by the last-minute details of polishing my shoes and combing my damp hair with a clump of sage to scent it.

"They say you're marrying him to get things. What about the seven new dresses he bought you, one for each day of the week? What about the horsehair sofa and brass bed? Didn't he even build you a house?"

Earlier that day I had taken Joyce on a tour of the new house, a neat clapboard structure made of planed lumber. I felt guilty as we moved through the rooms, the number of my possessions suddenly overwhelming me. All my life I had been taught that material goods were dispensable, things to be shared with friends and family. We were not supposed to have more than we needed, so there were endless rounds of giveaways at our dances, where people unburdened themselves of accumulated objects. But Emery was not Sioux, and his affection for me resulted in lavish offerings.

"They know Emery has different ways," I told her.

"Whatever you say." Joyce shrugged.

On our first wedding anniversary, Emery and I gave a feast for my Sioux relatives. I'd thought time would set things right for Joyce, but she remained bitter about the match. She trailed after me at the feast, and pretended to help me in the kitchen, where she sat idle, letting her mouth do all the work.

"Red Dress was really looking out for you." She fought a sly smile. She was referring to our grandmother's sister. Joyce liked to tell people that Emery hadn't fallen for me but for the old magic I had used to spell him. I struggled for something pleasant to discuss.

Later I forgave Joyce, because when she heard about my husband's death she sent her daughter to the house to watch over my son. Clifford accompanied his

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daughter, offering to take Emery's personal stock of two horses and one cow to his place, where he could tend them. I was grateful to my cousin for letting her family assist me.

Before his brothers buried him, I bathed Emery's face and trimmed his beard. I filled his pockets with the lemon drop candies he favored and the deck of cards we used for gin rummy. Then I packed both pairs of ice skates in the coffin so that he would be waiting for me by a shallow frozen pond, ready to strap skates on my feet and take me ice-dancing.

1. In terms of style and content, this passage can best be described as:
   - A. a persuasive piece about the importance of obtaining the approval of one's family before marrying someone.
   - B. an objective analysis of a courtship and marriage comparing the narrator's experiences to those of others.
   - C. a personal account of a courtship and marriage that includes a description of the narrator's reaction to the loss of her husband.
   - D. an ironic anecdote about how the interference of a family member can jeopardize an otherwise happy marriage.

2. The passage as a whole and the metaphor "Our courtship was an ice dance" (line 37) suggest that Anna and Emery:
   - F. made plans to marry as soon as Anna could skate well.
   - G. traveled to different places to skate while getting to know each other.
   - H. worked together to develop their bond with one another.
   - J. developed their friendship only while skating.

3. It can most reasonably be inferred that Anna and Emery attempt to deal with their cultural differences by:
   - A. avoiding social situations where their families might be present.
   - B. accepting each other's ways and acknowledging others' disapproval of those ways.
   - C. meeting with their families to discuss the possible sharing of material goods.
   - D. ignoring their families' reactions and trying to persuade each other to be more independent.

4. Which of the following questions can be answered based on information given in the passage?
   - F. What was Red Dress's attitude about Anna marrying Emery?
   - G. Why did Emery give gifts to Anna?
   - H. What was the cause of Emery's death?
   - J. How did Emery earn his living?

5. If the last paragraph of the passage were deleted, the passage would lose details about:
   - A. Anna and Emery's former life together that are crucial to understanding the rest of the passage.
   - B. how Anna Thunder comforted herself while grieving over Emery's death.
   - C. how the relationship between Anna and Joyce Blue Kettle changed after Emery's death.
   - D. Anna Thunder's life when she returned to live with her parents after Emery's death.

6. Details in the passage suggest that Anna Thunder is initially attracted to Emery's:
   - F. agile movements.
   - G. money and prestige.
   - H. generosity with gifts.
   - J. direct gaze.

7. Joyce Blue Kettle suggests that people will think Anna is greedy because Anna:
   - A. did not participate in giveaways at dances, as Sioux custom dictates.
   - B. requested clothes and furniture from her new husband, which was contrary to Sioux custom.
   - C. caused Joyce to be envious of Anna's new possessions by flaunting them at family gatherings.
   - D. accepted Emery's gifts, which represented more belongings than Anna actually needed.

8. The narrator's use of the words *skimming* and *smooth* (line 10) and *magically* (line 13) suggests that she found Emery's movements on ice to be:
   - F. ungainly but charming.
   - G. chilling and mysterious.
   - H. fast and frightening.
   - J. quick and graceful.

9. It can most reasonably be inferred that Joyce Blue Kettle's motive for mentioning Red Dress was to:
   - A. insinuate that Anna had used Red Dress's powers to make Emery fall in love with Anna.
   - B. boast that she, Joyce, knew more about Red Dress's activities than Anna Thunder did.
   - C. explain why Anna's family and Emery's family both disapproved of their marriage.
   - D. reveal that Red Dress had assisted both Joyce and Anna in getting men to propose to them.

10. Joyce Blue Kettle shows her kindness to Anna by:
    - F. having her brothers bury Emery.
    - G. complimenting Anna's magical powers.
    - H. sending her family to help Anna when Emery dies.
    - J. helping in the kitchen during the anniversary feast.

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Passage II

SOCIAL SCIENCE: This passage is adapted from Morton Hunt's *The Story of Psychology* (©1993 by Morton Hunt). In the passage, the term *maturation* refers to the process of growth and development, and the term *perceptual ability* refers to the capacity to recognize something through the senses (sight, smell, touch, etc.).

Much maturation research is concerned with physical skills and physical attributes, and adds little to our knowledge of the growth of the mind. But research on the development of perceptual abilities begins to provide solid factual answers to the ancient central question of psychology: How much is due to nature and how much to nurture (or, in developmental terms, to maturation and to learning)?

The work has been focused on early infancy, when perceptual abilities evolve rapidly; its aim is to discover when each new ability first appears, the assumption being that at its first appearance, the new ability arises not from learning but from maturation of the optic nervous structures and especially of that part of the brain cortex where visual signals are received and interpreted.

Much has been learned by simply watching infants. What, exactly, do very young infants see? Since we cannot ask them what they see, how can we find out?

In 1961, the psychologist Robert Fantz devised an ingenious method of doing so. He designed a stand in which, on the bottom level, the baby lies on her back, looking up. A few feet above is a display area where the experimenter puts two large cards, each containing a design—a white circle, a yellow circle, a bull's-eye, a simple sketch of a face. The researcher, peering down through a tiny peephole, can watch the movement of the baby's eyes and time how long they are directed at one or the other of each pair of patterns. Fantz found that at two months babies looked twice as long at a bull's-eye as at a circle of solid color, and twice as long at a sketch of a face as at a bull's-eye. Evidently, even a two-month-old can distinguish major differences and direct her gaze toward what she finds more interesting.

Using this technique, developmental psychologists have learned a great deal about what infants see and when they begin to see it. In the first week infants distinguish light and dark patterns; during the first month they begin to track slowly moving objects; by the second month they begin to have depth perception, coordinate the movement of the eyes, and differentiate among hues and levels of brightness; by three months they can glance from one object to another, and can distinguish among family members; by four months they focus at varying distances, make increasingly fine distinctions, and begin to recognize the meaning of what they see (they look longer at a normal sketch of a face than at one in which the features have been scrambled); and from four to seven months they achieve stereopsis, recognize that a shape held at different angles is still the same shape, and gain near-adult ability to focus at varying distances.

Exactly how maturation and experience interact in the brain tissues to produce such developmental changes is becoming clear from neuroscience research. Microscopic examination of the brains of infants shows that as the brain triples in size during the first two years of life, a profusion of dendrites (branches) grow from its neurons and make contact with one another.

By the time a human is twelve, the brain has an estimated hundred trillion synapses (connections between nerve cells). Those connections are the wiring plan that establishes the brain's capabilities. Some of the synaptic connections are made automatically by chemical guidance, but others are made by the stimulus of experience during the period of rapid dendrite growth. Lacking such stimulus, the dendrites wither away without forming the needed synapses. Mice reared in the dark develop fewer dendritic spines and synaptic connections in the visual cortex than mice reared in the light, and even when exposed to light never attain normal vision.

Why should nature have done that? Why should perceptual development be possible only at a critical period and not later? It does not make evolutionary sense for the organism to be permanently impaired in sensory performance just because it fails to have the proper experiences at specific times in its development. But some brain researchers say that there is an offsetting advantage: the essential experiences are almost always available at the right time, and they fine-tune the brain structure so as to provide far more specific perceptual powers than could result from genetic control of synapse formation.

With that, the vague old terms nature and nurture take on precise new meaning. Now, after so many centuries of speculation, we catch the first glimpse of how mind is constructed out of matter by experience.

11. The main point of the passage is that:

- **A.** during the first four to seven months of life, babies learn at an accelerated pace.
- **B.** organisms deprived of critical life experiences may or may not develop normal sensory performance.
- **C.** the development of perceptual abilities is the result of the interaction between nature and experience.
- **D.** research concerned with physical skills and abilities adds little to our knowledge of the growth of the mind.

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12. The passage asserts that research on the development of perceptual abilities begins to provide solid answers to the question: "How much is due to nature and how much to nurture?" (lines 6–7). Does the passage consistently support this assertion?

    F. Yes, because according to the passage, researchers have discovered that the brain develops through the interaction of natural processes and the stimulus of experience.
    G. Yes, because according to the passage, current brain research indicates that, due to rapid dendrite growth, the brain triples in size during a person's first two years.
    H. No, because the passage emphasizes the fact that learning is fully responsible for the development of perceptual abilities.
    J. No, because the passage never defines the terms nature and nurture.

13. According to the first two paragraphs (lines 1–16), researchers who study infant maturation want to find out:

    A. at what age an infant will generally acquire a new perceptual ability.
    B. how visual signals are received in the brain cortex of an infant.
    C. how infants' physical development affects their emotional development.
    D. why infants' perceptual abilities evolve at such a rapid rate.

14. Based on the fourth paragraph (lines 21–35), which of the following would a two-month-old infant be most interested in observing?

    F. A red, white, and blue ribbon
    G. A bright yellow circle
    H. A sketch of a face
    J. A bull's-eye

15. According to the passage, Fantz based the findings of his study primarily on:

    A. the length of time infants looked at particular designs.
    B. how quickly infants could distinguish among various patterns.
    C. how many times infants preferred one pattern or color over another.
    D. the number of infants who chose one display over another.

16. How, according to the passage, will the brain of a two-month-old infant differ from the brain of a four-month-old?

    F. The two-month-old's brain will be about half as large.
    G. The two-month-old's brain will have fewer nerve cells.
    H. The two-month-old's brain will have no depth perception.
    J. The two-month-old's brain will have fewer synapses.

17. When the author asks "Why should nature have done that?" (line 74), which of the following questions is he really asking?

    A. Why should anyone deprive mice or other animals from receiving light at the appropriate time?
    B. Why does an animal's genetic make-up include the possibility that it may inherit impaired vision?
    C. Why are some synaptic connections made only at certain periods in an animal's development?
    D. Why are experiences that are essential to development always available at the critical time?

18. It is reasonable to infer from the passage that one-month-old babies will demonstrate which of the following skills?

    F. Noticing the difference between a pale yellow rattle and a bright yellow rattle
    G. Recognizing each of their older brothers and sisters as individuals
    H. Glancing from their father's face to their mother's face and back to their father again
    J. Following a wooden butterfly on a slow-moving mobile hanging above their bed

19. According to the passage, if a mouse is reared in the dark during the first months of its life and later exposed to the light, it will never see normally because:

    A. without light, chemicals that destroy the optic nerve are released into the brain.
    B. the number of dendritic spines that are necessary for normal vision do not develop.
    C. synaptic connections that are necessary for normal vision begin to die off at a rapid rate.
    D. these mice have no visual cortex in their brains.

20. When the author uses the term *wiring plan* (lines 63–64), he is referring to:

    F. the number of nerve cells in the human brain.
    G. the connections between nerve cells in the human brain.
    H. the stimuli that are necessary to promote brain growth in infants.
    J. current breakthroughs in neuroscience research.

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Passage III

HUMANITIES: This passage is adapted from the essay "Faith and Work" by Scott Russell Sanders (©1995 by Scott Russell Sanders).

The difference between a machine and a tool—between a bread-maker and a bread pan—is that a tool extends human skills, a machine replaces them. When the freedom and craft have been squeezed out of work it becomes toil, without mystery or meaning, and that is why many people hate their jobs. You can measure the drudgery of a job by the number of layers of supervision required to keep the wheels spinning or the cash registers ringing. Toil drains us; but good work may renew us, by giving expression to our powers.

A generation or two ago it would have seemed less strange to relish hard work. My grandparents might smile at the laziness of Tom Sawyer, who fooled others into doing his chores, but they would remind you that Tom was a child. Grown-ups do their own chores, unless they are idlers, good-for-nothings, ne'er-do-wells. Grown-ups look after their own needs, provide for their families, help their neighbors, do something useful. So my grandparents taught by word and example. Any job worth doing is worth doing right, they used to say. To try sliding by with the least effort, my grandparents believed, was to be guilty of a sin called sloth.

I knew this cluster of values by experience long before I heard it referred to as the work ethic, a phrase that has lost its edge from tumbling over the lips of too many cynical bosses and politicians. Whatever happened to the work ethic? laments the manager who wishes to squeeze more profit from his employees. Whatever happened to the work ethic? groans the official who wants to shrink the welfare rolls. As I understand it, a regard for the necessity and virtue of work has nothing to do with productivity or taxes, and everything to do with fulfilling one's humanity. As I have seen it embodied in the lives not only of grandparents but of parents and neighbors and friends, this ethic arises from a belief that the creation is a sacred gift, and that by working we express our gratitude and celebrate our powers. To honor that gift, we should live simply, honestly, conservingly, saving money and patching clothes and fixing what breaks, sharing what we have.

Those values are under assault every minute of the day in a consumer economy—from advertising, from the glittering goodies in stores, from the luxurious imagery of television, magazines, and films, and from a philosophy that views the universe not as a gift to be honored but as a warehouse to be ransacked. If money is meaning, if winning the lottery or beating the stock market defines success, if the goal of life is easy sensation, then why lift a finger so long as you can force someone or something else to do it for you?

I can think of many reasons to lift a finger, among them the delight in exercising skill, in sharing labor with companions, in planning a task and carrying it through, in bringing some benefit to the world. But the chief reason for relishing work is that it allows us to practice our faith, whatever that faith may be. The Buddha advised his followers to seek right livelihood, to provide for their needs in a modest and responsible manner, with respect for other creatures, in harmony with the way of things. We show our understanding of the way of things by the quality of our work, whether or not we have heard the Buddha's teachings. The old theological debate as to whether salvation is to be gained by works or by faith begins from a false dichotomy. Faith concerns our sense of what is real, what is valuable, what is holy; work is how we act out that faith.

The Shakers condensed their faith into the maxim, "Hands to work, hearts to God." Anyone who has looked at their furniture or buildings can sense the clarity of their vision. "One feels that for the Shaker craftsmen," Thomas Merton observed, "love of God and love of truth in one's own work came to the same thing, and that work itself was a prayer, a communion with the inmost spiritual reality of things and so with God." Mother Ann Lee, who launched the Shaker movement, counseled her followers to "Do all your work as if you had a thousand years to live, and as you would if you knew you must die tomorrow."

If the purpose of life is not to acquire but to *in*quire, to seek understanding, to discover all we can about ourselves and the universe, to commune with the source of things, then we should care less about what we earn—money, prestige, salvation—and more about what we learn. In light of all we have to learn, the difference between dying tomorrow and a hundred years from tomorrow is not very great.

21. The author does not mention volunteer work by name in this essay. Which of the following statements offers an explanation for this omission and is also supported by the essay?

- **A.** Religious organizations have different names for the volunteer groups that serve their purposes.
- **B.** Work that generates income measured in productivity is the only kind of work the narrator values.
- **C.** The narrator assumes the reader understands that the subject of the essay is exclusively volunteer work.
- **D.** The essay explores the distinction between meaningful and meaningless work, not paid and unpaid work.

22. The author refers to Tom Sawyer in the second paragraph (lines 11–23) to illustrate which of the following points?

F. Sometimes amusing in a child, laziness, according to the author's grandparents, is sinful in adults.
G. Laziness is amusing as long as the work gets done on time and under budget.
H. Some people are born supervisors, others are born laborers, but everyone needs a creative outlet.
J. Clever children must be supervised in their work by grown-ups who understand the work ethic.

23. In the third paragraph (lines 24–42), the author alludes to but apparently does NOT share the point of view of which of the following?

A. Neighbors who live as if work is a kind of celebration
B. The official who wants to shrink welfare rolls
C. Those who believe that "the creation is a sacred gift"
D. One who mends rather than replaces torn clothing

24. Which of the following statements best describes the connection the author begins to make in the third paragraph (lines 24–42) between what he calls "the creation" and work?

F. Work is a form of appreciation for the creation.
G. Creativity comes in the midst of work.
H. Work enables us to change the creation.
J. Work precedes the leisure needed to enjoy the creation.

25. In the fourth paragraph (lines 43–52), the author sets up a direct contrast between the image of the universe as a warehouse and:

A. "the luxurious imagery of television."
B. life as easy sensation.
C. the universe as a gift to humanity.
D. workplaces that are more human in scale.

26. The Shaker expression "Hands to work, hearts to God" (line 70) reinforces which of the following statements from the essay?

F. "Any job worth doing is worth doing right, they used to say." (lines 20–21)
G. "Whatever happened to the work ethic?" (line 30)
H. "But the chief reason for relishing work is that it allows us to practice our faith, whatever that faith may be." (lines 56–58)
J. "In light of all we have to learn, the difference between dying tomorrow and a hundred years from tomorrow is not very great." (lines 86–88)

27. The author's point that there is more to learn about the universe than can ever be learned seems to be for him a source of:

A. inspiration mixed with reflection.
B. disappointment mixed with approval.
C. faith mixed with confusion.
D. freedom reduced by work.

28. It can most reasonably be inferred from the sixth paragraph (lines 69–80) that the Shaker belief system placed value on work that:

F. promoted long life but could not guarantee it.
G. was carried out very conscientiously.
H. required the contributions of many hands.
J. incorporated natural materials exclusively.

29. According to the author, the significant difference between a bread-maker and a bread pan is that only one:

A. was used by previous generations.
B. came on the market in recent years.
C. goes in the oven when the dough is prepared.
D. diminishes the human role in making bread.

30. The author claims that the values he believes in are threatened by which of the following?

F. Generations at odds with one another
G. The enticements of a consumer economy
H. Neighbors with different religious beliefs
J. A government that keeps raising taxes

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Passage IV

NATURAL SCIENCE: This passage is adapted from David Quammen's book *Natural Acts: A Sidelong View of Science and Nature* (©1985 by David Quammen).

The concept of *mind* is not inappropriate as applied to the octopi, since these creatures have by far the most highly developed brain in their province of the animal kingdom. They belong to the phylum Mollusca, a large group of invertebrates mainly characterized by soft bodies, hard shells, and rather primitive patterns of anatomical organization, well suited to surviving inconspicuously on the sea bottom. Typical of the Mollusca are clams, oysters, snails; the octopi (and to a lesser extent their near relatives, the squids) are decidedly untypical. They are an evolutionary anomaly, a class of genius misfits who have advanced far beyond their origins.

The octopi have an elaborate fourteen-lobed brain, an organ so large that their brain-to-body-weight ratio exceeds that of most fish and reptiles. Mentally, they are more on a level with birds and mammals. They possess a capacity for learning, memory and considered behavior that makes them—with the exception of marine mammals—the most intelligent of all sea-dwelling animals. In a laboratory, they tend to be good at mazes, and perform well in tests of discrimination among visual symbols. This last talent depends partly upon their acute eyesight. Every octopus looks out at the world through a pair of extraordinary eyes—eyes about which, to a human, there is something unexpectedly and disquietingly familiar.

"The animal has eyes that stare back," according to Martin J. Wells, a British zoologist who is one of the world's experts in octopus physiology and behavior. "It responds to movement, cowering if anything large approaches it, or leaning forward in an alert and interested manner to examine small happenings in its visual field." Jacques Cousteau goes a bit further: "When a diver sees a giant octopus in the dim water, its great eyes fixed on him, he feels a strange sensation of respect, as though he were in the presence of a very wise and very old animal, whose tranquility it would be best not to disturb." One of Cousteau's assistants adds: "I have often had the impression that they are 'reflecting.'" Other divers and lab researchers make the same sort of comment, describing the same eerie sense of encounter, recognition, even mutuality. Lately I've had occasion to experience it myself, during three evenings of octopus-watching in a small university room filled with quietly gurgling tanks: the potent, expressive gaze of the octopus. These animals don't just gape at you glassily, like a walleye [a fish]. They make eye contact, as though they are someone you should know.

One of the reasons for the potency of that stare is simply a matter of proportion. Relative to the body size of a given octopus, the eyes are, like the brain, unusually large. (The ultimate record in this regard belongs to that octopus cousin, the giant squid—with an eyeball up to fifteen inches across, largest on Earth and twice the size of the eye of a blue whale.) Octopus eyes are also protrusive and mobile, bulging up periscopically when the creature's attention is caught, swiveling far enough fore and aft to cover all 360 degrees of horizon. But the real magic behind the octopod gaze is that those eyes bear a startling structural similarity to our own.

It's an exemplary instance of the phenomenon called *convergent evolution*. Two separate evolutionary paths are followed for millions of years by two disparate groups of creatures, arriving eventually at two separate but (coincidentally) very similar solutions to a common problem. In this case, the problem of translating incident light rays into coherent images conveyable to the brain. The vertebrate eye—the model we humans share with cougars and eagles and rattlesnakes, all having inherited the pattern commonly—is an ingenious contrivance combining a cornea, a crystalline lens, an adjustable iris, and a retina. That such an organ evolved even once, within the vertebrate line, represents a miraculous triumph of time and trial-and-error over improbability. The still larger miracle is that *two* very similar versions have appeared independently. The other belongs exclusively to the octopi and their close kin. Each of those squid and octopus eyes consists of a cornea, a crystalline lens, an adjustable iris, and a retina, functioning together in much the same way as ours.

31. Which of the following best describes the main point of this passage?
    - A. To explain the links between the octopus and other species of marine life
    - B. To illustrate the theory of human evolution
    - C. To dispute the relevance of studying marine life
    - D. To highlight some discoveries about the octopus

32. What is the main idea of the first paragraph (lines 1–13)?
    - F. Mollusca survive well on the sea bottom.
    - G. Mollusca are known as the geniuses of the sea world.
    - H. Octopi have primitive bodies.
    - J. Octopi are unusually intelligent for their phylum.

33. Which of the following said octopi seem "very wise and very old"?
    - A. Martin J. Wells
    - B. Jacques Cousteau
    - C. One of Cousteau's assistants
    - D. The writer

3

34. Which of the following is(are) characteristic of the octopus's eyes as they are described in the passage?

    I. They are the largest of any sea creature.
    II. They protrude and are mobile.
    III. They are blue.

    F. I only
    G. II only
    H. I and II only
    J. I, II, and III

35. The passage suggests that the octopus's eyes evolved as they did so as to:

    A. translate light rays into coherent images.
    B. make up for poor hearing.
    C. communicate with human beings.
    D. solve the problem of convergent evolution.

36. The passage asserts that the octopus is more intelligent than:

    F. nonmammalian sea animals.
    G. humankind.
    H. birds.
    J. sea mammals.

37. The author notes that "they tend to be good at mazes" (lines 21–22) to illustrate which of the following octopus attributes?

    A. Radar
    B. Body size
    C. Memory
    D. Eye size

38. The phrase *visual field* (lines 33–34) refers to:

    F. that part of the brain that governs vision.
    G. the objects that are of interest in an area.
    H. that part of the surroundings that can be seen.
    J. the objects that attract attention by moving.

39. According to the information in the passage, if something were directly behind an octopus, would the octopus be capable of seeing it?

    A. No; the octopus's periscopic eyes would limit its field of vision.
    B. No; the octopus could sense something as if by magic, but not see it.
    C. Yes; the octopus could see something without having to turn its entire body.
    D. Yes; but the octopus would have to turn its head around 360 degrees.

40. As it is used in line 64, the term *convergent evolution* refers to two species evolving:

    F. from a common ancestor.
    G. toward greater and greater intelligence.
    H. along distinct courses, yet with a similar outcome.
    J. along similar courses, yet becoming dissimilar because of varying patterns.

END OF TEST 3

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

DO NOT RETURN TO A PREVIOUS TEST.

SCIENCE REASONING TEST

35 Minutes—40 Questions

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

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

Passage I

Concrete is a mixture of cement, water, and *aggregate* (usually sand or gravel). The cement and water react chemically to form a hard paste, which binds the aggregate together.

The strength of a cylindrical sample of concrete is measured by subjecting the sample to increasing vertical compression until it breaks (see Figure 1). The vertical compression needed to break the sample is called the *compressive strength* and is measured in kg/cm^2.

Figure 1

An engineer conducted the following studies to determine factors that affect the compressive strength of concrete.

Study 1

Eight groups of cylindrical concrete samples were prepared—4 using Type I cement (Groups A–D) and 4 using Type II cement (Groups W–Z). All samples had the same dimensions. The water content, by weight, was the same in each sample but the cement content, by weight, was varied to create different water to cement ratios in each group. Each sample contained the same type and amount of aggregate. After the samples had been *aged* (allowed to sit undisturbed) under identical conditions for 28 days, their compressive strengths were measured. The results are shown in Table 1.

Table 1

Cement type	Sample Group	Water:cement ratio (by weight)	Compressive strength (kg/cm^2)
I	A	4:9	398
	B	4:8	331
	C	4:7	262
	D	4:6	207
II	W	4:9	400
	X	4:8	330
	Y	4:7	265
	Z	4:6	205

Study 2

Cylindrical concrete samples were prepared as in Study 1 using Type II cement. Groups of samples with varying water:cement ratios were aged under identical conditions for 1, 3, 7, or 28 days and were then tested for compressive strength. The results are shown in Figure 2.

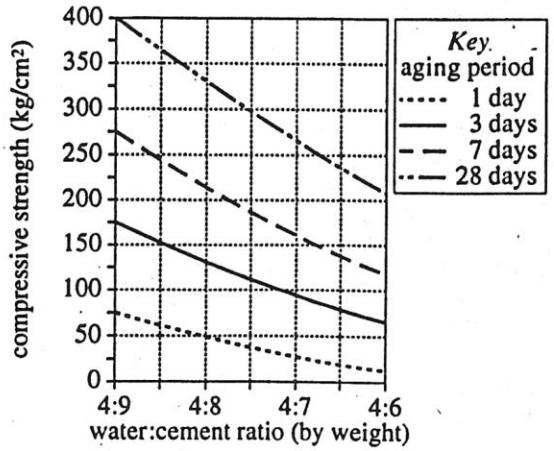


Figure 2

Figure adapted from Steven Kosmatka and William Panarese, *Design and Control of Concrete Mixtures*. ©1979 by the Portland Cement Association.

1. Plans for a new building show that the supporting pillars would be subject to a maximum vertical compression of 350 kg/cm^2. According to Study 1, the pillars should be made from concrete like that in Sample Groups:

   A. A and W.
   B. B and C.
   C. B and Z.
   D. C and D.

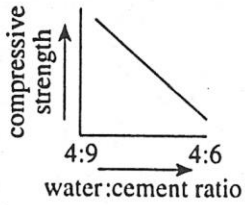
2. Based on the results of Study 1, the compressive strength of Type II cement concrete with a water:cement ratio of 4:10 and aged 28 days would most likely be:

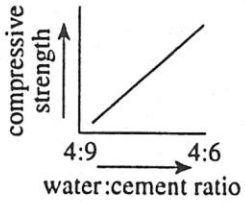
   F. less than 265 kg/cm^2.
   G. between 265 kg/cm^2 and 330 kg/cm^2.
   H. between 330 kg/cm^2 and 400 kg/cm^2.
   J. greater than 400 kg/cm^2.

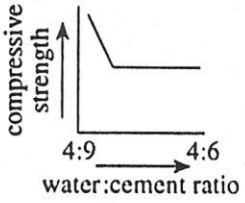
3. According to the results of Study 1, for any given water:cement ratio, the compressive strength of concrete made with Type I cement is approximately:

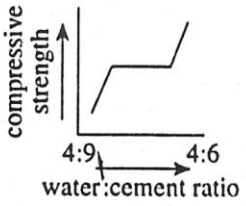
   A. one-half that of concrete made with Type II cement.
   B. the same as that of concrete made with Type II cement.
   C. twice that of concrete made with Type II cement.
   D. three times that of concrete made with Type II cement.

4. Which of the following figures best describes the relationship between the water:cement ratio and the compressive strength in Study 1, for a given cement type?

   F.
   

   G.
   

   H.
   

   J.
   

5. According to the results of Study 2, a group of concrete samples made with Type II cement, having a water:cement ratio of 4:7, and aged for 14 days would most likely have an average compressive strength, in kg/cm^2, between:

   A. 0 and 50.
   B. 50 and 90.
   C. 90 and 165.
   D. 165 and 265.

6. For concrete with a given water:cement ratio, which of the following statements describing the relationship between aging period and the compressive strength of concrete is best supported by the results of Study 2 ? The compressive strength of concrete:

   F. increases as the length of the aging period increases.
   G. decreases as the length of the aging period increases.
   H. remains the same as the length of the aging period increases.
   J. increases, then decreases as the length of the aging period increases.

Passage II

The shape of a planet's orbit around a star is elliptical. Kepler's third law of motion relates the planet's *orbital period* (the time the planet takes to complete one orbit) to the ellipse's *semimajor axis*, a, (see Figure 1) and the star's mass. Figure 2 contains a graph of the orbital period versus a for 6 of the planets that orbit the Sun. The average orbital speeds of these planets are plotted versus a in Figure 3.

Kepler's third law also describes a moon's orbit around a planet. Figure 4 contains graphs of the orbital period versus a for moons orbiting hypothetical planets of various masses.

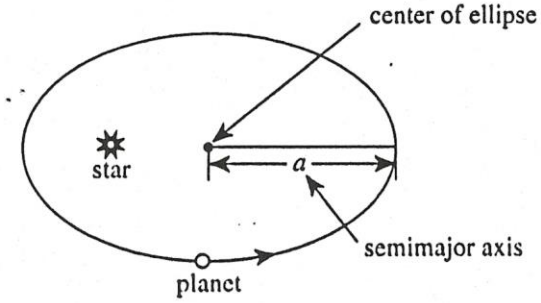


Figure 1

(Note: In Figures 2–4, 1 AU = 1.5×10^8 km, the average distance from Earth to the Sun, and periods are given in multiples of Earth days or years.)

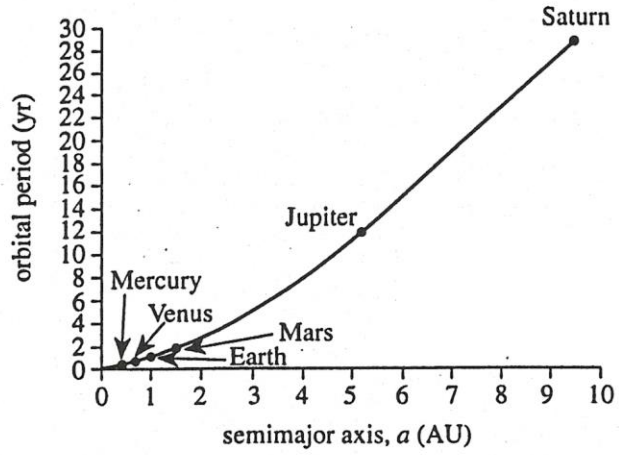


Figure 2

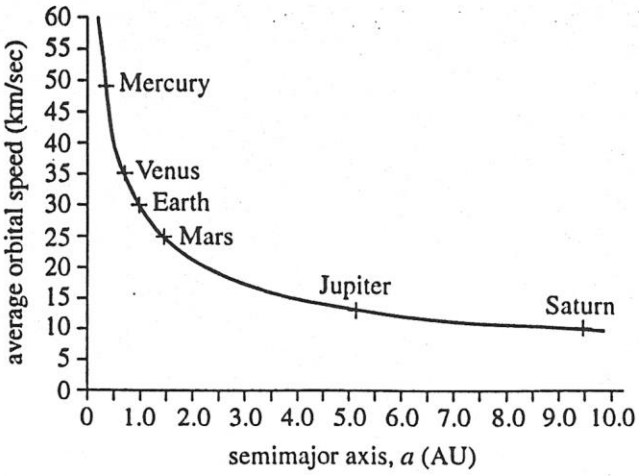
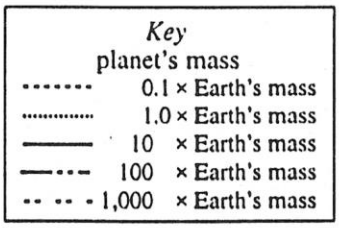


Figure 3



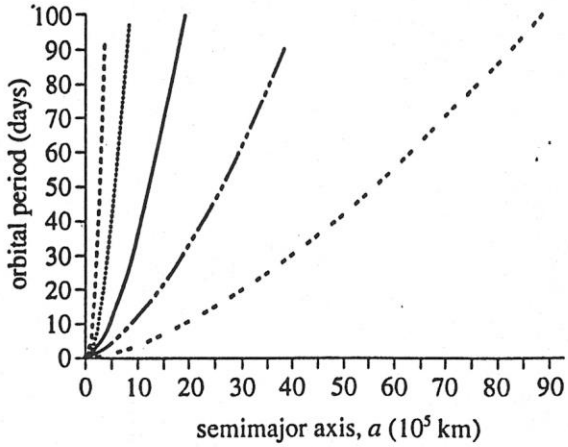


Figure 4

(Note: In Figure 4, moons' masses are assumed to be insignificant compared to the masses of planets they orbit.)

7. According to Figure 2, as the semimajor axis of a planet's orbit increases, the orbital period of the planet:

   A. increases.
   B. decreases.
   C. changes, but with no clear trend.
   D. remains constant.

8. The 2 planets in Figure 3 with the greatest difference in their orbital speeds are:

   F. Mars and Earth.
   G. Mars and Saturn.
   H. Mercury and Saturn.
   J. Mercury and Venus.

9. Based on Figure 3, which of the following planets travels the farthest in 1 day?

   A. Mercury
   B. Earth
   C. Jupiter
   D. Saturn

10. The asteroid Ceres requires 4.6 years to complete 1 orbit around the Sun. Based on Figure 2, the semimajor axis of the orbit is approximately:

    F. 0.46 AU.
    G. 2.8 AU.
    H. 4.6 AU.
    J. 10.5 AU.

11. The planets in Figure 3, ranked from smallest to largest according to their masses, are Mercury, Mars, Venus, Earth, Saturn, and Jupiter. Does this information and Figure 3 support the hypothesis that a planet's mass and its orbital speed are related?

    A. Yes, because as planetary mass increases, planetary orbital speed increases.
    B. Yes, because as planetary mass increases, planetary orbital speed decreases.
    C. No, because as planetary mass increases, planetary orbital speed decreases.
    D. No, because as planetary mass increases, planetary orbital speed changes with no clear trend.

Passage III

An *electrochemical cell* (Figure 1) is constructed with an *anode*, a strip of zinc (Zn) placed in a solution of zinc ions (Zn^{2+}), and a *cathode*, a strip of copper (Cu) or silver (Ag) placed in a solution of copper ions (Cu^{2+}) or silver ions (Ag^{1+}), respectively. The solutions are connected by a *salt bridge* (a tube filled with a solution containing nitrate ions). The anode and cathode are connected to a voltmeter. Tables 1 and 2 show how the mass (g) of the anode or cathode, concentrations (M) of the ionic solutions, and temperature (°C), affect the voltage difference (V) between Zn and either Cu or Ag.

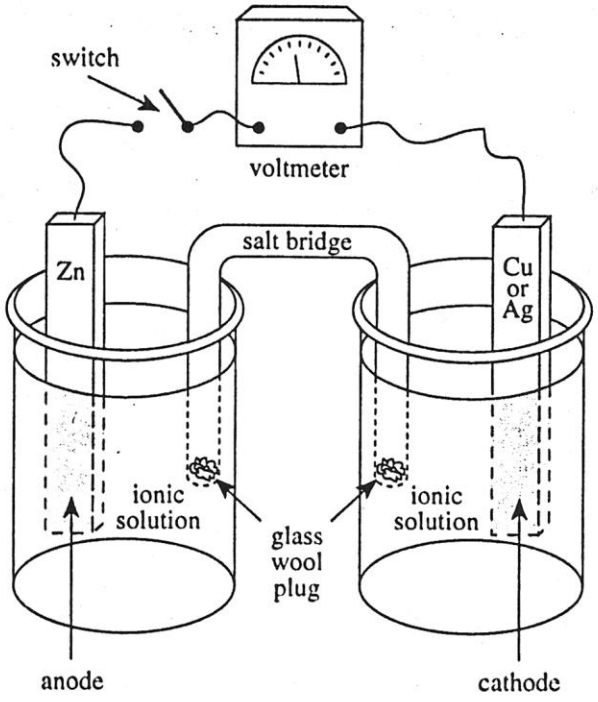


Figure 1

Table 1

Cell	Mass of Zn anode (g)	Mass of Cu cathode (g)	Concentration of Zn^{2+} (M)	Concentration of Cu^{2+} (M)	Temperature of solutions (°C)	Voltage difference (V)
1	1.00	1.00	1.00	1.00	25.0	1.100
2	5.00	1.00	1.00	1.00	25.0	1.100
3	5.00	5.00	1.00	1.00	25.0	1.100
4	5.00	5.00	1.00	6.00	25.0	1.132
5	5.00	5.00	6.00	1.00	25.0	1.071

Note: In Tables 1 and 2, g = grams, M = moles/liter, °C = degrees Celsius, and V = volts.

Table 2

Cell	Mass of Zn anode (g)	Mass of Ag cathode (g)	Concentration of Zn^{2+} (M)	Concentration of Ag^{1+} (M)	Temperature of solutions (°C)	Voltage difference (V)
6	5.00	5.00	1.00	1.00	25.0	1.560
7	5.00	5.00	6.00	1.00	25.0	1.532
8	5.00	5.00	1.00	6.00	25.0	1.600
9	5.00	5.00	1.00	6.00	100.0	1.631

12. Which of the following variables was NOT altered in the measurements of Cells 6–9 ?

F. Concentration of Ag^{1+}
G. Concentration of Zn^{2+}
H. Temperature
J. Mass of the cathode

13. Based on the data in Table 1, if an electrochemical cell is constructed with a 5.00 g Zn anode placed in 1.00 M Zn^{2+} and a 5.00 g Cu cathode placed in 1.00 M Cu^{2+} at 25°C, what voltage difference is produced?

A. 1.071 V
B. 1.100 V
C. 1.132 V
D. 1.560 V

14. Which of the following pairs of Zn-Cu cells supports the conclusion that increasing the Zn^{2+} concentration decreases the voltage difference?

F. Cells 1 and 2
G. Cells 2 and 3
H. Cells 2 and 4
J. Cells 3 and 5

15. Which of the following conclusions about the relationship between the components of the electrochemical cells and the voltage difference is supported by Table 1 ?

A. As the mass of an anode increases, the voltage difference decreases.
B. As the mass of an anode decreases, the voltage difference decreases.
C. As the concentration of Cu^{2+} increases, the voltage difference increases.
D. As the temperature increases, the voltage difference decreases.

16. Based on the data in Table 2, what would the voltage difference of Cell 6 most likely be at 100°C ?

F. 1.100 V
G. 1.532 V
H. 1.560 V
J. 1.590 V

Passage IV

Researchers performed the following experiments to evaluate the effectiveness of a *disinfectant* (chemical) called *NoGrow* (NG) at stopping bacterial growth.

Experiment 1

Equal amounts of a solution containing the bacterium *Escherichia coli (E. coli)* were added to 5 test tubes. One sample was not exposed to NG; the remaining 4 samples were exposed to 0.1 mL of NG for different times. The 5 samples were then washed to remove the NG and incubated for 24 hours at 37°C. After the 24-hour period, researchers checked the samples for bacterial growth (see Table 1).

Table 1

Tube	Exposure time to NG (min)	Bacterial growth*
A	0.0	+
B	2.5	+
C	5.0	–
D	10.0	–
E	15.0	–

* In Tables 1–5, + indicates growth; – indicates no growth.

Experiment 2

Experiment 1 was repeated with the bacterium *Staphylococcus epidermidis (S. epidermidis)*. The results appear in Table 2.

Table 2

Tube	Exposure time to NG (min)	Bacterial growth
F	0.0	+
G	2.5	+
H	5.0	+
I	10.0	–
J	15.0	–

Experiment 3

Experiment 1 was repeated with the bacterium *Bacillus subtilis (B. subtilis)*. The results appear in Table 3.

Table 3

Tube	Exposure time to NG (min)	Bacterial growth
K	0.0	+
L	2.5	+
M	5.0	+
N	10.0	+
O	15.0	–

Experiment 4

Four test tubes containing equal amounts of *S. epidermidis* and 1.0 mL of sterile water were subjected to different temperatures. Samples from each tube were taken periodically. Then the samples were washed, incubated, and checked for bacterial growth as described above. The results appear in Table 4.

Table 4

Time (min)	Temperature (°C)			
	20	40	60	100
2.5	+	+	+	+
5.0	+	+	+	–
10.0	+	+	+	–
15.0	+	+	+	–

Experiment 5

The same procedure described in Experiment 4 was used with 4 tubes containing *S. epidermidis* and 0.1 mL of NG. The results appear in Table 5.

Table 5

Time (min)	Temperature (°C)			
	20	40	60	100
2.5	+	+	–	+
5.0	+	–	–	–
10.0	–	–	–	–
15.0	–	–	–	–

17. Which of the following aspects of the experimental design used in Experiment 1 is NOT explained in the passage?

A. How the samples were checked for bacterial growth
B. How much NG was contained in each tube
C. How long the tubes were incubated
D. How many samples were used

18. Based on the results of Experiment 4, if a researcher wants to treat test tubes so that the growth of *S. epidermidis* will be prevented, the researcher should subject the glassware to which of the following sets of conditions?

F. 40°C water for 15 min
G. 60°C water for 10 min
H. 60°C water for 15 min
J. 100°C water for 5 min

19. Based on the results of Experiment 5, prior to incubation the tubes in Experiment 2 were most likely subjected to which of the following temperatures?

A. 20°C
B. 40°C
C. 60°C
D. 100°C

20. The results of Experiments 1, 2, and 3 are most consistent with the conclusion that for the 3 bacteria tested, NG is:

F. least effective at stopping the growth of *E. coli*.
G. least effective at stopping the growth of *S. epidermidis*.
H. most effective at stopping the growth of *E. coli*.
J. most effective at stopping the growth of *S. epidermidis*.

21. The results of the 5 experiments demonstrate that bacterial growth is influenced by all of the following factors EXCEPT the:

A. temperature at which the experiment is performed.
B. type of bacteria being examined.
C. type of disinfectant used.
D. length of time the bacteria are exposed to a disinfectant.

22. Is the conclusion that "*E. coli* does not grow well after heating at 100°C" supported by the results of Experiment 4 ?

F. No; after 2.5 min of exposure, bacterial growth occurred.
G. No; *E. coli* was not used in Experiment 4.
H. Yes; after 5.0 min of exposure, bacterial growth was stopped.
J. Yes; *E. coli* growth is stopped by NG.

Passage V

Nemoria caterpillars that hatch in the spring mature into a yellow, ridged *morph* (body type); those that hatch in the summer mature into a gray, smooth morph. A researcher hypothesized that caterpillar morphology is influenced by 3 environmental factors: temperature, *photoperiod* (hours [hr] of sunlight per day), and diet. He performed 3 studies on *Nemoria*.

Study 1

Treatment groups (groups exposed to different experimental conditions) of equal numbers were created by varying 3 factors: temperature (15°C or 25°C), photoperiod (12.5 hr or 14 hr), and diet (*catkins* [oak flower clusters] or oak leaves). The percent of caterpillars that developed into each morph appears in Table 1.

Table 1

Temperature (°C)	Photoperiod (hr)	Diet: Oak leaves: Gray morph (%)	Diet: Oak leaves: Yellow morph (%)	Diet: Catkins: Gray morph (%)	Diet: Catkins: Yellow morph (%)
15	12.5	100	0	0	100
15	14	100	0	0	100
25	12.5	100	0	0	100
25	14	100	0	0	100

Study 2

Caterpillars were raised at 25°C, with a 14 hr photoperiod, and on 1 of 5 diets: catkins, catkins and oak leaves, catkins and *tannins* (a compound found in oak leaves, but not found in catkins), oak leaves, or oak leaves without tannins. The percent that developed into each morph appears in Table 2.

Table 2

Diet	Gray morph (%)	Yellow morph (%)
Catkins	2	98
Catkins and oak leaves	88	12
Catkins and tannins	94	6
Oak leaves	94	6
Oak leaves without tannins	2	98

Study 3

Female caterpillars were raised at 25°C with a 14 hr photoperiod on either catkins or oak leaves. Pupation time in days (d), pupal weight (g), and number of offspring produced by female moths were recorded (see Figure 1).

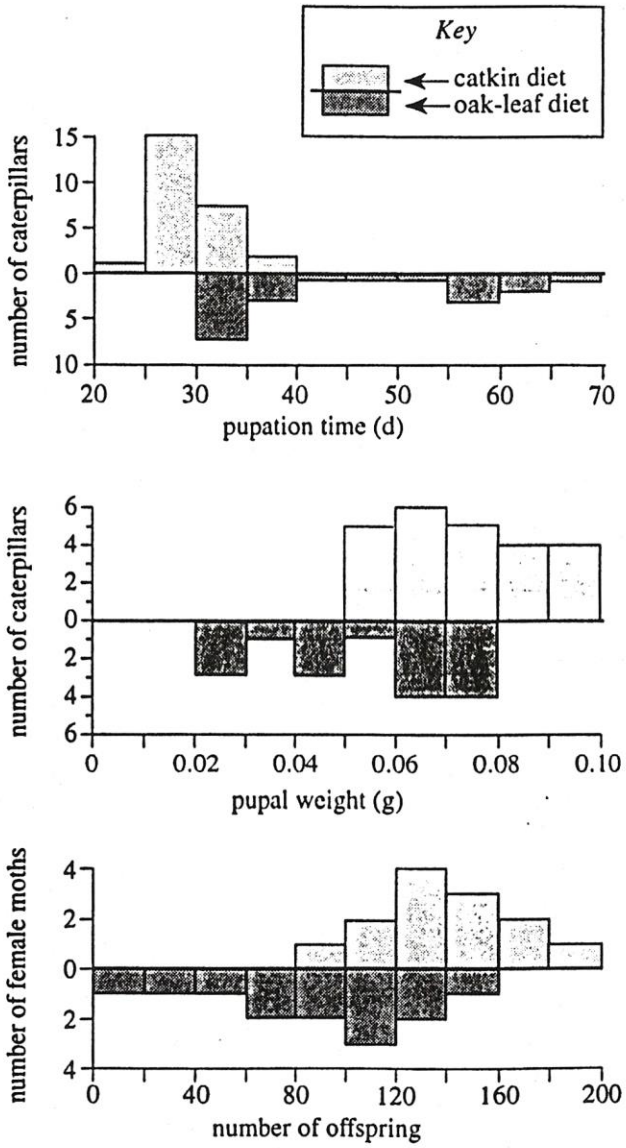


Figure 1

Tables and figure adapted from Erick Greene, "A Diet-Induced Developmental Polymorphism in a Caterpillar." ©1989 by the American Association for the Advancement of Science.

23. Based on the results of Study 1, if a researcher wanted to produce yellow-morph *Nemoria* caterpillars, the researcher should:

A. feed the caterpillars catkins only.
B. feed the caterpillars oak leaves only.
C. expose the caterpillars to a 14 hr photoperiod.
D. expose the caterpillars to a 12.5 hr photoperiod.

24. The experimental procedures used in Studies 1 and 2 differed in that, in Study 2, some caterpillars were:

F. fed catkins only.
G. fed both catkins and oak leaves.
H. raised with a 14 hr photoperiod.
J. raised at a temperature of 25°C.

25. Which of the following sets of conditions best characterizes a treatment group used in Study 1 ?

A. A temperature of 14°C, a photoperiod of 12.5 hr, and a diet of oak leaves
B. A temperature of 14°C, a photoperiod of 15 hr, and a diet of catkins
C. A temperature of 25°C, a photoperiod of 12.5 hr, and a diet of oak leaves
D. A temperature of 25°C, a photoperiod of 15 hr, and a diet of catkins

26. A student raised a female *Nemoria* caterpillar at 25°C with a 14 hr photoperiod and a diet composed entirely of catkins. Based on the results of Study 3, the caterpillar would most likely have a pupation time of approximately how many days?

F. 15–24
G. 25–34
H. 35–44
J. 45–54

27. Which of the following generalizations about pupation times and pupal weights in female *Nemoria* caterpillars is consistent with the results of Study 3 ? Compared to caterpillars fed a diet of oak leaves, caterpillars fed a diet of catkins tend to have:

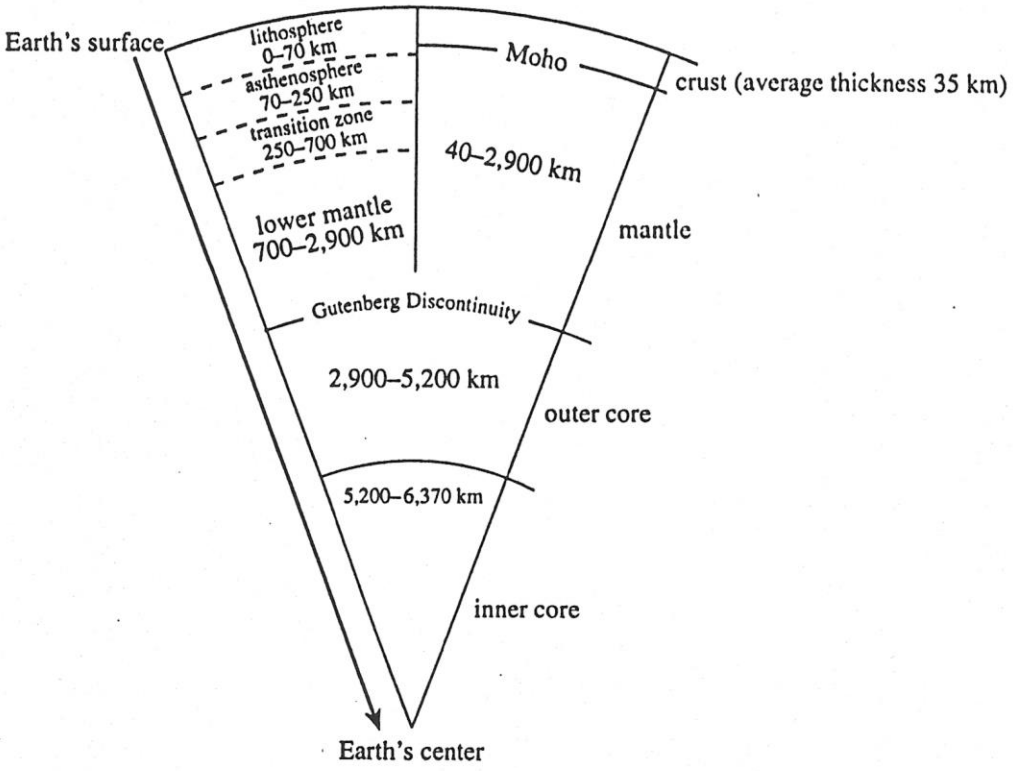
A. longer pupation times and higher pupal weights.
B. longer pupation times and lower pupal weights.
C. shorter pupation times and higher pupal weights.
D. shorter pupation times and lower pupal weights.

28. A student hypothesized that *Nemoria* caterpillars feed primarily on catkins during the summer. Do the results of Study 1 support this hypothesis, and why?

F. Yes; summer caterpillars are yellow, indicating that they are feeding primarily on catkins.
G. Yes; summer caterpillars are gray, indicating that they are feeding primarily on catkins.
H. No; summer caterpillars are yellow, indicating that they are feeding primarily on oak leaves.
J. No; summer caterpillars are gray, indicating that they are feeding primarily on oak leaves.

Passage VI

Earth's interior is divided into 4 primary layers of different chemical composition: the crust, mantle, outer core, and inner core. Figure 1 shows the 4 layers, their depths, and 2 named layer boundaries (Moho and Gutenberg Discontinuity). The lithosphere, asthenosphere, and transition zone boundaries were determined using speed changes in S waves, a type of earthquake wave. Speed changes indicate a phase and/or density change of material inside Earth.



(Note: Drawing is not to scale)

Figure 1

Figure 2 shows how P-wave (another earthquake wave type) and S-wave velocities and density change with depth inside Earth.

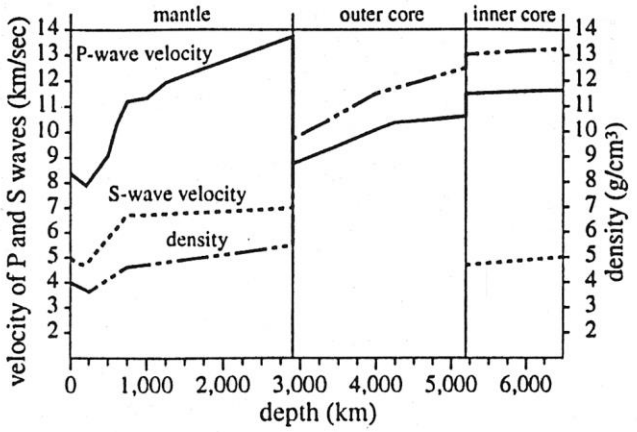


Figure 2

Figure 3 shows how Earth's temperature changes with depth.

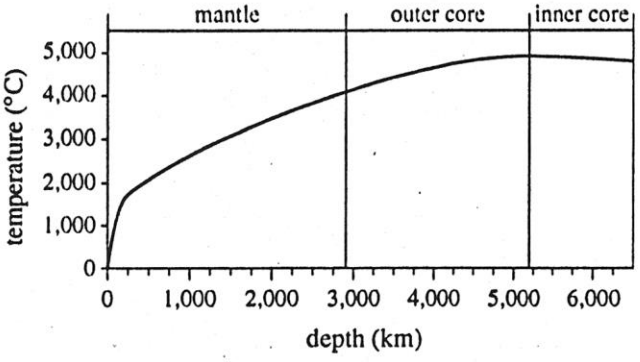


Figure 3

29. A drilling project on one of the continents struck the Moho at a depth of 60 km below the surface and a similar project on an ocean struck that boundary at a depth of 10 km beneath the ocean floor. Based on these facts and the information provided, which of the following statements about layer thickness is most accurate?

A. The crust is thinner under the continents.
B. The crust is thinner under an ocean.
C. The lithosphere is thicker than the lower mantle.
D. The mantle is thinner under an ocean.

30. S waves do not travel through liquids. Based on this fact and the data provided, which of Earth's layers is most likely completely liquid?

F. Lithosphere
G. Mantle
H. Asthenosphere
J. Outer core

31. According to the information provided, the lithosphere is best described by which of the following statements?

A. The lithosphere includes the crust and part of the mantle.
B. The lithosphere transmits only S waves.
C. The lithosphere is hotter than the outer core.
D. The lithosphere is thicker than the transition zone.

32. An increase in pressure increases the density of materials. Using this information and the data provided, which of the following would one infer about Earth's interior?

F. Pressure is highest in the mantle.
G. Pressure is highest in the outer core.
H. Pressure is highest in the inner core.
J. Pressure is constant throughout Earth's interior.

33. According to the data provided, what is the relationship between S-wave velocity and density in the mantle?

A. As density increases, S-wave velocity increases.
B. As density increases, S-wave velocity decreases.
C. As density increases, S-wave velocity remains the same.
D. As density increases, S-wave velocity increases, then decreases.

Passage VII

A double-stranded DNA molecule is shown in Figure 1. Each single strand, or *polynucleotide*, is composed of repeating subunits called *nucleotides*. A nucleotide is composed of a sugar, a phosphate group, and a base. There are 4 types of bases in DNA: *adenine*, *guanine*, *cytosine*, and *thymine*.

Nucleotides are joined in a ladderlike structure. The sugars and phosphate groups form the sides of the ladder, or *backbones*, while pairs of bases form the rungs. Pairing between bases is specific: adenine always binds with thymine, and guanine always binds with cytosine. Base pairs are connected together with *hydrogen bonds*, weak chemical bonds.

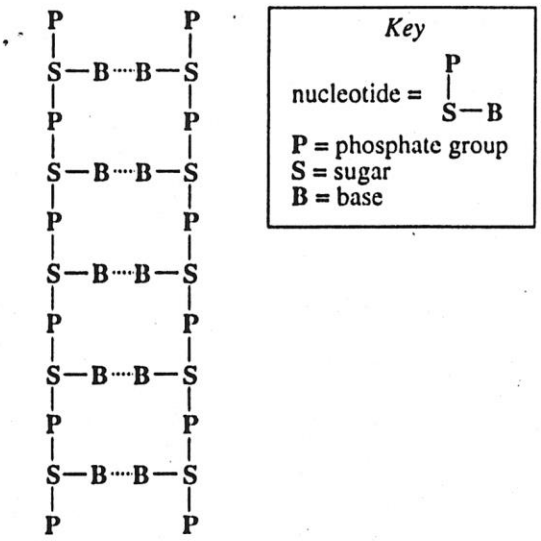


Figure 1

Scientists have proposed 3 models to explain how DNA replicates.

Semiconservative Model

DNA is separated into 2 polynucleotides by breaking the bonds between the base pairs. Each parental polynucleotide serves as a template for the synthesis of a new polynucleotide. Each parental polynucleotide then combines with the new polynucleotide synthesized from it. Thus, after replication, each DNA molecule is composed of a parental polynucleotide and a new polynucleotide (Figure 2).

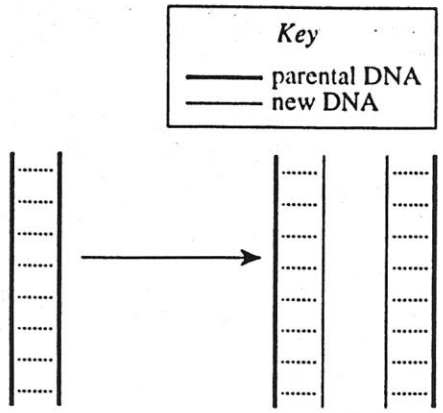


Figure 2

Conservative Model

DNA is separated into 2 polynucleotides by breaking the bonds between the base pairs. Each polynucleotide serves as a template for the synthesis of a new polynucleotide. The parental polynucleotides then rejoin; the new polynucleotides also combine. Thus, after replication, 1 DNA molecule is composed of parental DNA; the other is composed of new DNA (Figure 3).

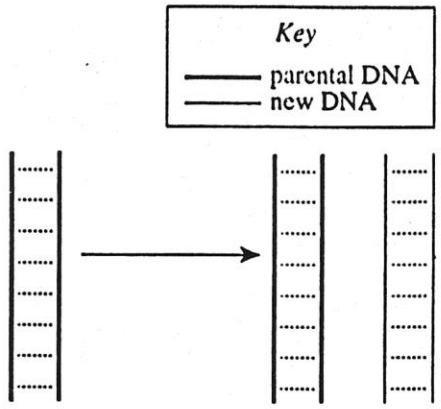


Figure 3

Dispersive Model

DNA is separated into 2 polynucleotides by breaking the bonds between the base pairs. Each polynucleotide is then fragmented along the length of the sugar-phosphate backbone into many short, single-stranded polynucleotide fragments. Each fragment serves as a template for the synthesis of a new complementary fragment. The fragments then combine so that, after replication, each DNA molecule contains many pieces of parental DNA and many pieces of new DNA (Figure 4).

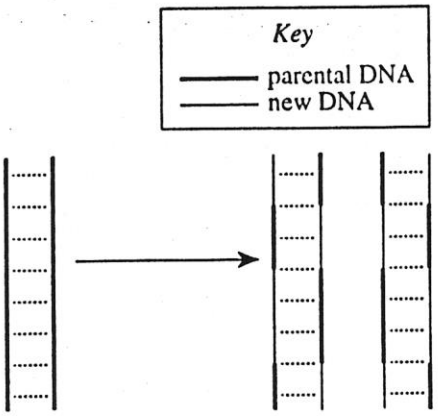


Figure 4

34. According to the passage, polynucleotides are composed of:

F. phosphate groups only.
G. phosphate groups and bases only.
H. sugars and bases only.
J. sugars, phosphate groups, and bases.

35. All 3 models assert that which of the following must occur before new polynucleotides are synthesized?

A. Parental DNA must be eliminated.
B. Base pairs must be separated.
C. DNA backbones must be fragmented.
D. DNA bases must be converted into sugars.

36. Based on the information in the passage, if a cell containing 8 double-stranded DNA molecules underwent DNA replication, how many double-stranded DNA molecules would be present in the cell after replication, but prior to cell division?

F. 4
G. 8
H. 16
J. 32

37. A problem in DNA replication that is unique to the Conservative Model is how the:

A. bonds between the sugars and phosphate groups are broken prior to replication.
B. cell obtains the chemical components necessary for replication.
C. parental polynucleotides recognize each other and rejoin after replication.
D. double-stranded parental DNA is used as a template without being separated into single polynucleotides.

38. All 3 models assert that when 2 polynucleotides combine to form 1 double-stranded DNA molecule, bonds form between which DNA components?

F. The sugars of one polynucleotide and the sugars of the other polynucleotide
G. The bases of one polynucleotide and the bases of the other polynucleotide
H. The phosphate groups of one polynucleotide and the sugars of the other polynucleotide
J. The phosphate groups of one polynucleotide and the bases of the other polynucleotide

39. To investigate whether DNA replication is semiconservative or conservative, researchers should perform an experiment that would determine whether:

A. parental polynucleotides rejoin after synthesis.
B. parental polynucleotides are fragmented during replication.
C. new polynucleotides contain the same bases as the parental polynucleotides.
D. new polynucleotides can act as a template for additional rounds of replication.

40. A drug that blocks the synthesis and accumulation of adenine and guanine would prevent a cell from replicating its DNA according to which model(s) of DNA replication?

F. The Dispersive Model only
G. The Semiconservative and Conservative Models only
H. The Conservative and Dispersive Models only
J. The Semiconservative, Conservative, and Dispersive Models

END OF TEST 4

STOP! DO NOT RETURN TO ANY OTHER TEST.

ACT Resource Links

ACT Online Practice Tests: https://www.crackab.com/act/

※ **ACT English Practice Tests:**

https://www.crackab.com/act/english/

※ **ACT Math Practice Tests:**

https://www.crackab.com/act/math/

※ **ACT Reading Practice Tests:**

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https://www.crackap.com

https://www.apstudy.net

Explanation of Procedures Used to Obtain Scale Scores from Raw Scores

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

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

ACT Test 58E	Your Scale Score
English	_____
Mathematics	_____
Reading	_____
Science Reasoning	_____
Sum of scores	_____
Composite score (sum ÷ 4)	_____

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

Scale Score	Raw Scores				Scale Score
	Test 1 English	**Test 2** Mathematics	**Test 3** Reading	**Test 4** Science Reasoning	
36	75	60	40	40	36
35	74	59	38-39	--	35
34	73	57-58	--	39	34
33	72	56	37	--	33
32	--	55	36	38	32
31	71	53-54	35	37	31
30	69-70	51-52	34	--	30
29	67-68	49-50	33	36	29
28	66	47-48	32	35	28
27	64-65	44-46	30-31	33-34	27
26	62-63	42-43	29	32	26
25	60-61	39-41	28	31	25
24	58-59	37-38	27	29-30	24
23	56-57	35-36	26	28	23
22	54-55	33-34	25	26-27	22
21	51-53	31-32	23-24	25	21
20	49-50	29-30	22	23-24	20
19	46-48	27-28	21	21-22	19
18	44-45	24-26	20	19-20	18
17	41-43	21-23	19	17-18	17
16	39-40	18-20	18	15-16	16
15	36-38	15-17	17	14	15
14	34-35	12-14	15-16	12-13	14
13	32-33	10-11	14	11	13
12	30-31	08-09	11-13	10	12
11	28-29	06-07	09-10	08-09	11
10	25-27	05	08	07	10
9	22-24	04	07	06	9
8	18-21	--	06	05	8
7	15-17	03	05	04	7
6	12-14	--	04	03	6
5	09-11	02	--	02	5
4	07-08	--	03	--	4
3	05-06	01	02	01	3
2	03-04	--	01	--	2
1	00-02	00	00	00	1