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ENGLISH TEST

45 Minutes—75 Questions

DIRECTIONS: In the passages that follow, some words and phrases are underlined and numbered. In the answer column, you will find alternatives for the words and phrases that are underlined. Choose the alternative that you think is best, and fill in the corresponding bubble on your answer sheet. If you think that the original version is best, choose “NO CHANGE,” which will always be either answer choice A or F. You will also find questions about a particular section of the

passage, or about the entire passage. These questions will be identified either by an underlined portion or by a number in a box. Look for the answer that clearly expresses the idea, is consistent with the style and tone of the passage, and makes the correct use of standard written English. Read the passage through once before answering the questions. For some questions, you should read beyond the indicated portion before you answer.

PASSAGE I

The following paragraphs may or may not be in the most logical order. You may be asked questions about the logical order of the paragraphs, as well as where to place sentences logically within any given paragraph.

Mike and his Cable TV

[1]

My best friend Mike is notorious for ignoring many of the modern conveniences that most people could not live without he'd sooner handwrite anything than sit at a computer to type.

He insists that, it would be too much trouble to learn all of the functions on a word-processing program. So, I was not the least bit surprised to hear of his disappointment in his evening last Friday. Apparently, he is very excited to host some friends from work at his apartment for the first time. Within minutes of their arrival, one of them reached for the television remote and punched in a channel. Alerted by the sound of static from the TV, Mike realized immediately what was happening: the first game of the playoffs was on and he didn't have cable service!

Therefore, he asserts he has no desire to have more than

1. **A.** NO CHANGE
B. without, he'd sooner handwrite
C. without sooner handwriting
D. without. He'd sooner handwrite
2. **F.** NO CHANGE
G. insists, that
H. insists that
J. insists, that,
3. **A.** NO CHANGE
B. was
C. has been
D. was being
4. **F.** NO CHANGE
G. Thus, he
H. Consequently, he
J. He

GO ON TO THE NEXT PAGE.

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a few channels to flip through, but I imagine at that moment on Friday evening, he had wished for cable service. [5]

[2]

To help my friend, I said I would look into it for him. I spoke to a sales agent with the cable company about the different packages of channels available to someone living in Mike's apartment building. She started by describing the most premium package, so I quickly interrupted her to say she should begin with the cheapest offer. She insisted that the premium package was amazing, with many extra sports, and movie channels.

I assured her that the cheapest possible option, when she told me it was only \$15 per month, would more than suffice, I arranged to have it installed. I knew it would be worth it to Mike.

[3]

[1] During his first few days with cable, Mike has sat in front of his TV; when before he would have been reading a comic book or milling around the apartment. [2] He is fond of animal documentaries and can't believe how many of them he finds every day across the 70 channels. [3] I showed him how to program his VCR to record what he likes.

5. Given that all are true, which of the following additions to the preceding sentence (replacing "cable service") would be most relevant?

- A. cable service to entertain his guests
- B. cable service that was wired into his apartment
- C. cable service with a good remote control
- D. cable service to watch

6. F. NO CHANGE

- G. them
- H. some
- J. cable service

7. A. NO CHANGE

- B. because
- C. due to the fact that
- D. since

8. F. NO CHANGE

- G. sports, and movie, channels.
- H. sports and movie, channels.
- J. sports and movie channels.

9. A. NO CHANGE

- B. I assured her that the cheapest possible option would more than suffice, and when she told me it was only \$15 per month, I arranged to have it installed.
- C. I arranged to have installed the cheapest possible option that would more than suffice, which she told me was only \$15 per month.
- D. She told me it was only \$15 per month, which I assured her would more than suffice as the cheapest possible option, so I arranged to have it installed.

10. F. NO CHANGE

- G. sits
- H. was sitting
- J. sat

11. A. NO CHANGE

- B. TV: when
- C. TV. When
- D. TV when

12. F. NO CHANGE

- G. by programming
- H. a program with
- J. and programmed

GO ON TO THE NEXT PAGE.

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[4]

[1] With this discovery of cable television, I suspect Mike might take more kindly to technology in the future.

[2] Soon I hope to introduce to him to the Internet and maybe even the cellular phone. [3] I doubt he'll turn out

13

to be a gadget-lover like me someday. [4]

13

13. Which of the choices would provide an ending most consistent with the essay as a whole?
- A. NO CHANGE
 - B. With time, perhaps he'll learn to embrace modern technology.
 - C. I'm not sure if he'd know how to use it, though.
 - D. Maybe Mike isn't as behind the times as I once thought.
14. Upon reviewing Paragraph 4 and realizing that some information has been left out, the writer composes the following sentence:
- Little by little, I see him enjoying the pleasures of our digital world.
- The most logical placement for this sentence would be:
- F. before Sentence 1.
 - G. after Sentence 1.
 - H. after Sentence 2.
 - J. after Sentence 3.

Question 15 asks about the preceding passage as a whole.

15. The writer is considering deleting Sentence 2 of Paragraph 3. If the writer removed this sentence, the essay would primarily lose:
- A. an interesting detail about how Mike is benefiting from cable television.
 - B. details supporting the fact that Mike is inexperienced with cable television.
 - C. a humorous blend of descriptive detail and relevant information.
 - D. proof that Mike will continue to pay the \$15 per month for cable service.

GO ON TO THE NEXT PAGE.

1



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PASSAGE II

The following paragraphs may or may not be in the most logical order. You may be asked questions about the logical order of the paragraphs, as well as where to place sentences logically within any given paragraph.

Ragtime: Uniquely American Music

[1]

Many forms of music have originated in the United
16

States, thanks in large part to the nations rich ethnic
17

diversity. It is ragtime that is one form of American music.
18

Characterized both by its distinctive African-American
syncopation and conservative European classical structure,
ragtime in its heyday from 1900 to 1918 was enjoyed by
19
people of all races and ethnicities.

[2]

Ragtime grew from the marches and jigs popular in the
Northern Black communities of the late 19th century.

Historians consider 1897 the beginning of mature ragtime.

A “rag” can have varied instrumentation; but usually it is
20
written for piano. Ragtime songs have a vocal part, but

much of the music makes the piano 21 center stage.

Predating recorded music, ragtime was distributed almost
exclusively as sheet music, which was performed by

amateur pianists in homes and cafés around the country.

For this reason, many consider ragtime to be a form of

classical music. Public performances by ragtime

composers were in short supply, but high demand.

One alternative to seeing a great performance was to hear

the piece on a player piano. The first official ragtime hit

16. F. NO CHANGE

G. Music forms

H. One form of music

J. The form of music that

17. A. NO CHANGE

B. national

C. nations’

D. nation’s

18. F. NO CHANGE

G. Known as ragtime, it is one form of American music.

H. Ragtime is one such form of American music.

J. Being one form of American music is ragtime.

19. A. NO CHANGE

B. ragtime, in its heyday from 1900 to 1918

C. ragtime, in its heyday, from 1900 to 1918,

D. ragtime, in its heyday from 1900 to 1918,

20. F. NO CHANGE

G. instrumentation but

H. instrumentation, but

J. instrumentation

21. At this point, the writer is considering adding the following parenthetical phrase:

–and those who played it –

Given that it is true, would this be a relevant addition to make here?

A. Yes, because it helps the reader have a better understanding of the style of music.

B. Yes, because it provides an important historical detail that is elaborated on later in the paragraph.

C. No, because this detail is not essential to the meaning of the sentence nor to the content of the paragraph.

D. No, because the essay only describes the musical form and not its role in American society in the early 20th century.

GO ON TO THE NEXT PAGE.

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was Scott Joplin's *Maple Leaf Rag*, published in 1899.

America was enthralled by this sophisticated composition.

[3]

[1] Today, Joplin is the most famous figure in ragtime history. [2] He first showed great musical potential at a young age, and when his family moved to a new home in Texas, his mother worked long hours to earn enough money to buy a piano for him. [3] His abilities were noticed by a German piano teacher he gave Joplin free lessons and instilled in him good classical technique.

[4] Soon enough, Joplin was a skilled musician and began studying music composition at George Smith College in Sedalia, Missouri. [5] After some years as a traveling musician, where he eventually settled back in Sedalia and

became a pianist at several, popular, black men's clubs.

[6] It was during this phase of his career that he composed

his *Maple Leaf Rag*, the piano piece that

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

- F. demonstrated his talent on the piano
- G. revealed his musical skills
- H. exposed his rhythmic touch
- J. played

23. A. NO CHANGE

- B. who
- C. whom
- D. that

24. The writer is considering deleting the following clause from the preceding sentence (placing a period after the word *composition*):

at George Smith College in Sedalia, Missouri.

Should the writer make this deletion?

- F. Yes, because the information is unrelated to the topic addressed in this paragraph.
- G. Yes, because the information diminishes the impact of Joplin's natural musical talent on his body of work.
- H. No, because the information explains why Joplin likely began his career in Sedalia.
- J. No, because the information shows that Joplin was an unremarkable music student who could not enroll in a more prestigious institution.

25. A. NO CHANGE

- B. it was there that
- C. was where
- D. OMIT the underlined portion.

26. F. NO CHANGE

- G. pianist, at several, popular black men's clubs.
- H. pianist at several popular black men's clubs.
- J. pianist, at several popular black men's clubs.

27. Given that all of the choices are true, which one would most effectively tie together the two main subjects of this essay?

- A. NO CHANGE
- B. a piano piece most Americans recognize today.
- C. his most popular work during his lifetime.
- D. the profits from which helped him dedicate more time to composition instead of performing in clubs.

GO ON TO THE NEXT PAGE.

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propelled him, and ragtime itself into

national prominence. ²⁷ [28]

²⁷

[4]

The ragtime style illustrates how people of diverse

heritage can create unique music that lots of people like.

Ragtime gave way to jazz by the 1920s. Audio recording ²⁹ was becoming popular at the same time. The piano was no longer required and jazz albums began playing in living rooms across the country. Like all folk music, though, jazz pays homage to its predecessor—ragtime—by borrowing its style, rhythm, and mood.

28. Upon reviewing this paragraph and finding that some information has been left out, the writer composes the following sentence incorporating that information:

Connoisseurs of piano music appreciate his compositions for the novel combination of folk rhythms and classical harmonies.

This sentence would most logically be placed after Sentence:

- F. 1.
G. 2.
H. 5.
J. 6.
29. A. NO CHANGE
B. everyone likes to listen to.
C. appeals to a broad audience.
D. never gets old.

Question 30 asks about the preceding passage as a whole.

30. Suppose the writer's goal had been to write a brief essay focusing on the history and development of ragtime music. Would this essay successfully fulfill this goal?
- F. Yes, because the essay mentions the contributions that ragtime music has made to other African-American musical traditions.
G. Yes, because the essay discusses the origins of ragtime music and one of its early important figures.
H. No, because the essay refers to other musical forms besides ragtime.
J. No, because the essay focuses on only one ragtime musician, Scott Joplin.

PASSAGE III

Sequoia's System of Writing

Although few facts exist regarding the life of the Native ³¹ American named Sequoia, the information that is available

articulate and paint a colorful picture of this man

³²

on the plains. Sequoia was born into the Cherokee Nation

³³

31. A. NO CHANGE
B. that exist
C. are existing
D. exists
32. F. NO CHANGE
G. paints
H. articulating and painting
J. paint articulately
33. A. NO CHANGE
B. of the plains
C. from and on the plains
D. on which the plains

GO ON TO THE NEXT PAGE.

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in approximately 1770; his mother was a descendant of

34

many respected Cherokee chiefs. This provided Sequoia

35

with a secure social stature despite his unknown paternity.

Sequoia's fame comes mainly from his acknowledged

36

development of a written Cherokee language. ³⁷ Over a period of twelve years, Sequoia developed a *syllabary* consisting of over eighty characters. Unlike an alphabet, where each letter represents a basic sound of speech, a syllabary consists of written characters,

each of which represents a syllable. Remarkably, a person

38

learning Cherokee using the syllabary is able to read and write the language in an extremely short period of time compared to the time it takes someone to master the

English language. Its use among the nation's

39

Cherokee people spread quick, and soon Cherokee

40

reading materials were being widely published, even

41

though other tribes had no written language.

Religious missionaries quickly realized the advantages of translating sacred texts into the new Cherokee language,

34. F. NO CHANGE
G. mother who was
H. mother being
J. mother is

35. A. NO CHANGE
B. respecting
C. respectably
D. OMIT the underlined portion.

36. Which choice gives the sense that some of the facts of the story are unsubstantiated?
F. NO CHANGE
G. documented
H. alleged
J. accounted

37. Assuming that all of the choices are true, which one best links the preceding sentence with the rest of the paragraph?
A. Sequoia was also known as George Guess, and he frequently interacted with white men.
B. The Cherokees, like many Native Americans, had primarily used pictographs to communicate.
C. A syllabary can consist of many different symbols and characters.
D. Legend reveals that Sequoia was determined to prove that his people could communicate in writing more effectively than could other tribes.

38. F. NO CHANGE
G. that represent one syllable each
H. that represents a syllable
J. representing, each one, a syllable

39. A. NO CHANGE
B. It's use
C. The syllabary's use
D. Use of it

40. F. NO CHANGE
G. spreads quick
H. spreads quickly
J. spread quickly

41. A. NO CHANGE
B. reading materials that were being widely published
C. had reading materials were widely published
D. the reading materials, that were being published widely

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so Bibles and other religious materials soon became widespread.⁴² Laws were also written using Sequoia's symbols,⁴² and the first Native American newspaper, *The Cherokee Phoenix*, was also launched. Cherokee history was preserved through new written records, which included accounts and descriptions of ceremonial traditions and common customs.

[1] One peculiarity of this new Cherokee language was that it does not instigate a literary explosion among the Cherokee people.⁴³ [2] Instead, the syllabary was used primarily as a recording device. [3] Seemingly, no poetry, novels, or biographies emerged during that time. [4] The syllabary elevated the Cherokee nation in the eyes of the rest of the world, and they became widely regarded as a learned people as a result. [5] Sequoia's system is still in use today, and anyone can discover it at a library or a computer. [44]

42. If the writer were to delete the phrase "so Bibles and other religious materials soon became widespread," ending the sentence with "language," the essay would primarily lose a detail that:
- F. enhances the main point of the essay.
 - G. helps the reader understand the real purpose of Sequoia's syllabary.
 - H. further explains the first part of the same sentence.
 - J. adds a humorous element to the essay.
43. A. NO CHANGE
 B. it did not
 C. it might not
 D. it should not
44. Which of the following sequences of sentences makes this paragraph most logical?
- F. NO CHANGE
 - G. 1, 3, 2, 4, 5
 - H. 3, 4, 2, 1, 5
 - J. 4, 3, 1, 2, 5

Question 45 asks about the preceding passage as a whole.

45. Suppose the writer had intended to write a brief introduction to the Cherokee nation of the early United States. Would this essay successfully fulfill this goal?
- A. Yes, because the essay discusses the development of an important part of the Cherokee nation, specifically its written language.
 - B. Yes, because Sequoia made a huge contribution to the Cherokee culture.
 - C. No, because the essay focuses on one aspect of the Cherokee nation, not on the society as a whole.
 - D. No, because the essay does not address any of the most important moments of Cherokee history.

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PASSAGE IV

Finding My Family Tree

As a boy, I was fortunate to have a close family, all living in the same town. I saw my grandparents often, and they'd tell me story after story of a past world and of the people who dwelled in it.

46

In one summer night I strolled through a thicket with my grandfather, picking up leaves and sticks along the way.

47

Sometimes I knew from which tree they had fallen, but my grandpa happily gave me hints for most of them. [48] Bit by bit, he told me a story about from where he and his family had come and the acres of woods he had explored as a boy.

My grandfather's immediate family came from Quebec;

his distant relatives hailed from France. He always wanted

49

to take me to his hometown near Montreal, but we hadn't yet had the opportunity. The woods in French Canada,

50

he said, were hearty and old, all of, the trees were the regrowth from widespread logging over a century ago.

51

Quebec has a lot of maples, too, and Grandpa explained how his mother knew how to boil the sap just slowly enough to make syrup.

46. F. NO CHANGE

G. who, dwelled, in it

H. who dwelled, in it

J. who, dwelled in it

47. A. NO CHANGE

B. On one summer night

C. One summer night,

D. In one summer night,

48. The writer is considering revising the preceding sentence by deleting the phrase "but my grandpa happily gave me hints for most of them" (placing a period after the word *fallen*). If the writer did this, the paragraph would primarily lose:

F. information comparing the narrator's knowledge of the woods with that of his grandfather.

G. details describing the grandfather's lifelong experience with wooded lands.

H. details describing how the narrator and his grandfather passed the time on their walks in the woods.

J. details revealing the narrator's fondness of his grandfather through sharing his knowledge of trees.

49. A. NO CHANGE

B. his relatives hailing from distant France

C. hailing more distant relatives from France

D. his relatives hailed from France distantly

50. Which of the following alternatives to the underlined portion would NOT be acceptable?

F. by

G. outside

H. about

J. close to

51. A. NO CHANGE

B. old; all of

C. old all of

D. old; all, of

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When we came in from our walk, Grandpa would take out one of his dusty shoeboxes from the cellar and sit down next to me. It amazes me how I've never seen the same shoebox emerge twice from the attic; his family records are astounding. In the dusty box were old sepia photographs of family members

going about their daily business. My great-grandmother

was pictured having kneaded dough in the kitchen.

These edges were splitting on a photograph of boys skating on a pond, hockey sticks raised in celebration of a goal. One by one, I felt the emotion captured by these images, and I got the nagging feeling that I would never know these people from my family's past. After that day, I often joined my grandpa to learn about my French-Canadian ancestry, so that, when he is gone, I will be the custodian of the stories.

The culmination of our time together was a detailed family tree, its base formed by our French, ancestors who first arrived on this continent. Our search for information uncovered amazing historical documents, as ships' manifests and handwritten marriage certificates.

If you were lucky, we'd find more than just a name. Dates recognizing births and deaths were fairly easy to find; occupations and bits of ancestors' life stories became

52. Given that all of the choices are true, which one would most effectively lead the reader from the first sentence of this paragraph to the description that follows in the next two sentences?

F. NO CHANGE

G. Maple syrup aside, there are lots of things I like about my family, and my grandpa continued to astound me with his tales.

H. Grandpa usually has a good story to tell on our walks.

J. No one else in my family has as much passion for long walks as does my grandpa.

53. Given that all of the choices are true, which one provides information most relevant to the main focus of this paragraph?

A. NO CHANGE

B. in suits and dresses.

C. enjoying a picnic in the country.

D. with stark expressions that spoke of the toil of farm life generations ago.

54. F. NO CHANGE

G. kneads

H. kneading

J. was kneading

55. A. NO CHANGE

B. My edges

C. The edges

D. Those edges

56. F. NO CHANGE

G. our French ancestors, whom

H. our French ancestors whom

J. our French ancestors who

57. A. NO CHANGE

B. such as

C. being

D. as like

58. F. NO CHANGE

G. If we were lucky,

H. If you are lucky,

J. If we are lucky,

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increasing difficult to uncover as we dug deeper
⁵⁹
 into the past. Now, though, we're preserving this history
 so that our progeny may learn from these stories
 and take comfort in knowing that, though life may end,
photos capture history very well.
₆₀

- 59. A. NO CHANGE
 B. increasing and difficult
 C. increasingly difficult
 D. increasing with difficulty

- 60. The writer wants to balance the statements made in the earlier part of this essay with a related detail that reveals why the narrator wants to preserve this history. Given that all of the choices are true, which one best accomplishes this goal?
 E. NO CHANGE
 G. we can tell our stories through the records of our past.
 H. family goes on forever.
 J. people can reminisce over photo albums and scrap-books.

PASSAGE V

How Volcanoes Work

What causes the formation of volcanoes? Before humans understood that the center of the Earth was made of molten iron, scientific hypotheses pointed to chemical reactions in superficial layers of magma to explain the phenomenon. Through modern geology, humans have a clearer—though hardly complete—understanding of the mechanism of magma flow, and can analyze the vibrations
₆₁

of the earth to warn of recent eruptions.
₆₂

Most volcanoes were being the result of magma flowing
₆₃
 out of the surface of the earth and hardening, usually near a subduction zone. As two tectonic plates collide, one of them is forced under the other, and the seabed rock
₆₄
 melts to form new, low-density magma.

- 61. A. NO CHANGE
 B. and, can
 C. and can,
 D. and

- 62. F. NO CHANGE
 G. distant
 H. approximate
 J. impending

- 63. A. NO CHANGE
 B. Most volcanoes have been
 C. Most volcanoes are
 D. Most volcanoes will be

- 64. F. NO CHANGE
 G. one of the plates are
 H. one,
 J. one plate, being

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This magma is red-hot and eventually penetrates unstable pockets of the Earth's surface. Some magma will succeed⁶⁵ in reaching the surface either to form a new volcano or

adding more mass to an existing one. Not all volcanoes are formed at continental boundaries, however.⁶⁶

Hotspot volcanoes form by a different mechanism. One theory, proposed in the 1960s, seeks to explain volcanoes such as those that formed the Hawaiian Islands, which are not at a plate boundary. The probable explanation is a hotspot, which is a fixed point beneath the Earth's crust where a narrow plume of magma rises into the crust and appears at the surface as a continental volcano or a volcanic island. Chains, of volcanic islands called archipelagos, provide evidence that the hotspot stays in⁶⁷ place as the tectonic plate passes over it.⁶⁸

Geologic processes are slow, while research must include the study of ancient human accounts of eruptions and layers of rock millions of years old.⁶⁹

In general, eruptions seem to occur every several hundred or even thousand years, and many volcanoes seem to be completely dormant, that is unlikely to erupt soon.⁷⁰ No one can say for sure that these volcanoes will not erupt again⁷¹ in the future, so scientists take serious the study of every volcano situated where a future eruption could bring significant human loss and environmental damage.⁷²

Predicting volcanic eruptions is not an exact science, and only within the briefest geological moment can people warn to evacuate. Through studying the earth's vibrations,⁷³ physical deformation, and gas emissions, geologists in recent decades have made several excellent predictions of

65. Given that all of the choices are true, which one provides the most logical cause for the action described in the statement immediately following this underlined portion?

- A. NO CHANGE
- B. This magma rises
- C. This magma condenses
- D. This magma forms pools

66. F. NO CHANGE

- G. adds
- H. add
- J. added

67. A. NO CHANGE

- B. Formation of hotspot volcanoes is
- C. There are hotspot volcanoes that forming
- D. In addition, hotspot volcanoes are formed

68. F. NO CHANGE

- G. Chains of volcanic islands, called archipelagos,
- H. Chains of volcanic islands called archipelagos
- J. Chains, of volcanic islands, called archipelagos

69. A. NO CHANGE

- B. slow, but
- C. slow, so
- D. slow, although

70. F. NO CHANGE

- G. Quite regularly, eruptions
- H. Many times, eruptions
- J. Often, eruptions

71. A. NO CHANGE

- B. that is, unlikely to erupt soon
- C. that is unlikely, to erupt soon
- D. that, is unlikely to erupt soon

72. F. NO CHANGE

- G. taken seriously
- H. seriously taking
- J. take seriously

73. A. NO CHANGE

- B. be warning
- C. receive warning
- D. have the warning

GO ON TO THE NEXT PAGE.

1**1**

volcanic eruption, as if at the Philippines' Mount Pinatubo
⁷⁴
in 1991 and Popocatépetl outside Mexico City in 2000.

Understanding the mechanisms of the earth's interior
and continuing to study volcanoes will advance the
development of reliable early warning systems for
dangerous eruptions. Volcanoes are both feared and
revered for their beauty and awesome destructive power,

but they show that humans have much more to learn about
⁷⁵
the planet Earth.

74. F. NO CHANGE
G. most notably
H. typically
J. characteristically

75. A. NO CHANGE
B. seemingly
C. when
D. and

END OF THE ENGLISH TEST.
STOP! IF YOU HAVE TIME LEFT OVER, CHECK YOUR WORK ON THIS SECTION ONLY.

2



2

MATHEMATICS TEST

60 Minutes—60 Questions

DIRECTIONS: Solve each of the problems in the time allowed, then fill in the corresponding bubble on your answer sheet. Do not spend too much time on any one problem; skip the more difficult problems and go back to them later.

You may use a calculator on this test. For this test you should assume that figures are NOT necessarily drawn to scale, that all geometric figures lie in a plane, and that the word *line* is used to indicate a straight line.

1. The minimum fine for driving in excess of the speed limit is \$25. An additional \$6 is added to the minimum fine for each mile per hour (mph) in excess of the speed limit. Rachel was issued a \$103 fine for speeding in a 55-mph speed limit zone. For driving at what speed, in mph, was Rachel fined?

A. 48
B. 52
C. 62
D. 68
E. 78

2. $5x^3 \times 2xy \times 3xy^2$ is equivalent to:

F. $10x^3y^2$
G. $10x^5y^3$
H. $30x^3y^3$
J. $30x^5y^3$
K. $30x^5y^2$

3. What is the fourth term in the arithmetic sequence 13, 10, 7, ...?

A. 14
B. 9
C. 4
D. 0
E. -7

4. When written in symbols, “the product of r and s , raised to the fourth power,” is represented as:

F. r^4s^4
G. $(r + s)^4$
H. $(rs)^4$
J. $\frac{r^4}{s^4}$
K. rs^4

DO YOUR FIGURING HERE.

GO ON TO THE NEXT PAGE.



5. Which of the following numbers has the digit 5 in the thousandths place?

A. 5,000.00
B. 50.0
C. 0.05
D. 0.005
E. 0.0005

DO YOUR FIGURING HERE.

6. Mandy and Jordan each bought some of the same notebooks and the same three-ring binder. Mandy paid \$5.85 for 3 notebooks and 1 binder. Jordan paid \$4.65 for 2 notebooks and 1 binder. What is the price of one of the notebooks?

F. \$2.70
G. \$2.25
H. \$1.80
J. \$1.20
K. \$0.75

7. If $mn = k$ and $k = x^2n$, and $nk \neq 0$, which of the following is equal to m ?

A. 1
B. $1/x$
C. \sqrt{x}
D. x
E. x^2

8. If $7x + 5 = 2x + 9$, then $x = ?$

F. $\frac{4}{5}$
G. $1\frac{4}{5}$
H. $\frac{4}{9}$
J. $1\frac{4}{9}$
K. 2

9. What percent of 5 is 7?

A. 14%
B. 35%
C. 71%
D. 140%
E. 157%



10. If x is a positive real number such that $x^2 = 16$, then $x^3 + \sqrt{x} = ?$

F. 18
G. 20
H. 66
J. 68
K. 74

DO YOUR FIGURING HERE.

11. $-|-16| - (-16) = ?$

A. -16
B. 0
C. 4
D. 16
E. 32

12. A partial deck of cards was found sitting out on a table. If the partial deck consists of 6 spades, 3 hearts, and 7 diamonds, what is the probability of randomly selecting a red card from this partial deck? (Note: diamonds and hearts are considered "red," while spades and clubs are considered "black.")

F. $\frac{9}{16}$
G. $\frac{13}{16}$
H. $\frac{7}{16}$
J. $\frac{3}{8}$
K. $\frac{5}{8}$

13. Which of the following is a simplified form of $4x - 4y + 3x$?

A. $x(7 - 4y)$
B. $x - y + 3x$
C. $-8xy + 3x$
D. $7x - 4y$
E. $-4y - x$

2**2**

14. Gary has turtles, cats, and birds for pets. The number of birds he has is 4 more than the number of turtles, and the number of cats is 2 times the number of birds. Of the following, which could be the total number of Gary's pets?
- F. 14
G. 18
H. 20
J. 22
K. 26
15. On a map, $\frac{1}{4}$ inch represents 12 miles. If a road is 66 miles long, what is its length, in inches, on the map?
- A. $5\frac{1}{2}$
B. $5\frac{1}{8}$
C. $1\frac{1}{2}$
D. $1\frac{3}{8}$
E. $\frac{7}{8}$
16. If $b = a - 4$, then $(a - b)^3 = ?$
- F. 64
G. 16
H. -4
J. -16
K. -64
17. If g is an integer, which of the following could NOT equal g^2 ?
- A. 0
B. 1
C. 4
D. 8
E. 9
18. Justin owns 6 different dress shirts, 3 different pairs of pants, and 5 different ties. How many distinct outfits, each consisting of a shirt, a pair of pants, and a tie, can Justin make?
- F. 14
G. 42
H. 90
J. 120
K. 144
19. An oil refinery produces gasoline from crude oil. For every 10,000 barrels of crude oil supplied, the refinery can produce 6,500 barrels of gasoline. How many barrels of gasoline can be produced from 3,500 barrels of crude oil?
- A. 1,265
B. 1,750
C. 2,125
D. 2,275
E. 5,385

DO YOUR FIGURING HERE.

2



2

20. What is the slope of a line that passes through the origin and the point $(-6, 2)$?

F. 3
 G. $1/3$
 H. $-1/3$
 J. -3
 K. -6

DO YOUR FIGURING HERE.

21. If $n^x \cdot n^8 = n^{24}$ and $(n^6)^y = n^{18}$, what is the value of $x + y$?

A. 7
 B. 9
 C. 12
 D. 19
 E. 27

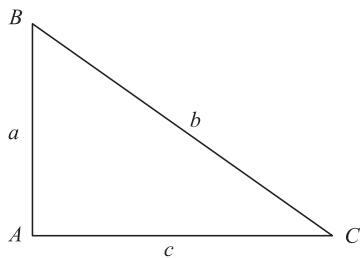
22. What is the slope-intercept form of $9x + 3y - 6 = 0$?

F. $y = 9x - 6$
 G. $y = 3x + 2$
 H. $y = 3x - 2$
 J. $y = -3x + 2$
 K. $y = -9x + 6$

23. If the volume of a cube is 64, what is the shortest distance from the center of the cube to the base of the cube?

A. 2
 B. 4
 C. $2\sqrt{4}$
 D. $\sqrt{32}$
 E. 16

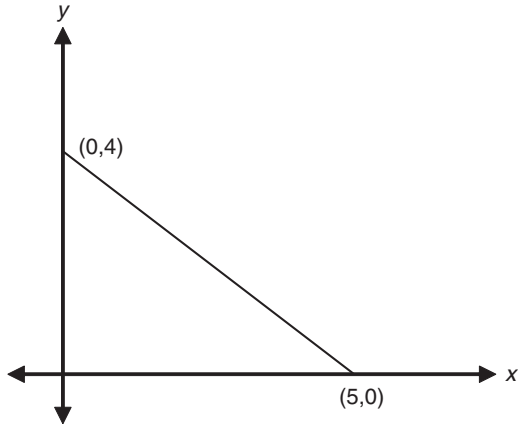
24. For the right triangle $\triangle ABC$ shown below, what is $\sin C$?



F. $\frac{a}{b}$
 G. $\frac{a}{c}$
 H. $\frac{b}{a}$
 J. $\frac{c}{b}$
 K. $\frac{c}{a}$

2**2**

25. What is the area, in coordinate units, of the triangle in the figure below?



- A. 4.5
B. 9.0
C. 10.0
D. 12.5
E. 20.0
26. A shoe store charges \$39 for a certain type of sneaker. This price is 30% more than the amount it costs the shoe store to buy one pair of these sneakers. At an end-of-the-year sale, sales associates can purchase any remaining sneakers at 20% off the shoe store's cost. How much would it cost an employee to purchase a pair of sneakers of this type during the sale (excluding sales tax)?
F. \$31.20
G. \$25.00
H. \$24.00
J. \$21.84
K. \$19.50
27. After excavating a lot, workers removed an estimated 7,000 cubic yards of dirt from the area. If this dirt were spread in an even layer over an empty lot with dimensions 30 yards by 64 yards, about how deep, in yards, would the layer of dirt be?
A. Less than 1
B. Between 1 and 2
C. Between 2 and 3
D. Between 3 and 4
E. More than 4

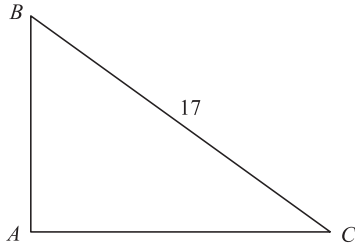
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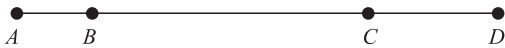


2

28. The hypotenuse of the right triangle $\triangle ABC$ shown below is 17 feet long. The cosine of angle C is $\frac{3}{5}$. How many feet long is the segment AC ?



- F. 6
G. 10.2
H. 12
J. 15
K. 28.3
29. When the choir is arranged in rows of 5 people each, the last row is one person short. When the choir is arranged in rows of 6 people each, the last row is still one person short. What is the least possible number of people in the choir?
- A. 29
B. 30
C. 56
D. 60
E. 99
30. What is the y -coordinate of the point in the standard (x,y) coordinate plane at which the 2 lines $y = \frac{x}{2} + 3$ and $y = 3x - 2$ intersect?
- F. 5
G. 4
H. 3
J. 2
K. 1
31. Points B and C lie on segment AD as shown below. Segment AD is 32 units long, segment AC is 23 units long, and segment BD is 27 units long. How many units long, if it can be determined, is segment BC ?



- A. 21
B. 18
C. 9
D. 4
E. Cannot be determined from the given information.

DO YOUR FIGURING HERE.

2



2

32. For all pairs of real numbers M and N where $M = 6N + 5$, $N = ?$

F. $\frac{M}{6} - 5$

G. $\frac{M}{5} + 6$

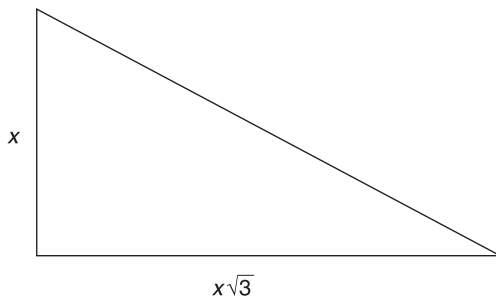
H. $6M + 5$

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

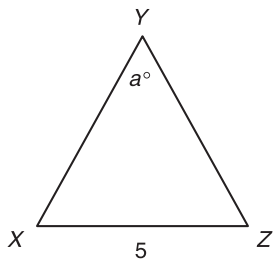
K. $\frac{M + 5}{6}$

DO YOUR FIGURING HERE.

33. In the figure below, the perimeter of the triangle is $12 + 4\sqrt{3}$ inches. What is the value of x , in inches?



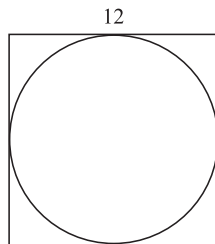
- A. 2
 B. 4
 C. 6
 D. 8
 E. 12
34. In the figure below, $\overline{XY} = \overline{YZ}$. If $a = 40^\circ$, then $\overline{XY} = ?$



- F. 9.50
 G. 8.75
 H. 7.75
 J. 6.25
 K. 5.50

2**2**

35. In the (x, y) coordinate plane, what is the y -intercept of the line $-9x - 3y = 15$?
- A. -9
B. -5
C. -3
D. 3
E. 15
36. The product of two integers is between 137 and 149. Which of the following CANNOT be one of the integers?
- F. 15
G. 13
H. 11
J. 10
K. 7
37. When x is divided by 7, the remainder is 4. What is the remainder when $2x$ is divided by 7?
- A. 1
B. 4
C. 5
D. 7
E. 8
38. A circle is circumscribed within a square with sides of 12 feet, as shown below. What is the area of the circle, to the nearest square foot?



- F. 144
G. 113
H. 72
J. 12π
K. 3π
39. The average of 7 consecutive numbers is 16. What is the sum of the least and greatest of the 7 integers?
- A. 13
B. 14
C. 16
D. 19
E. 32

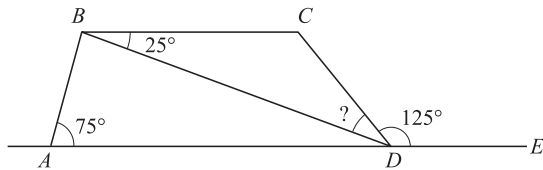
DO YOUR FIGURING HERE.

2



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40. In the figure below, $ABCD$ is a trapezoid. Point E lies on line AD , and angle measures are as marked. What is the measure of angle BDC ?



DO YOUR FIGURING HERE.

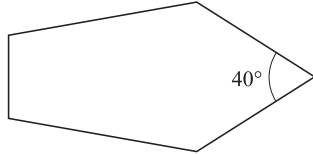
- F. 25°
 G. 30°
 H. 45°
 J. 55°
 K. 100°
41. For which of the following functions is $f(-5) > f(5)$?
- A. $f(x) = 6x^2$
 B. $f(x) = 6$
 C. $f(x) = 6/x$
 D. $f(x) = 6 - x^3$
 E. $f(x) = x^6 + 6$
42. For what value of n would the following system of equations have an infinite number of solutions?
- $$3a + b = 12$$
- $$12a + 4b = 3n$$
- F. 4
 G. 9
 H. 16
 J. 36
 K. 48
43. If x and y are positive integers such that the greatest common factor of x^2y^2 and xy^3 is 27, then which of the following could y equal?
- A. 81
 B. 27
 C. 18
 D. 9
 E. 3

2



2

44. What is the smallest possible integer for which 15% of that integer is greater than 2.3?
- F. 3
G. 12
H. 15
J. 16
K. 18
45. What is the distance in the standard (x,y) coordinate plane between the points $(0,1)$ and $(4,4)$?
- A. $\sqrt{7}$
B. 3
C. 4
D. 5
E. $\sqrt{27}$
46. The sides of a triangle are 9, 12, and 15 centimeters long. What is the angle between the 2 shortest sides?
- F. 180°
G. 90°
H. 60°
J. 45°
K. 30°
47. In the pentagon, shown below, one interior angle measures 40° . What is the total measure of the other 4 interior angles?



- A. 120°
B. 160°
C. 320°
D. 500°
E. 680°
48. For real numbers r and s , when is the equation $|r - s| = |r + s|$ true?
- F. Always
G. Only when $r = s$
H. Only when $r = 0$ or $s = 0$
J. Only when $r > 0$ and $s < 0$
K. Never

DO YOUR FIGURING HERE.



49. What is the value of $\log_4 64$?

- A. 3
- B. 4
- C. 8
- D. 10
- E. 16

DO YOUR FIGURING HERE.

50. How many different positive three-digit integers can be formed if the three digits 3, 4, and 5 must be used in each of the integers?

- F. 6
- G. 8
- H. 12
- J. 15
- K. 24

51. Which of the following is the set of all real numbers x such that $x - 3 < x - 5$?

- A. The empty set
- B. The set containing only zero
- C. The set containing all nonnegative real numbers
- D. The set containing all negative real numbers
- E. The set containing all real numbers

52. What is the slope of a line that is perpendicular to the line determined by the equation $7x + 4y = 11$?

- F. -4
- G. $-\frac{7}{4}$
- H. $\frac{11}{4}$
- J. 4
- K. $\frac{4}{7}$

53. If each element in a data set is multiplied by 3, and each resulting product is then reduced by 4, which of the following expressions gives the mean of the resulting data set in terms of x ?

- A. x
- B. $3x - 4$
- C. $x + \frac{4}{3}$
- D. $\frac{x}{3} + 4$
- E. $x + \frac{4}{3}$

2**2**

54. If $\cos \theta = -\frac{3}{5}$ and $\frac{\pi}{2} < \theta < \pi$, then $\tan \theta = ?$

F. $-\frac{5}{4}$

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

H. $-\frac{3}{5}$

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

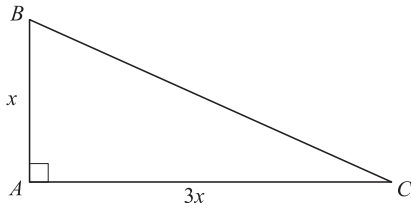
K. $\frac{4}{3}$

DO YOUR FIGURING HERE.

55. The City Council has approved the construction of a circular pool in front of City Hall. The area available for the pool is a rectangular region 12 feet by 18 feet, surrounded by a brick wall. If the pool is to be as large as possible within the walled area, and edge of the pool must be at least 2 feet from the wall all around, how many feet long should the radius of the pool be?
- A. 14
 B. 10
 C. 7
 D. 5
 E. 4
56. Kate rode her bicycle to visit her grandmother. The trip to Kate's grandmother's house was mostly uphill, and took m minutes. On the way home, Kate rode mostly downhill and was able to travel at an average speed twice that of her trip to her grandmother's house. Which of the following expresses the total number of minutes that Kate bicycled on her entire trip?
- F. $3m$
 G. $2m$
 H. $m + \frac{1}{2}$
 J. $\frac{3m}{2}$
 K. $\frac{m}{2}$
57. Let n equal $3a + 2b - 7$. What happens to the value of n if the value of a increases by 2 and the value of b decreases by 1?
- A. It is unchanged.
 B. It decreases by 1.
 C. It increases by 4.
 D. It decreases by 4.
 E. It decreases by 2.

2**2**

58. In the figure below, $\triangle ABC$ is a right triangle with legs that measure x and $3x$ inches, respectively. What is the length, in inches, of the hypotenuse?



- F. $\sqrt{10}x$
G. $\sqrt{3}x$
H. $\sqrt{2}x$
J. $2x$
K. $4x$
59. If the edges of a cube are tripled in length to produce a new, larger cube, then the larger cube's surface area is how many times larger than the smaller cube's surface area?
- A. 3
B. 9
C. 18
D. 27
E. 54
60. Considering all values of a and b for which $a + b$ is at most 9, a is at least 2, and b is at least -2 , what is the minimum value of $b - a$?
- F. 0
G. -7
H. -11
J. -13
K. -15

DO YOUR FIGURING HERE.

END OF THE MATHEMATICS TEST.
STOP! IF YOU HAVE TIME LEFT OVER, CHECK YOUR WORK ON THIS SECTION ONLY.

3

3

READING TEST

35 Minutes—40 Questions

DIRECTIONS: This test includes four passages, each followed by ten questions. Read the passages and choose the best answer to each question. After you have selected your answer, fill in the corresponding bubble on your answer sheet. You should refer to the passages as often as necessary when answering the questions.

PASSAGE I

PROSE FICTION: *This passage is adapted from The Story of a Bad Boy by Thomas Bailey Aldrich © 1869.*

I call my story the story of a bad boy, partly to distinguish myself from those faultless young gentlemen who generally figure in narratives of this kind, and partly because I really was not an angel. I may truthfully say I was an amiable, impulsive lad, and no hypocrite. I didn't want to be an angel; I didn't think the sermons presented to me by the Reverend Hawkins were half so nice as Robinson Crusoe; and I didn't send my pocket-change to the needy, but spent it on peppermint-drops and taffy candy. In short, I was a real human boy, such as you may meet anywhere in New England, and not like the impossible boy in a storybook.

Whenever a new scholar came to our school, I used to confront him at recess with the following words: "My name's Tom Bailey; what's your name?" If the name struck me favorably, I shook hands with the new pupil cordially; but if it didn't, I would turn and walk away, for I was particular on this point. Such names as Higgins, Wiggins, and Spriggins were offensive affronts to my ear; while Langdon, Wallace, Blake, and the like, were passwords to my confidence and esteem.

I was born in Rivermouth almost fifty years ago, but, before I became very well acquainted with that pretty New England town, my parents moved to New Orleans, where my father invested in the banking business. I was only eighteen months old at the time of the move, and it didn't make much difference to me where I was because I was so small; but several years later, when my father proposed to take me North to be educated, I had my own views on the subject. I instantly kicked over the little boy, Sam, who happened to be standing by me at the moment, and, stamping my foot violently on the floor, declared that I would not be taken away to live among a lot of Yankees!

You see I was what is called "a Northern man with Southern principles." I had no recollection of New England: my earliest memories were connected with the South. I knew I was born in the North, but hoped nobody would find it out. I never told my schoolmates I was a Yankee because they talked about

the Yankees in such a scornful way it made me feel that it was quite a disgrace not to be born in the South. And this impression was strengthened by Aunt Chloe, who said, "there wasn't no gentlemen in the North no way."

To be frank, my idea of the North was not at all accurate. I supposed the inhabitants were divided into two classes—hunters and schoolmasters. I pictured it to be winter pretty much all the year round. The prevailing style of architecture I took to be log-cabins.

With this picture of Northern civilization in my eye, the reader will easily understand my terror at the bare thought of being transported to Rivermouth to school, and possibly will forgive me for kicking over little Sam, when my father announced this to me. As for kicking little Sam, I always did that, more or less gently, when anything went wrong with me.

My father was greatly perplexed and troubled by this violent outbreak. As little Sam picked himself up, my father took my hand in his and led me thoughtfully to the library. I can see him now as he leaned back in the bamboo chair and questioned me. He appeared strangely puzzled on learning the nature of my objections to going North, and proceeded at once to knock down all my pine log houses, and scatter all the hunters and schoolmasters with which I had populated the greater portion of the Eastern and Middle States.

"Who on earth, Tom, has filled your brain with such silly stories?" asked my father calmly.

"Aunt Chloe, sir; she told me."

My father devoted that evening and several subsequent evenings to giving me a clear and succinct account of New England: its early struggles, its progress, and its present condition—faint and confused glimmerings of which I had obtained at school, where history had never been a favorite pursuit of mine.

I was no longer unwilling to go North; on the contrary, the proposed journey to a new world full of wonders kept me awake nights. Long before the moving day arrived I was eager to be off. My impatience was increased by the fact that my father had purchased for me a fine little Mustang pony, and shipped it to Rivermouth two weeks before the date set for our own journey. The pony completely resigned me to the situation. The pony's name was Gitana, which is the Spanish for "gypsy," so I always called her Gypsy.

GO ON TO THE NEXT PAGE.

3

3

Finally the time came to leave the vine-covered mansion among the orange-trees, to say goodbye to little Sam (I am convinced he was heartily glad to get rid of me), and to part with Aunt Chloe. I imagine them standing by the open garden gate; the tears are rolling down Aunt Chloe's cheeks; Sam's six front teeth are glistening like pearls; I wave my hand to him manfully. Then I call out "goodbye" in a muffled voice to Aunt Chloe; they and the old home fade away. I am never to see them again!

1. Which of the following persons mentioned in the passage had the greatest effect on the narrator's negative views of life in the North?
 - A. Sam
 - B. Aunt Chloe
 - C. Tom Bailey
 - D. Reverend Hawkins
2. As it is used in line 18, *cordially* most nearly means:
 - F. angrily.
 - G. strikingly.
 - H. sincerely.
 - J. offensively.
3. It can reasonably be inferred from the passage that, as compared to most boys in New England, the narrator was:
 - A. no better behaved, but no worse behaved.
 - B. more angelic and innocent.
 - C. less hypocritical but more troublesome.
 - D. very different in many ways.
4. According to the passage, which of the following names were acceptable to the narrator?
 - I. Higgins
 - II. Blake
 - III. Wallace
 - F. I only
 - G. III only
 - H. II and III only
 - J. I and III only
5. The narrator's initial feeling toward moving to Rivermouth can best be described as:
 - A. indifferent, as he was too young to know any better.
 - B. reluctant until his father dispelled inaccuracies about life in the North.
 - C. apprehensive because he would be forced to leave his pony, Gypsy, behind.
 - D. excited until he realized that he would have to part with Aunt Chloe and little Sam.
6. As he is revealed in the conversation he has with his son, the narrator's father can best be characterized as:
 - F. understanding and patient.
 - G. stern and unforgiving.
 - H. proud but uneducated.
 - J. ignorant but affectionate.
7. The narrator's point of view is that of:
 - A. a young boy.
 - B. an adult.
 - C. an omniscient observer.
 - D. a psychologist.
8. The sixth paragraph suggests that the narrator's relationship with little Sam is primarily characterized by:
 - F. the narrator's patience with Sam.
 - G. Sam's annoyance with the narrator.
 - H. the narrator's abuse of Sam.
 - J. Sam's respect for the narrator.
9. It can reasonably be inferred that, when the narrator describes himself as "a Northern man with Southern principles," he means that:
 - A. even though he now lives in the South, he has retained and is proud of his Northern heritage.
 - B. he is first and foremost a Yankee, as he was born in the North, reluctantly adapting to a Southern lifestyle.
 - C. he has successfully reconciled his conflicting allegiances, subscribing to some Northern values and some Southern values.
 - D. although he was born in New England he identifies more closely with the way of life and culture of the South.
10. It can reasonably be inferred that the author included the second paragraph to:
 - F. support the narrator's assertion that he is a "faultless young gentleman."
 - G. show just how much confidence and self-esteem the narrator possesses.
 - H. contradict the narrator's belief that he was not a well-behaved, amiable boy.
 - J. provide an example of how the narrator is both friendly and fickle.

3

3

PASSAGE II

SOCIAL SCIENCE: *This passage is adapted from The American Republic: Constitution, Tendencies, and Destiny by O.A. Brownson © 1866.*

The ancients summed up the whole of human wisdom in the maxim “Know Thyself,” and certainly there is for an individual no more important and no more difficult knowledge, than knowledge of himself.

5 Nations are only individuals on a larger scale. They have a life, an individuality, a reason, a conscience, and instincts of their own, and have the same general laws of development and growth, and, perhaps, of decay, as the individual man. Equally important, and no less
10 difficult than for the individual, is it for a nation to know itself, understand its own existence, powers and faculties, rights and duties, constitution, instincts, tendencies, and destiny. A nation has a spiritual as well as a material existence, a moral as well as a physical
15 existence, and is subjected to internal as well as external conditions of health and virtue, greatness and grandeur, which it must in some measure understand and observe, or become lethargic and infirm, stunted in its growth, and end in premature decay and death.

20 Among nations, no one has more need of full knowledge of itself than the United States, and no one has, to this point, had less. It has hardly had a distinct consciousness of its own national existence, and has lived the naive life of the child, with no severe trial,
25 till the recent civil war, to throw it back on itself and compel it to reflect on its own constitution, its own separate existence, individuality, tendencies, and end. The defection of the slaveholding States, and the fearful struggle that has followed for national unity and
30 integrity, have brought the United States at once to a distinct recognition of itself, and forced it to pass from thoughtless, careless, heedless, reckless adolescence to grave and reflecting manhood. The nation has been suddenly compelled to study itself, and from now
35 on must act from reflection, understanding, science, and statesmanship, not from instinct, impulse, passion, or caprice, knowing well what it does, and why it does it. The change which four years of civil war have wrought in the nation is great, and is sure to give it the
40 seriousness, the gravity, and the dignity it has so far lacked.

Though the nation has been brought to a consciousness of its own existence, it has not, even yet, attained a full and clear understanding of its own
45 national constitution. Its vision is still obscured by the floating mists of its earlier morning, and its judgment rendered indistinct and indecisive by the wild theories and fancies of its childhood. The national mind has been quickened, the national heart has been opened,
50 the national disposition prepared, but there remains the important work of dissipating the mists that still linger, of brushing away these wild theories and fancies, and of enabling it to form a clear and intelligent judgment of itself, and a true and just appreciation of
55 its own constitution tendencies.

As the individual states have vindicated their national unity and integrity, and are preparing to make a new start in history, nothing is more important than

60 that they should make that new start with a clear and definite view of their national constitution, and with a distinct understanding of their political mission in the future of the world. The citizen who can help his countrymen to do this will render them an important
65 service and deserve well of his country, though he may have been unable to serve in her armies and defend her on the battle-field. The work now to be done by American statesmen is even more difficult and more delicate than that which has been accomplished by our
70 brave armies. As yet the people are hardly better prepared for the political work to be done than they were at the outbreak of the civil war for the military work they have so nobly achieved. But, with time, patience, and good-will, the difficulties may be overcome, the errors of the past corrected, and the government placed
75 on the right track for the future.

11. The author’s tone toward the subject of the passage can best be characterized as:
- A. impassioned.
 - B. indifferent.
 - C. whimsical.
 - D. resigned.
12. The main idea of the passage can best be summarized by which of the following statements?
- F. The United States will forever be disposed to repeating political mistakes of the past.
 - G. A country has the responsibility of providing safety and stability to its citizens in the form of a national constitution.
 - H. It is imperative that the United States comprehend its identity as a nation, which can be accomplished through an understanding of its unique qualities.
 - J. The United States is not prepared or able to reunite as one nation after the ideological division that caused the Civil War.
13. As used in line 24 of the passage, *naive* most nearly means:
- A. aware.
 - B. inexperienced.
 - C. difficult.
 - D. incapable.
14. According to the passage, what caused the United States to “pass from thoughtless, careless, heedless, reckless adolescence to grave and reflecting manhood (lines 31–33)?”
- F. A difficult and controversial legal trial that captured the whole country’s attention
 - G. The ratification of the final draft of the constitution
 - H. International questioning regarding the integrity and viability of America’s government
 - J. The secession of the southern states and the conflict that ensued

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15. Which of the following statements best summarizes the main point of the first paragraph?
- A. Understanding one's own strengths and weaknesses is a difficult yet important task, not only for individuals, but for nations as a whole.
 - B. The spirituality of individuals should be dictated by the nation's government.
 - C. Comparing a nation to a person is an inaccurate analogy that only leads to confusion and misrepresentation.
 - D. The United States was founded upon a principle of law originating from the ancient world.
16. According to the author, a citizen who helps his countrymen to develop "a distinct understanding of their political mission in the future of the world" (lines 61–62) should be:
- F. enlisted in the military.
 - G. ignored.
 - H. revered.
 - J. tried for treason.
17. According to the last paragraph, what does the author believe will happen if the United States is able to fully understand its own constitution and political duty on a global scale?
- A. Disagreements will be resolved diplomatically, rendering warfare obsolete.
 - B. The nation, as a whole, will reconcile its previous missteps and have a more hopeful future.
 - C. Citizens will be no more prepared for future conflicts and understanding the past and present of the nation's politics will have no benefit.
 - D. The government, realizing the inadequacies of the constitution, will take the necessary steps to improve upon it.
18. As it is used in line 56, the word *vindicated*, in this context, most nearly means:
- F. justified.
 - G. weakened.
 - H. squandered.
 - J. separated.
19. A recurring metaphor the author uses in the piece compares the United States to:
- A. a battlefield, where two separate armies are clashing over political issues.
 - B. an ancient sage, who is admired for his great knowledge and wisdom.
 - C. a scholar, who is dedicated to the pursuit of higher education.
 - D. a man, who begins as an immature child and grows into a wise and experienced adult.
20. According to the passage, what does the author assert will happen to the United States if the nation does not become more aware of itself and its role in the global community?
- F. The country will erupt in a civil war.
 - G. Its citizens, no longer having a conscience or moral compass, will rebel against the government.
 - H. The nation will become weak, leading to its eventual downfall.
 - J. Its strength and power will continue to grow, becoming a global leader in industry.

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PASSAGE III

HUMANITIES: *William Faulkner: Great Southern Author*

Born in Mississippi in 1897, William Faulkner is touted as the master of such revolutionary literary devices as stream of consciousness, multiple narra-
 5 tions, and time-shifts within a narrative. During a career that spanned more than three decades, Faulkner produced literary works filled with emotional turmoil and unflinching honesty. His unique interpretation of history is highlighted in the symbolism and imagery of his writing. It has also been argued that Faulkner's
 10 works are some of the best representations of Southern Gothic literature ever written.

It is clear that Faulkner's Deep South roots greatly influenced his writing. He was a prolific writer whose works both parallel and depart from popular myths of
 15 southern culture. Faulkner's remarkable understanding of race relations and his clever satire of Southern characters stemmed from his memories of growing up in rural Mississippi. He set many of his short stories and novels in the fictional Yoknapatawpha County, based
 20 on what Faulkner referred to as "my own little postage stamp of native soil," Lafayette County, Mississippi. It was there, immersed in traditional southern lore, that William Faulkner began to write of the great political, social, and economic transformation taking place in the
 25 Deep South, depicting traditional society in timeless human dramas.

Faulkner came from an old and relatively prominent Southern family. He grew up surrounded by traditional folklore, family stories, accounts from the
 30 Civil War, and lectures about being a Southern gentleman. In his works, Faulkner examined how traditional values and beliefs affected Southern society after the Civil War. Faulkner particularly abhorred the rampant racism and abuse that African Americans suffered in
 35 the South. Although Faulkner's novels do not shy away from describing the brutality and anguish that life can bring, his works are filled with profound compassion and humor. Faulkner refused to avoid painful or controversial issues and he was intrigued with understanding
 40 human freedom. His work explores, condemns, and analyzes obstructions to human freedom and happiness by examining racism, shame, fear, false pride, and abstract ideals. Much of Faulkner's exploration is done using brilliant symbolism and exquisite dialogue.
 45 For example, his novel *The Sound and the Fury*, published in 1929, dealt with the painful demise of a distinguished southern family and demonstrated a rich variety of literary styles, relying most heavily on stream-of-consciousness writing, in which a character's
 50 thoughts are conveyed in a manner roughly akin to the way the human mind actually works.

Faulkner's mastery of unique literary styles was formally recognized when, much to his surprise, he was awarded the Nobel Prize for literature in 1949.
 55 Always his own harshest critic, William Faulkner considered many of his books failures because they did not live up to his high expectations. However, it is clear that Faulkner's experimental literary techniques simultaneously perplexed and challenged his readers, who were
 60 more often than not inspired by his insightful analysis

of the human spirit. Faulkner continued to explore the interconnections between his characters and their counterparts in the real world until his death in 1962.

In the months before his death, Faulkner updated
 65 his will, leaving the bulk of his manuscripts to the Faulkner Foundation at the University of Virginia, where he had been appointed its first Writer-in-Residence. While the original documents are protected, electronic versions of the collection are freely available
 70 to scholars of great Southern literature and others interested in gaining additional insight into the life's work of a truly revolutionary American author.

21. As it is used in line 22, the word *immersed* most nearly means:
 A. depicted.
 B. submerged.
 C. related.
 D. interpreted.
22. The author describes Faulkner's writing as all of the following EXCEPT:
 F. symbolic.
 G. honest.
 H. malicious.
 J. tumultuous.
23. One of the main ideas of the passage is that:
 A. Faulkner was devoted to his southern roots.
 B. authors employed revolutionary literary devices.
 C. Faulkner was a prominent author with strong convictions.
 D. many of Faulkner's books were considered failures.
24. As it is used in line 33, the word *abhorred* most nearly means:
 F. greatly enjoyed.
 G. strongly disliked.
 H. firmly believed in.
 J. clearly misunderstood.
25. The author suggests which of the following about Faulkner's attitude toward racism in the South?
 A. He felt that racism was a necessary evil.
 B. He hated racism and sought to expose it in his writing.
 C. He shied away from any discussion of racism.
 D. He was not concerned about racism as a social issue.
26. The main emphasis of the fourth paragraph (lines 52–63) is to:
 F. provide support for Faulkner's belief that he was a failed author.
 G. question the claim that Faulkner was a master of unique literary styles.
 H. summarize the value and importance of Faulkner's vision as an author.
 J. sharpen the distinction between Faulkner's different techniques.

GO ON TO THE NEXT PAGE.

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27. With which of the following statements about Faulkner's literary style would the author most likely agree?
- A. It had never been utilized by authors of southern culture.
 - B. It was generally less effective than more traditional approaches.
 - C. It has often been employed by 20th-century authors.
 - D. It was an innovative approach to discussions of social issues.
28. The passage states that *The Sound and the Fury* depicted:
- F. the tragic downfall of a respected family.
 - G. the profound rise to freedom of Civil War slaves.
 - H. a harsh criticism of William Faulkner.
 - J. an inspirational look at southern life.
29. The author uses the term "counterparts" (line 63) most likely in order to:
- A. disprove the theory that fictional characters can be based on real people.
 - B. reveal the source of Faulkner's literary methods.
 - C. indicate that Faulkner's characters were often based on real people.
 - D. cast doubt on the idea that readers often identify with fictional characters.
30. Which of the following best states the main purpose of the passage?
- F. To suggest that some writers are more deserving of major literary awards.
 - G. To describe one man's desire to write about important social issues.
 - H. To review the use of certain literary devices in best-selling novels.
 - J. To illustrate one author's understanding of and commitment to his craft.

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PASSAGE IV

NATURAL SCIENCE: *Those Jellystone Bears*

Over the years, there have been countless fans of the classic Hanna-Barbera cartoon character Yogi Bear. The cartoon series enjoyed by young and old alike revolved mostly around the misadventures of this loveable bear and his sidekick Boo-Boo as they attempted to snag “pic-a-nic” baskets in the made-up land of Jellystone Park. It’s not often that people think about where the ideas for these cartoons characters come from, which brings up an interesting point: do bears actually search for food left in picnic baskets and unattended campsites? Anyone who has watched an episode of *Yogi Bear* can see that the bears’ behavior goes far beyond the limits of what is natural. The thing which must be explored, then, is which of those humorous antics were license on the part of Hanna-Barbera, and which were actually based on the bear’s normal behaviors.

Remarkably enough, bears have been known to seek out food from some unlikely sources, including picnic baskets, on top of their usual diet of berries, insects, and fish. Bears work throughout the summer and fall to build up fat stores so as to have energy enough to last them through their winter hibernations. Related to this is their need to replenish their depleted reserves when they wake up in the spring. Food is generally scarce in the early spring, and consequently they will gladly indulge in any foods that are high in proteins or fats. This is the main reason for many incidents involving bears entering campsites in search of food.

Although this behavior may seem strange, it is no more than the result of nature equipping bears with a variety of traits that allow them to remain well fed in increasingly human-populated habitats. Specifically, the American black bear, *Ursus americanus*, has color vision and has been observed by scientists using its color vision to distinguish between varying food items at close range. On top of this, all bears have an acute sense of smell and can use their especially sensitive lips to locate food. These sensory talents contribute to the bears’ remarkably high intelligence and curiosity, giving them the ability to open closed containers if they believe food is inside. Their exploratory and navigational skills are also worthy of note—most bears will maintain vast territories in order to obtain food from a variety of sources. Bears may even vary their sleep cycles in areas where there is a large degree of human activity, either feasting on road-side garbage during the day or scouring campsites for leftovers at night.

Yet another strange but true comparison is that Yogi and Boo-Boo have developed a social relationship much like the ones that will form between wild bears when several animals find themselves sharing a limited number of food sources. Generally solitary, black bears will create a hierarchical order in situations where paths cross in pursuit of food, so as to assure that all animals remain adequately fed. While it is unlikely that any black bears in nature would actually send a cub after a camper’s lunch, the behavioral relationships that might inspire the creation of such a story are indeed real.

60 Though many of the features of the comical Yogi Bear are likely the result of pure imagination, there is scientific fact behind at least some of his activities. Despite his appearance as a brown bear, the distinctive feeding behaviors of the American black bear match remarkably well with the habits of the cartoonish culprit. The uncanny truth behind little known scientific facts such as these should make everyone think twice the next time they sit down to watch Saturday morning cartoons.

31. The main idea of the passage is that:
- A. cartoon characters should never be based on real animals.
 - B. bears have some unique eating habits that are comically portrayed on television.
 - C. bears are generally solitary creatures, but they sometimes venture into human habitats.
 - D. there is little scientific data to support the comparison between “Yogi Bear” and the American black bear.
32. The passage states that bears maintain large territories in order to:
- F. avoid contact with humans.
 - G. develop stronger social relationships.
 - H. ensure that they have enough food.
 - J. more easily locate abandoned campsites.
33. The passage states that which of the following is a regular staple of a bear’s diet?
- A. Picnic baskets
 - B. Garbage
 - C. Insects
 - D. Small mammals
34. As it is used in line 37, the word *acute* most nearly means:
- F. small.
 - G. sharp.
 - H. reduced.
 - J. abnormal.

GO ON TO THE NEXT PAGE.

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35. According to the passage, which of the following traits CANNOT be attributed to bears?
- A. Intelligent
 - B. Curiosity
 - C. Solitary
 - D. Anti-social
36. With which of the following statements would the author most likely agree?
- F. Bears are particularly resourceful.
 - G. Bears cannot tolerate human food.
 - H. Bears eat voraciously throughout the winter.
 - J. Bears have only one method of obtaining food.
37. The author mentions all of the following as potential food sources for bears EXCEPT:
- A. garbage.
 - B. general stores.
 - C. fish and berries.
 - D. unattended campsites.
38. The passage suggests that one of the differences between the American black bear and other bears is the American black bear's:
- F. acute sense of smell.
 - G. abnormal sleep patterns.
 - H. color vision.
 - J. sensitive lips.
39. What is the main idea of the second paragraph (lines 18–29)?
- A. Despite the scarcity of food in the spring, most bears avoid human contact.
 - B. Bears must sometimes supplement their regular diets with food found near humans.
 - C. Bears engage in strange behaviors to maintain social order.
 - D. It is important that humans avoid any contact with bears during the summer and fall.
40. One of the main observations made in the next-to-last paragraph (lines 49–59) is that:
- F. black bears often rely on their cubs to secure food.
 - G. black bears will act as a group in order to secure food.
 - H. black bears are incapable of securing food without help from humans.
 - J. black bears secure food in a manner completely unique to the species.

END OF THE READING TEST.

STOP! IF YOU HAVE TIME LEFT OVER, CHECK YOUR WORK ON THIS SECTION ONLY.

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4

SCIENCE REASONING TEST*35 Minutes—40 Questions*

DIRECTIONS: This test includes seven passages, each followed by several questions. Read the passage and choose the best answer to each question. After you have selected your answer, fill in the corresponding bubble on your answer sheet. You should refer to the passages as often as necessary when answering the questions. You may NOT use a calculator on this test.

PASSAGE I

Scientists have observed rapid eutrophication of a local lake, at a rate much higher than that of other lakes in the area. Eutrophication is the aging of a lake, resulting in increased levels of plant life and accumulated sediments, brought on by a build-up of nutrients such as nitrates and phosphates. Rapid eutrophication is harmful, as it leads to the dying off of cold water fish such as trout. Researchers performed the following experiments to determine the possible source of the increased nitrates and phosphates.

Experiment 1

Scientists suspected that one source of nutrients was a feeder stream which intercepts run-off from farmland where pesticides and animal waste are found. Water samples were obtained over several days from that stream (Feeder A) as well as another feeder stream (Feeder B) not near the farm. Results are displayed in Table 1.

Table 1		
Day	Phosphate concentration (mg/L)	Nitrate concentration (mg/L)
Feeder A		
Day 1	20.7	43.2
Day 2	13.2	44.5
Day 3	35.6	41.6
Day 4	42.3	58.0
Feeder B		
Day 1	10.4	13.2
Day 2	11.5	13.4
Day 3	7.9	12.9
Day 4	10.2	11.4

Experiment 2

The scientists also surmised that another possible source of harmful nutrients entering the lake was run-off from a golf course adjacent to the lake where fertilizers were applied. Water samples were obtained from the lake at various distances (0 meters, 100 meters and 200 meters) from the golf course on four successive days, and the levels of chlorophyll, phosphates, and nitrates were measured. The results are depicted in Table 2.

Table 2			
Day	Chlorophyll level (PPB)	Phosphate concentration (mg/L)	Nitrate concentration (mg/L)
0 m			
Day 1	38.9	35.6	52.3
Day 2	39.1	42.3	48.7
Day 3*	38.8	46.9	70.8
Day 4	40.2	57.0	61.6
100 m			
Day 1	30.3	31.8	42.4
Day 2	29.0	29.4	36.6
Day 3*	29.2	30.1	45.2
Day 4	30.4	37.9	44.1
200 m			
Day 1	26.5	25.3	33.9
Day 2	26.8	24.6	33.2
Day 3*	26.4	25.5	34.6
Day 4	27.0	24.2	35.3

Note: *Fertilizer was applied to the golf course on the morning of Day 3.

GO ON TO THE NEXT PAGE.

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- How do the designs of Experiments 1 and 2 differ in terms of sampling procedure?
 - In Experiment 1, the lake water was tested, while in Experiment 2 feeder stream water was tested.
 - In Experiment 2, lake water was tested, while run-off water was tested in Experiment 1.
 - In Experiment 1, only phosphate concentration was tested, while in Experiment 2, only nitrate concentration was tested.
 - In Experiment 2, chlorophyll level was tested in addition to phosphates and nitrates, while in Experiment 1, it was not.
- What was the scientists' hypothesis concerning lake eutrophication in Experiment 1?
 - Run-off from farmland increases levels of phosphates and nitrates, speeding up the eutrophication process.
 - Fertilizer used on the golf course increases phosphate and nitrate levels in lake water.
 - Pesticides and animal waste entering the lake through a feeder stream hinder the eutrophication process.
 - Increases in phosphate and nitrate concentration lead to more plant and algae growth, increasing chlorophyll levels in the lake.
- Given the results of Experiments 1 and 2, all of the following would reduce the levels of phosphates and nitrates, and therefore the rate of eutrophication, of the lake EXCEPT:
 - decreasing the amount of fertilizer used on the lake golf course.
 - limiting use of pesticides on the farmland on the lake.
 - increasing the number of farms on the lake.
 - installing a filtration system to divert run-off from farmlands and the golf course away from the lake.
- According to Table 2, which of the following statements is NOT true?
 - Chlorophyll levels increase as distance to the golf course decreases.
 - Phosphate concentration is unaffected by fertilizer application.
 - Chlorophyll levels increase sharply the day after application of fertilizer on the golf course.
 - Nitrate concentration decreases as distance from golf course increases.
- Scientists suspect that leakage from sewage systems carrying wastewater from the houses on the lake also contributes to nutrient deposit in the lake. In order to test this hypothesis, what should the scientists do next?
 - Sample groundwater near the sewage systems, testing for phosphate and nitrate content.
 - Measure the chlorophyll levels at many more locations in the lake.
 - Test the nutrients in the drinking water of various houses around the lake.
 - Obtain nutrient content of fertilizer used on residential property.
- If scientists sampled lake water from a third location 300 meters from the golf course, which of the following would most likely represent the average phosphate level found there?
 - 35.3 mg/L
 - 30.6 mg/L
 - 26.2 mg/L
 - 20.1 mg/L

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PASSAGE II

Students in a science class collected soil samples from various locations in order to analyze the composition of the soil. They measured the percentage of the three types of soil minerals—sand, silt, and clay—in each sample. Their data is presented in Table 1. The students also measured the size of the mineral particles found in the soil samples. The particle size ranges are listed in Table 2.

Soil sample	Sand (%)	Clay (%)	Silt (%)
1	65	10	25
2	10	75	15
3	25	35	40
4	60	20	20
5	55	30	15

Type of mineral particle	Size range of particles (mm)
Sand	2.0–0.06 mm
Silt	0.06–0.002 mm
Clay	less than 0.002 mm

7. According to Table 1, Sample 3 was composed primarily of:
- sand and clay.
 - clay and silt.
 - silt and sand.
 - sand only.
8. Based on the data in Table 1, Sample 5 contained:
- more sand than silt.
 - more clay than sand.
 - less clay than silt.
 - less sand than silt.
9. Which soil sample is most likely to have an average mineral particle size of 1.3 millimeters?
- Sample 2
 - Sample 3
 - Sample 4
 - Sample 5
10. The students collected a sixth soil sample from a location near the location from which they collected Sample 4. Based on information in the passage, this sixth sample would contain mineral particles that were predominantly:
- smaller than 0.002 mm.
 - smaller than 0.06 mm.
 - larger than 0.06 mm.
 - larger than 2.0 mm.
11. Sample 2 would most likely, if measured, have an average mineral particle size of:
- 1.5 mm.
 - 1.0 mm.
 - 0.06 mm.
 - 0.001 mm.

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PASSAGE III

Students debate 4 hypotheses regarding the origin of the asteroid belt located between Mars and Jupiter, based on the following observations.

Observations

Observation 1—If all of the asteroids were gathered together into one object, the diameter of the object formed would be less than half the diameter of Earth’s Moon.

Observation 2—The total mass of the asteroid belt is only 4% that of the Moon. One asteroid alone, Ceres, contains $\frac{1}{3}$ of the total mass of the asteroid belt.

Observation 3—Asteroids are largely composed of silicate, with some deposits of iron and nickel, a composition proportionately similar to that of the terrestrial planets. Some asteroids also contain carbon and other elements.

Observation 4—There is a strong orbital resonance (overlapping gravity) with Jupiter in the region of the asteroid belt, which keeps the asteroids in an orbit around the sun.

Observation 5—In reality, asteroids within the belt are very far apart, not clustered together.

Observation 6—Within the early solar system, the velocity of collisions within the region of the asteroid belt was much higher than it is currently.

Hypothesis 1

All of the material that makes up the asteroids in the asteroid belt is similar to that of the material that makes up the terrestrial planets. The velocity of collisions in the early solar system was at one time high enough to break apart planets as they formed. Since one asteroid, Ceres, has $\frac{1}{3}$ the total mass of the belt, the asteroids are most likely the result of a partially formed planet that broke apart and became trapped in an orbit between Mars and Jupiter.

Hypothesis 2

The material that composes the asteroids is similar to that of the terrestrial planets. The belt likely formed during the same time that the planets were forming, and due to the strong orbital resonance with the gas giant Jupiter and high velocity collisions, chunks of the material were pulled away from various planets and trapped within orbit. This also explains the varying composition of the asteroids throughout the belt.

Hypothesis 3

The asteroids could not once have been a planet, because there is not enough material within the entire belt to form a planet-sized object. The lack of material, shown by the total diameter and mass of the objects within the belt, is proof that the asteroids are no more than large particles left over from the formation of the terrestrial planets from a single cloud of material.

Hypothesis 4

The asteroids most likely came from somewhere outside the solar system. As they passed through space at varying

intervals, they were trapped by the large orbital resonance of Jupiter and formed a “belt.” The vast distances between most of the asteroids in the belt are evidence that they did not come from a singular source, but arrived at different points in the belt’s development.

12. According to Hypothesis 2, most of the matter composing the asteroids in the belt came from:

F. Earth’s Moon.
G. a partially formed planet between Mars and Jupiter.
H. the same material that composes the terrestrial planets.
J. a planet outside of Earth’s Solar System.

13. Supporters of Hypothesis 1 would most likely agree that, at the time the asteroid belt formed the planets were:

A. still in the process of forming.
B. completely formed as they are seen today.
C. no more than a cloud of material in space.
D. all the size of asteroids.

14. Suppose that supporters of Hypothesis 2 suggested that the asteroid belt, when it was first formed, contained dense formations of ice and debris slightly bigger than current asteroids. Which of the following statements about the asteroids’ composition would be most consistent with their suggestion?

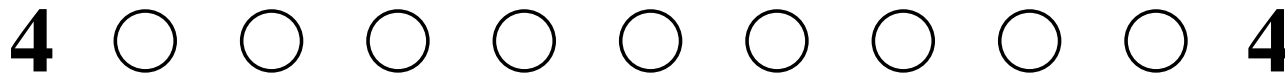
F. The asteroids’ ice content was constant after the belt was formed.
G. The asteroids’ ice content decreased after the belt was formed.
H. The asteroids’ ice content increased slowly after the belt was formed.
J. The asteroids’ ice content increased rapidly after the belt was formed.

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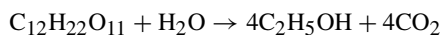
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15. Hypothesis 3 includes the assertion that the asteroids are made up of particles left over from a single cloud of material. This assertion explains which of the following observations?
- A. Observations 1 and 2
 - B. Observation 4 only
 - C. Observations 5 and 6
 - D. Observation 3 only
16. With which of the following statements would supporters of all four hypotheses agree?
- F. There is not enough scientific data to prove the existence of asteroids.
 - G. Asteroids are comprised of the same material as that which comprises Mars.
 - H. The asteroid belt lies entirely outside of the solar system.
 - J. The objects currently in an orbit between Mars and Jupiter are asteroids.
17. Consider the crust of a terrestrial planet to have a proportion of silicate to iron to nickel of 10,000:100:10. Based on the information in the passage, the ratio of these substances in the composition of an average asteroid is likely to be:
- A. 500:10:1.
 - B. 1,000:50:5.
 - C. 10,000:100:10.
 - D. 10,000:500:50.
18. Which of the following assumptions regarding the asteroid belt's origins is implicit in Hypothesis 1?
- F. The asteroid's composition is identical to that of the Moon.
 - G. The asteroids have several different sources of origin.
 - H. The asteroid belt is older than Jupiter.
 - J. The asteroid belt is younger than Jupiter.



PASSAGE IV

Yeast is a unicellular fungus, and is arguably one of the most important members of the fungus family, primarily because of its involvement in the process of *fermentation*. During this process, yeast breaks down sucrose into alcohol and carbon dioxide. The chemical equation for fermentation is given below. Scientists study how to induce fermentation in yeast most effectively.



Experiment 1

Since yeast needs sucrose to ferment and molasses is 60% sucrose, scientists first study yeast grown in molasses. Five test tubes are filled with .4 grams of yeast and various molasses concentrations. Carbon dioxide levels are measured as an indication of fermentation for each test tube after one day and again after two days. These levels are shown in Table 1.

Table 1			
	Molasses (%)	CO ₂ (mm)	
		Day 1	Day 2
1	6.2	2	9
2	12.5	6	32
3	25	24	78
4	50	69	94
5	100	86	100

Experiment 2

Five different test tubes are filled with .4 grams of yeast and various pure sucrose dilutions. Carbon dioxide levels are then measured as an indication of fermentation after one and two days. These levels are shown in Table 2.

Table 2			
	Sucrose(%)	CO ₂ (mm)	
		Day 1	Day 2
1	60	90	100
2	30	78	100
3	15	40	84
4	7.5	18	43
5	3.25	5	12

Experiment 3

Eight more test tubes were filled with .4 grams of yeast and a 15% sucrose solution. Various combinations of ammonium sulfate, potassium dihydrogen phosphate, minerals, and vitamins were added to the test tubes. Carbon dioxide levels were measured after one and two days. These levels are shown in Table 3.

Table 3				
	Sucrose (%)	Other materials added	CO ₂ (mm)	
			Day 1	Day 2
1	15	(NH ₂) ₂ SO ₄ , KH ₂ PO ₄	19	38
2	15	(NH ₂) ₂ SO ₄ , KH ₂ PO ₄ , minerals	28	40
3	15	(NH ₂) ₂ SO ₄ , KH ₂ PO ₄ , vitamins	31	52
4	15	(NH ₂) ₂ SO ₄ , KH ₂ PO ₄ , minerals, vitamins	100	100
5	15	minerals	3	12
6	15	vitamins	0	9
7	15	minerals, vitamins	0	14
8	15	—	4	5

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19. Based on Experiment 1, which test tube showed the highest level of fermentation after 1 day?
- A. Test tube 1
 - B. Test tube 2
 - C. Test tube 4
 - D. Test tube 5
20. Which of the following variables was controlled in Experiment 1?
- F. Amount of yeast
 - G. Percent of molasses
 - H. Percent of sucrose
 - J. Carbon dioxide levels
21. Which of the following is a weakness in the design of Experiment 3?
- A. Different amounts of yeast were used in each test tube.
 - B. Varying concentrations of sucrose were used.
 - C. There was no control group in which the experimental treatment was not applied.
 - D. All possible combinations of nutrients were not tested.
22. Which of the following is the most likely reason that a 15% sucrose solution was used in Experiment 3? Results showed that:
- F. in experiment 1, yeast grew most efficiently in a 15% sucrose solution.
 - G. yeast produced the most carbon dioxide in a 15% sucrose solution in Experiment 2.
 - H. an amount of sucrose greater than 15% did not increase carbon dioxide production in either Experiment 1 or Experiment 2.
 - J. a 15% sucrose solution was the minimum concentration needed to produce yeast growth.
23. Based on Experiments 1 and 2, one can infer that, as compared to molasses, pure sucrose:
- A. is more effective at inducing fermentation in yeast.
 - B. is less effective at inducing fermentation in yeast.
 - C. is exactly as effective at inducing fermentation in yeast.
 - D. does not induce fermentation in yeast.
24. In order for scientists to decide which conditions produce the most efficient growth of yeast, which of the following experiments would most likely need to be completed next?
- F. Varying the amount of yeast added to the test tubes and repeating the steps of Experiment 3
 - G. Repeating Experiments 1 through 3, measuring for alcohol content rather than carbon dioxide
 - H. Measuring yeast growth in a solution of pure water
 - J. Testing varying sucrose concentrations with added nutrients of ammonium sulfate, potassium dihydrogen phosphate, minerals, and vitamins in a fourth experiment.

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PASSAGE V

Tenebrio molitor is an arthropod insect which, like 90% of all insects, undergoes the process of complete metamorphosis, meaning that it passes through four life stages: egg, larva, pupa, and adult. In the larval stage the insect is commonly known as a mealworm; as a full adult it is a darkling beetle. Figure 1 shows the four stages of the *T. molitor* life cycle (x-axis), as well as data for minimum and maximum days spent in each stage of metamorphosis for *T. molitor* that were raised by students in a lab.

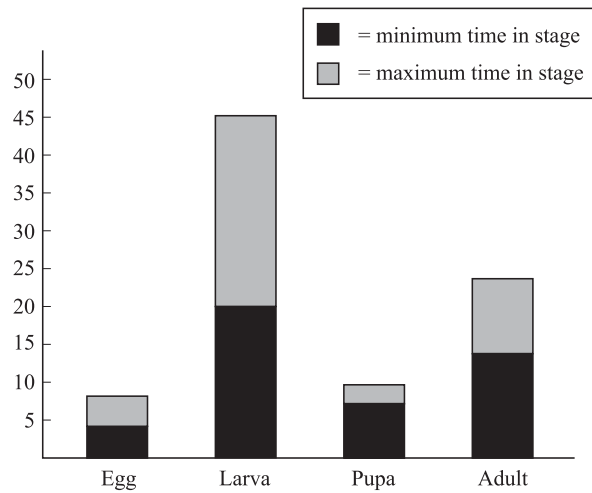


Figure 1

Table 1 includes data recorded for four different colonies of *T. molitor* raised by students in a lab, including the type of food each colony was given, beginning larval length, duration of time in larval and pupal stages, and final adult length. It was decided that the colonies would be given only one type of food source: either a fruit, a vegetable, or one of two whole grains. Apple was chosen as the fruit, carrot for the vegetable, and oats and wheat for the two whole grains.

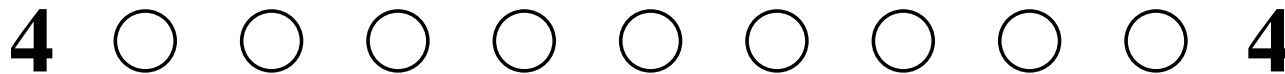
Colony	Diet	Avg. larval size (mm)	Avg. duration in larval stage (days)	Avg. duration in pupal stage (days)	Avg. adult size (mm)
1	Apple	25.8	36.9	7.5	19.3
2	Carrot	24.5	39.4	8.4	19.5
3	Oat	24.9	49.1	9.2	20.6
4	Wheat	25.3	57.2	10.8	21.3

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25. According to the passage, the *Tenebrio molitor* beetle must spend at least 20 days in what stage of metamorphosis?
- A. Egg stage
 - B. Larval stage
 - C. Pupal stage
 - D. Adult stage
26. According to Table 1, which of the following has no effect on the final adult size of the *Tenebrio molitor* beetle?
- F. Larval size
 - G. Duration in larval stage
 - H. Duration in pupal stage
 - J. Diet
27. A *Tenebrio molitor* specimen has been in the same metamorphic stage for 12 days. According to Figure 1, in which stage is it possible for the specimen to be?
- I. Egg stage
 - II. Larval stage
 - III. Pupal stage
 - IV. Adult stage
- A. II only
 - B. I and II only
 - C. IV only
 - D. II and IV only
28. Which one of the following hypotheses about *Tenebrio molitor* growth is supported by the data presented in Table 1?
- F. Larger larval *T. molitor* yield larger *T. molitor* beetles.
 - G. *T. molitor* larvae fed carrots will spend a greater amount of time in the larval stage than those larvae fed apples.
 - H. The more time a *T. molitor* spends in the pupal stage, the smaller the adult beetle will be.
 - J. Larger *T. molitor* beetles spend less time, on average, in the pupal stage of metamorphosis.
29. A fifth colony of *Tenebrio molitor* was raised on barley, another whole grain, in the same lab. Assuming this colony behaved similarly to the other colonies raised on whole grains, what was most likely the average size, in millimeters, of the adults in the fifth colony?
- A. 17.6
 - B. 18.1
 - C. 19.2
 - D. 20.9



PASSAGE VI

Oil and natural gas stores are formed naturally in reservoirs. However, these reservoirs are not like the giant man-made lakes that might come to mind; they are underground. In fact, a reservoir occurs in a rock that looks on the surface like any other. The oil and gas pool in millions of tiny pores in the rock. Porous rocks include sandstone, limestone, shale, and many more. There are several factors affecting *porosity* (the ability to store fluid in the open spaces located between rock particles). Among these factors are the nature and characteristics of the sand and other sediment that accumulate to form rocks. The sand particle size is not critical to porosity, but the uniformity or sorting of the sand grains greatly effects porosity. Uniform or well-sorted sand will tend to be more porous than poorly sorted sand.

Experiment 1

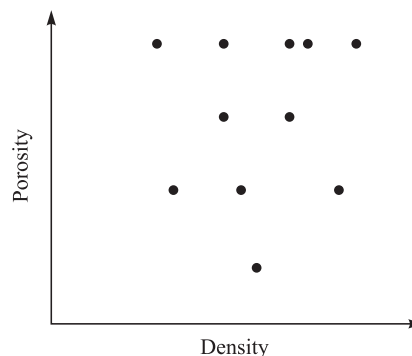
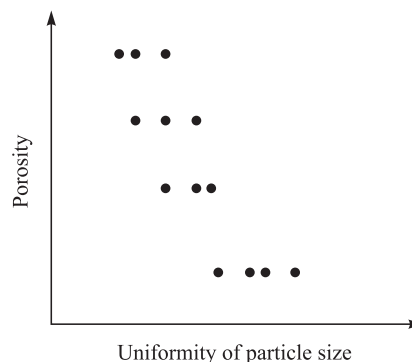
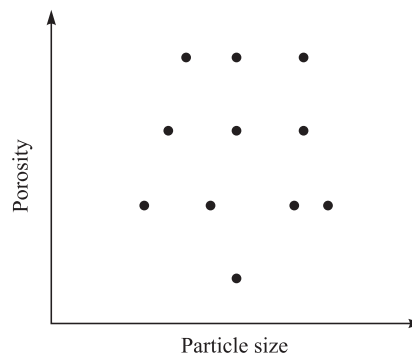
In a laboratory, a scientist wanted to determine the porosity of 4 samples of different rocks. The scientist recorded the mass of the rock samples prior to the experiment. To measure porosity, the samples were soaked in water and the mass of the samples was recorded periodically. A highly porous rock would have a significant increase in mass the longer it soaked in water, eventually reaching the point at which it could no longer absorb any more water (saturation point). The data was recorded in Table 1.

Table 1				
Sample (volume of sample cm ³)				
Time (hr)	Limestone (33 cm ³)	Sandstone (27 cm ³)	Shale (30 cm ³)	Pumice (25 cm ³)
0 (starting mass)	27 g	24 g	25 g	34 g
2	29 g	26 g	28 g	35 g
4	30 g	28 g	30 g	36 g
6	31 g	29 g	31 g	37 g
12	32 g	30 g	32 g	38 g
Porosity (%)	15	19	23	12

Experiment 2

Geologists in Arizona were interested in the porosities of different varieties of sandstone. They documented the relationship between porosity, density, sand particle size, and the uniformity or sorting of the sand grains. The geologists found that, in general, neither density nor particle size affected the porosity if the particles were uniform. However, they did find that in samples with a wide variety of particle sizes, the porosity was generally lower. Also, the presence of contaminants such as clay or silt negatively

affected the porosity. The geologists recorded their results in the following diagrams.



30. Which of the following properties would likely result in a porous rock on the basis of the results of Experiment 2?
- F. High density; small particle size
 - G. Uniform particle size; high density
 - H. Uniform particle size; low concentration of contaminants
 - J. Large particle size; low density

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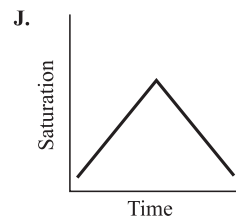
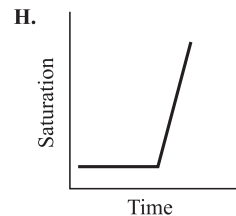
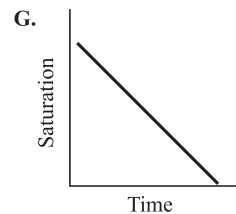
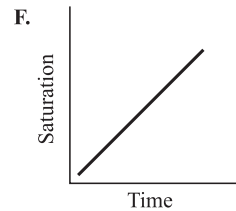
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31. If a sample of rock is studied and found to possess medium-sized particles with a high level of uniformity, the porosity of the rock:
- A. will likely be low.
 - B. will likely be high.
 - C. will likely be determined by density.
 - D. cannot be determined with the given information.

32. Based on the passage, the relationship between porosity and particle uniformity is best described as:
- F. inverse.
 - G. exponential.
 - H. direct.
 - J. unrelated.

33. A company wants to investigate the idea of creating a large oil reserve to stockpile oil in case of a shortage. Based on the results of Experiment 1, which of the following rock types would be the best choice for a storage medium?
- A. Limestone
 - B. Shale
 - C. Sandstone
 - D. Granite

34. Which of the following graphs best represents the relationship between time elapsed and saturation of the rocks observed in Experiment 1?



35. Which of the following findings would NOT be consistent with the information provided about rock porosity?
- A. A rock with a low density will always be highly porous.
 - B. A rock with uniform particle size will likely be more porous than a rock with varying particle size.
 - C. Particle uniformity is a major determining factor of rock porosity.
 - D. Rocks can store liquids such as oil and water.

GO ON TO THE NEXT PAGE.

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PASSAGE VII

Sedimentary layers form when changes in the environment cause changes in the top soil of the area. As pressure is applied from the additional layers, fossils are formed. Figure 1 shows the different depths and pressure conditions under which different Fauna (categories of fossils) are formed.

A fossil's formation stage (a measure of the age of the fossil) is classified on a scale of early (first recovered) to late (deeply buried). Table 1 lists the grades of Fauna A–I from Figure 1. Figure 2 shows characteristic compounds that may be found in fossils of a given stage.

Table 1	
Fauna	Fossilized stage*
A	Early
B	Late
C	Late
D	Early to moderate
E	Moderate
F	Early
G	Early
H	Late
I	Moderate to late

Note: *Fossilized stage is a measure of the age of the fossil.

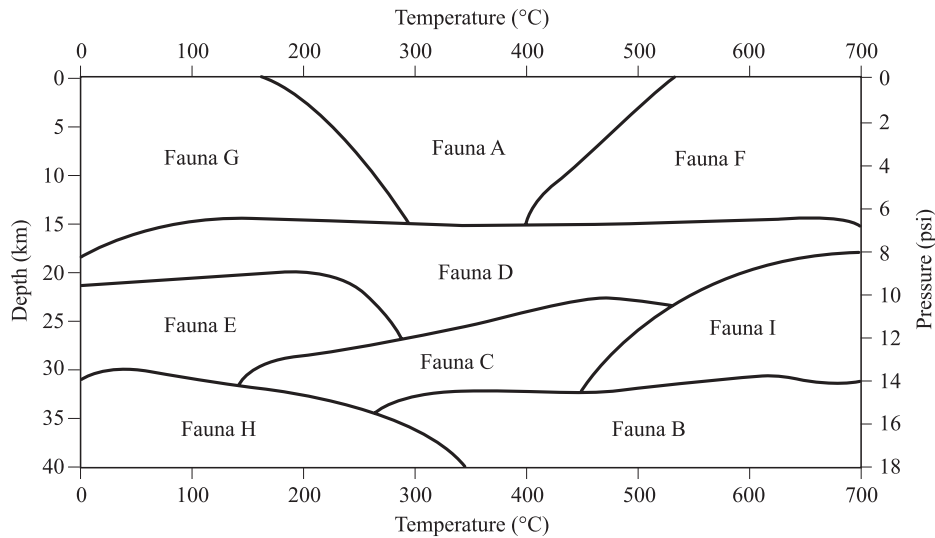


Figure 1

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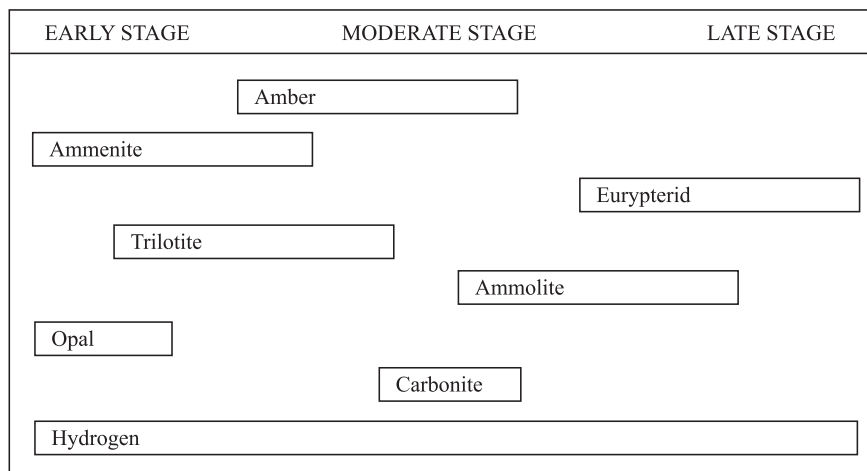


Figure 2

36. According to Figure 2, which of the following compounds would most typically be found only in rocks at the moderate stage?
- F. Ammonite
G. Eurypterid
H. Carbonite
J. Clay
37. According to Figure 1, a Fauna H rock would most likely form under which of the following pressure and temperature conditions?
- | Pressure | Temperature |
|-----------|-------------|
| A. 4 psi | 200°C |
| B. 8 psi | 500°C |
| C. 12 psi | 350°C |
| D. 16 psi | 150°C |
38. Figure 1 indicates that as depth increases, pressure:
- F. increases only.
G. decreases only.
H. remains the same.
J. decreases, then increases.
39. According to Figure 2, the presence of which of the following compounds in a fossil is the *least* helpful when determining the fossil's stage?
- A. Hydrogen
B. Trilolite
C. Amber
D. Eurypterid
40. *Cast fossils* are formed when material is placed into a depression in a rock near the surface. They are formed at very high temperatures and low pressures. According to Figure 1, cast fossils are most likely formed in which of the following faunas?
- F. Fauna D
G. Fauna H
H. Fauna B
J. Fauna F

**END OF THE SCIENCE REASONING TEST.
STOP! IF YOU HAVE TIME LEFT OVER, CHECK YOUR WORK ON THIS SECTION ONLY.**

WRITING TEST PROMPT

DIRECTIONS: This test is designed to assess your writing skills. You have 30 minutes to plan and write an essay based on the stimulus provided. Be sure to take a position on the issue and support your position using logical reasoning and relevant examples. Organize your ideas in a focused and logical way, and use the English language to clearly and effectively express your position.

When you have finished writing, refer to the Scoring Rubrics discussed in the Introduction (page 4) to estimate your score.

Some high schools require students and staff to wear name badges any time they are on school property. Some people feel this is an effective measure to take against unauthorized school visitors. Opponents say that so many students will refuse to wear the badge or simply leave it at home that identifying unwanted visitors will be made no easier.

In your opinion, should schools mandate that all students and staff wear a name badge to aid in identifying unaffiliated visitors?

In your essay, take a position on this question. You may write about one of the points of view mentioned above, or you may give another point of view on this issue. Use specific examples and reasons for your position.

ANSWER KEY**English Test**

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

Mathematics Test

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

Reading Test

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

Science Reasoning Test

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