## EXAMINEE STATEMENT, CERTIFICATION, AND SIGNATURE

1. Read the following Statement: By opening this test booklet, I agree to the terms and conditions communicated to me prior to this examination, including the rules regarding prohibited behavior and proper testing conduct for examinees. I understand that ACT owns the test questions and responses and affirm that I will not share any test questions or responses with anyone by any form of communication.
2. Copy the Certification shown below (only the text in italics) on the lines provided. Write in your normal handwriting.
Certification: I agree to the Statement above and certify that I am the person whose name appears on this form.
$\qquad$
$\qquad$
3. Sign your name as you would any official document and enter today's date.

> Your Signature

Today's Date

## Form 05A

Your Name:
(Please print.)
Your Student ID Number:


## EXPLORE



## TEST 1: ENGLISH TEST <br> 30 Minutes-40 Questions

DIRECTIONS: In the four passages that follow, certain words and phrases are underlined and numbered. In the right-hand column, you will find alternatives for the underlined part. In most cases, you are to choose the one that best expresses the idea, makes the statement appropriate for standard written English, or is worded most consistently with the style and tone of the passage as a whole. If you think the original version is best, choose "NO CHANGE." In some cases, you will find in the righthand column a question about the underlined part. You are to choose the best answer to the question.
You will also find questions about a section of the passage, or about the passage as a whole. These
questions do not refer to an underlined portion of the passage, but rather are identified by a number or numbers in a box. Sometimes, the paragraphs or the sentences of a paragraph will be numbered and referred to in these questions.
For each question, choose the alternative you consider best and fill in the corresponding oval on your answer folder. Read each passage through once before you begin to answer the questions that accompany it. For many of the questions, you must read several sentences beyond the question to determine the answer. Be sure that you have read far enough ahead each time you choose an alternative.

PASSAGE I

## The Youngest Rider for the Pony Express?

Much fact and some fiction surrounds the mail service known as the Pony Express. Riders
on horseback could approximately deliver mail
from Missouri to California in ten days instead of the weeks and months it had previously taken by

1. The best placement for the underlined portion would be:
A. where it is now.
B. before the word on.
C. before the word mail.
D. before the word ten.
2. F. NO CHANGE
G. until
H. as long as
J. unless
stagecoach or ship. 3 The riders would pick up mail in St. Joseph, Missouri, and then gallop across the plains, mountains, and deserts, dropping and receiving mail at the stations they passed along the way to Sacramento, California. The Pony Express, begun in 1860 , lasted only eighteen months, ending
$\frac{\text { after the completion of a cross-country telegraph }}{4}$ system.

One man, Charlie Miller, who came to be known as Broncho Charlie, claimed to $\frac{\text { had }}{5}$ been the youngest
rider for the Pony Express. $\frac{\text { For example, there is }}{6}$ doubt about whether his story is fact or legend.

According to his own account, Miller first rode for the Pony Express when he was only eleven years old. On his first ride, Miller claimed, he and his horse, Rambler, left Sacramento and headed east
to Placerville $\frac{\text { when Miller was only eleven. }}{7}$ He supposedly rode through narrow mountain passes,
swam across deep, creeks swollen with rain, and survived encounters with wild animals. Miller also claimed to have delivered mail on the regular route
3. At this point, the writer is considering adding the following true statement:

California officially became a state in 1850.

Should the writer make this addition here?
A. Yes, because it provides a detail related to the paragraph's focus on the history of California.
B. Yes, because it supports the paragraph's claim that the Pony Express delivered mail quickly.
C. No, because it blurs the paragraph's focus on the Pony Express and its riders.
D. No, because it suggests that the Pony Express delivered mail only in California.
4. F. NO CHANGE
G. along
H. for
J. as
5. A. NO CHANGE
B. has
C. have
D. DELETE the underlined portion.
6. F. NO CHANGE
G. However,
H. Besides,
J. Likewise,
7. A. NO CHANGE
B. when Miller was the young age of eleven.
C. when Miller, at eleven years old, was young.
D. DELETE the underlined portion and end the sentence with a period.
8. F. NO CHANGE
G. across, deep creeks,
H. across, deep creeks
J. across deep creeks
between Carson City, Nevada, and Sacramento,
California, for several months before the Pony
Express disbanded. But Miller apparently never
provided any proof of these claims, and there $\frac{9}{9}$ accuracy may never be established.

One thing that is known about Miller is that he accomplished a great riding feat at age eighty-two.

Wanting to celebrate the Pony Express seventy years after its demise, in 1931 Miller hopped on a horse and rode from New York to California. He became the first person known to have crossed the continent while riding the same horse. Broncho Charlie's final accomplishment was to live to the age of 105 .
9. A. NO CHANGE
B. their
C. they're
D. those
10. F. NO CHANGE
G. riding
H. had rode
J. rides

## PASSAGE II

## On Gathering Raspberries

One of my favorite things to do in July is
berry picking. I live in a midwestern city of about 80,000 people, but I do all my picking within the city limits. I mainly search for the black raspberry
because $\frac{i t \text { 's the most common wild berry here, }}{11}$, but I'll also gather blackberries and gooseberries.
11. A. NO CHANGE
B. they were
C. it was
D. its

There's nothing more delightful $\frac{\text { then }}{12}$ bringing home
a quart or two of sweet fruit which costing only the time it took to pick.
$\frac{\text { Since black raspberries are high in antioxidants, }}{14}$ $\frac{\text { researchers have been studying their potential benefit }}{14}$ $\frac{\text { for treating various diseases. First, I'm mindful of }}{14}$
the places where the raspberry canes grows wild and untended. The thorny, woody stems stand four or five feet tall in thickets. In the spring, I take note when I see the familiar fruit forming, bright red, on public lands-along bike trails and in parks and woods.

When I return to those locations in early July, I usually find plenty of black raspberries. I proceed patiently as I pick, berry by berry, ignoring the sweat soaking my shirt and the mosquitoes and gnats into their world that have welcomed me.
12. F. NO CHANGE
G. than
H. for
J. as
13. A. NO CHANGE
B. and costing
C. that cost
D. and cost
14. Given that all the choices are true, which one provides the most effective transition to the rest of the essay?
F. NO CHANGE
G. While most black raspberries grow wild, red raspberries are an important commercial crop in temperate regions.
H. My plan for locating and picking berries has several stages, spread out over a number of months.
J. Freshly picked black raspberries can be used to make delicious jams and desserts or frozen for later use.
15. A. NO CHANGE
B. has grown
C. had grew
D. grow
16. The best placement for the underlined portion would be:
F. where it is now.
G. after the word sweat.
H. after the word welcomed.
J. after the word $m e$ (and before the period).

Did I mention that I carry bug repellent?

I must be nimble to avoid the thorny snags of the brambles I'm standing among. $\frac{\text { I also need manual }}{18}$ dexterity to coax each tiny fruit into my pail without crushing it. As I do so, I'm always searching for the next ripe berry. It should be a dusky black, with no hint of red in the shadows of the drupelets (the tiny individual globes that make up this fruit). I've $\frac{\text { founded that the the }}{19}$ the ripest berries hide under leaves in the darkest depths of the cane thicket.

I'm always surprised $\frac{\text { at quickly }}{20}$ I can fill a two-quart pail, enough berries for two delicious pies. In the process, I've also participated in the widespread historical tradition of gathering wild
17. At this point, the writer is considering adding the following true statement:

DDT was once widely used as an insecticide, but it was banned in the 1970s because of its negative impact on the environment and human health.
Should the writer make this addition here?
A. Yes, because it supports the point that the narrator is considerate of the environment.
B. Yes, because it warns readers to avoid using DDT as a bug repellent.
C. No, because it's irrelevant to the paragraph's focus on the process of picking berries.
D. No, because it doesn't tell enough about the negative impact of DDT.
18. Three of the following alternatives to the underlined portion would be acceptable. Which one would NOT be acceptable?
F. At the same time, I need
G. On the contrary, I need
H. In addition, I need
J. I need, as well,
19. A. NO CHANGE
B. found that
C. finded out
D. find that
20. F. NO CHANGE
G. how quickly
H. that quick
J. quickly
food.

## Why Do Beavers Build Dams?

[1] Dams built by beavers are impressive feats of construction; sometimes they can be as large as three meters high and several hundred meters long.
[2] To create a dam, beavers use their chisel-like front teeth to fell trees along a stream. [3] Then they cut the tree trunks and branches into smaller $\frac{\text { pieces so they can drag them into the stream by }}{21}$, skillfully using their front feet. [4] They wedge the first pieces into the stream bottom, usually at the $\frac{\text { streams }}{22}$ narrowest point, and build upward, strengthening the structure with rocks and mud.
[5] After the dam is finished, the water behind it deepens and widens to form a pond. [6] The dam and the pond provide beavers with safety. [7] The pond is an ideal place to build a lodge, a structure that can't $\frac{\text { be entered by wolves, bears, or foxes. [8] The lodge, }}{23}$, well insulated with sticks and mud, protects beavers from extremes of heat and cold and offers a safe
place for them to raise their young. 24
21. A. NO CHANGE
B. pieces, which
C. pieces, but
D. pieces that
22. F. NO CHANGE
G. streams,
H. streams'
J. stream's
23. A. NO CHANGE
B. be entering
C. entering
D. enter
24. The writer wants to divide this paragraph into two so that the first paragraph describes how beavers build dams and the second paragraph begins the essay's discussion of the purposes these dams serve. The best place to start the new paragraph would be at the beginning of Sentence:
F. 3 .
G. 4.
H. 5 .
J. 7.
$\frac{\text { Also }}{25}$ the living space of the
lodge is above the water level, there are
$\frac{\text { underwater openings that let beavers }}{26}$ go in and out. When young beavers are ready to leave the safety of the lodge, they are pushed into the pond through one of these openings, unseen by predators.

In addition, the pond yields food that can
be eaten without the risk of overland travel.
Beavers harvest plants that grow on the bottom
of the pond, such as yellow pond lilies and they also store branches in the pond, the inner bark serving as winter food. They create tunnels from the land around the stream to the pond; these provide escape routes if the beavers are $\frac{\text { threatened when looking around on land for }}{28}$ $\frac{\text { food to eat and finding themselves in danger. }}{28}$

For a beaver, a dam is well worth building
because it allows for a vegetable garden, a nursery,
a hiding place, an escape route, $\frac{\text { swimming in a pool, }}{29}$ and a food-storage facility.
25. A. NO CHANGE
B. For example,
C. Although
D. Yet
26. F. NO CHANGE
G. underwater, openings that let beavers,
H. underwater openings, that let beavers,
J. underwater, openings that let beavers
27. A. NO CHANGE
B. pond such as yellow pond lilies, and,
C. pond, such as yellow pond lilies, and
D. pond such as yellow pond lilies and
28. F. NO CHANGE
G. threatened during the time they spend out of the water searching all over the place on land for something to eat.
H. being threatened themselves when they are walking on land looking for food to eat.
J. threatened when searching for food on land.
29. A. NO CHANGE
B. that they can swim in a pool,
C. a swimming pool,
D. to swim in a pool,

## Question 30 asks about the preceding passage as a whole.

30. Assuming that the writer had set out to answer the question in the title of the essay, would this essay accomplish that goal?
F. Yes, because in the concluding paragraph, it introduces the reasons that beavers build dams.
G. Yes, because it focuses on the many benefits dams provide for beavers.
H. No, because it is primarily about how beavers build dams rather than about why they do so.
J. No, because it is more about how beavers avoid predators than about the dams beavers build.

## PASSAGE IV

## Architect Norma Sklarek

Most people in Los Angeles are familiar with the Pacific Design Center, a massive building in West Hollywood constructed in the 1970s. It has been nicknamed the "Blue Whale" because of its size and color. One of the main architects on the Blue Whale team was Norma Sklarek, that her specialty was large-scale buildings. Her projects have included the award-winning Fox Hills Mall in Culver City, California; the California Mart, the world's largest
fashion center; and Terminal One of the Los Angeles
International Airport.
31. A. NO CHANGE
B. her
C. whose
D. who's
[1] But Sklarek was accepted to architecture
school and made it through. [2] When Sklarek
decided, in the 1940s, to study architecture, it was
a difficult field for women and African Americans
to enter due to discrimination. [3] Unlike many newly graduated architects, she passed the four-day, thirty-six-hour architect's licensing exam the first time she took it. 32

When Sklarek looked for a job, however, $\frac{\text { disappointment was met with. She applied to twenty }}{33}$ different architecture firms and was rejected by all.

34 She took a job outside of architecture but kept applying for work in her field. Finally, she was hired
at Skidmore, Owings \& Merrill, one of the nation top
architectural firms. Instead, like any new architect, she was given small projects. Soon, though, her talent for large buildings was recognized.
32. Which of the following sequences of sentences makes this paragraph most logical?
F. NO CHANGE
G. $2,1,3$
H. $2,3,1$
J. $3,2,1$
33. A. NO CHANGE
B. disappointment was met with by her.
C. she met with disappointment.
D. meeting with disappointment.
34. At this point, the writer is considering adding the following true statement:

Sklarek's father, a doctor, had helped his daughter learn how to repair many things around their home.
Should the writer make this addition here?
F. Yes, because it explains how Sklarek became interested in architecture.
G. Yes, because it tells the reader about Sklarek's childhood.
H. No, because it doesn't explain what specific things Sklarek learned to do.
J. No, because it doesn't logically fit with the other information in the paragraph.
35. A. NO CHANGE
B. nations's
C. nation's
D. nations
36. F. NO CHANGE
G. On the contrary,
H. For example,
J. At first,

Sklarek has $\frac{\text { said, that she she no models }}{37}$ had when she began her career. She was the first African American woman to become a licensed architect and the first to become a Fellow of the American Institute of Architects. Later, she was also the first African American woman to own an architectural firm. Now retired, women and African Americans today, Sklarek believes, are making a significant impact on
architecture. $\frac{\text { Perhaps this is partly because they }}{39}$
now have many role models, one is Norma Sklarek.
37. A. NO CHANGE
B. said that,
C. said, "that
D. said that
38. F. NO CHANGE
G. Sklarek believes women and African Americans today
H. it is Sklarek's belief that women and African Americans today
J. today, women and African Americans, Sklarek believes,
39. A. NO CHANGE
B. It might possibly be, perhaps, that this is
C. Perhaps this could possibly be
D. This maybe could be, perhaps,
40. F. NO CHANGE
G. models one of them
H. models, one of them
J. models, one of whom

## TEST 2: MATHEMATICS TEST

## 30 Minutes-30 Questions

DIRECTIONS: Solve each problem, choose the correct answer, and then use your pencil to fill in the corresponding oval on your answer folder.
Do not use too much time on any one problem. Solve the ones you can do quickly; then return to the others in the time you have left.
You should have a calculator to use on this test. You may use your calculator for any problems you choose, but some of the problems may best be done without using a calculator.

Note: Unless the problem indicates otherwise, you should assume all of the following.

1. Diagrams are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word line indicates a straight line.
4. The word average indicates arithmetic mean. For example, the average of 2,6 , and 7 is $\left(\frac{2+6+7}{3}\right)$.

You may do your figuring in your test booklet. If you need more space for your figuring, you may ask your room supervisor for scratch paper. If you receive scratch paper, it will be collected along with your test booklet.

1. What is the area, in square yards, of a rectangular field that is 25 yards long and 20 yards wide?
A. 500
B. 625
C. 1,500
D. 3,600
E. 4,500
2. After the Fine Arts Booster Club's Soup Supper, there were 120 pieces of pie left over. The leftover pie was distributed equally among the volunteers ( 6 cooks and 4 cafeteria workers) so that each volunteer received the same number of pieces of pie. How many pieces of pie did each volunteer receive?
A. 5
B. 12
C. 20
D. 24
E. 30
3. What is the value of $x$ when $14=2 x-6$ is true?
F. 4
G. 10
H. 13
J. 18
K. 40
4. All of the following figures are parallelograms EXCEPT for one. Which one?
A.

D.

B.

E.
C.


$\square$
5. What is the median of the data given below?

$$
14,20,7,12,20,18
$$

F. 7
G. 14
H. 16
J. 18
K. 20
9. What is the least common denominator of the fractions $\frac{1}{6}, \frac{1}{8}$, and $\frac{1}{12}$ ?
A. 12
B. 24
C. 48
D. 72
E. 576
10. One of the following graphs represents the set of integers that are greater than 0 and less than 4 . Which one?

F. | -1 | 0 | $\bullet$ | $\bullet$ | $\bullet$ | 1 | 1 |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| -1 | 0 | 1 | 2 | 3 | 4 | 5 |

G.

H.

J.

K.

11. Makoto's summer job is mowing and edging lawns. He charges $\$ 20$ to mow a lawn and $\$ 10$ to edge a lawn. Makoto earned $\$ 180$ mowing some lawns and edging 4 lawns. How many lawns did he mow?
A. 3
B. 6
C. 7
D. 9
E. 14

Use the following information to answer questions 12-15.

Mrs. Christman raises and sells golden retriever puppies. For each of the past 5 years, 1 of her 3 adult female dogs has produced a litter of puppies. Information about these litters is shown in the table below. Mrs. Christman collects $\$ 1,000$ for each puppy she sells as a show dog, and $\$ 800$ for each puppy she sells as a pet.

| Year | Adult <br> female <br> dog | Male <br> puppies | Female <br> puppies | Total <br> puppies |
| :---: | :---: | :---: | :---: | :---: |
| 1 | Ginger | 6 | 5 | 11 |
| 2 | Peach | 5 | 2 | 7 |
| 3 | Saffron | 4 | 5 | 9 |
| 4 | Ginger | 4 | 2 | 6 |
| 5 | Peach | 5 | 2 | 7 |
| Total: |  |  |  |  |

12. For the 5 litters, what is the ratio of male puppies to female puppies?
F. $1: 1$
G. $2: 3$
H. $3: 5$
J. $3: 2$
K. $5: 3$
13. What is the average number of puppies per litter?
A. 7
B. 8
C. $8 \frac{1}{4}$
D. $8 \frac{1}{2}$
E. 9
14. Mrs. Christman sells $s$ puppies as show dogs and $p$ puppies as pets. Which of the following expressions describes the total amount, in dollars, Mrs. Christman collects from the sale of the puppies?
F. $8,000 s p$
G. $1,800+s+p$
H. $800 s+1,000 p$
J. $1,000 s-800 p$
K. $1,000 s+800 p$
15. To the nearest $0.1 \%$, what percent of the total puppies produced in the 5 litters were born to Saffron?
A. $16.7 \%$
B. $20.0 \%$
C. $22.5 \%$
D. $31.3 \%$
E. $33.3 \%$
16. Jim leaves his house and takes a walk. He walks 4 blocks due south to Jill's house and 3 blocks due west to Jack's house. Jim then walks due north and due east to Jonesy's Ice Cream Shop. Finally, he walks due north and due east from Jonesy's back to his house. On the map below, his route is marked by arrows and each block has the same length. What is the length, in blocks, of Jim's walk?

F. 10
G. 11
H. 12
J. 13
K. 14
17. The scatterplot below shows the relationship between the time each of 10 students spent writing a book report and the score each of them earned on the book report. The vertical dashed line marks the average time spent writing, and the horizontal dashed line marks the average score. The 2 dashed lines form 4 regions, which are labeled $\mathrm{P}, \mathrm{Q}, \mathrm{R}$, and S .


The students represented in Region S spent:
A. an above-average time writing and earned a below-average score.
B. an above-average time writing and earned an average score.
C. an above-average time writing and earned an above-average score.
D. a below-average time writing and earned a below-average score.
E. a below-average time writing and earned an above-average score.
18. The sum of 0.8 and 0.04 can be written as a fraction where the numerator and the denominator are both positive integers. When the numerator and the denominator are both divided by their greatest common factor, what is the sum of the numerator and the denominator of the resulting fraction?
F. 46
G. 84
H. 92
J. 100
K. 184
19. For all whole numbers $m$, which of the following statements is always true about the value of $2 m+5$ ?
A. It is a multiple of 5 .
B. It is a multiple of 7 .
C. It is greater than or equal to 25 .
D. It is odd.
E. It is even.
20. The figure below is a net (flat pattern) of a geometrical solid. The net, when folded on the dashed lines, makes a right rectangular prism. The given lengths are in feet. What is $x$ ?

F. 3
G. 4
H. 5
J. 6
K. 7
21. Each student in Ms. Wang's class will use a keyboard with 5 buttons on it to enter a 3-digit number. Each button has a different digit on it, from 1 through 5. (Some possible numbers are 111, 123, and 552.) How many different 3-digit numbers are possible for a student to enter?
A. 9
B. 15
C. 27
D. 60
E. 125
22. Which of the following numbers lies between $-\sqrt{11}$ and $-\sqrt{5}$ ?
F. -8
G. -6
H. -4
J. -3
K. -1
23. In hexagon $A B D E F G$, shown below, all 6 sides have equal lengths, all 6 interior angles have equal measures, and the 3 diagonals shown intersect at $C$. What is the measure of $\angle B D E$ ?

A. $60^{\circ}$
B. $108^{\circ}$
C. $120^{\circ}$
D. $144^{\circ}$
E. $150^{\circ}$
24. At a certain school carnival game, a player earns 5 points every time the player hits the target and loses 3 points every time the player misses the target. After 8 attempts to hit the target, Carlos had 16 points. Carlos hit the target on how many of the 8 attempts?
F. 1
G. 2
H. 3
J. 4
K. 5
25. For all nonzero $x, \frac{5}{2 x}+\frac{7}{x}$ is equivalent to:
A. $\frac{4}{x}$
B. $\frac{6}{x}$
C. $\frac{19}{2 x}$
D. $\frac{12}{19 x}$
E. $\frac{35}{19 x}$
26. Point $G(3,7)$ is shown in the standard $(x, y)$ coordinate plane below. Point $G$ is rotated $90^{\circ}$ counterclockwise (つ) about the origin and, after the rotation, is labeled $H$. What are the coordinates of $H$ ?

F. $(-3,-7)$
G. $(3,-7)$
H. $(-7,-3)$
J. $(-7,3)$
K. $(7,-3)$
27. A laboratory produces 500.00 grams of a certain radioactive substance. The substance decays by the same percent from one year to the next year. The table below gives the mass of the substance that remains 1,2 , and 3 years after the substance's production. Which of the following values is closest to the mass, in grams, of the substance that remains 4 years after production?

| Years after <br> production | Mass that remains <br> (grams) |
| :---: | :---: |
| 1 | 450.00 |
| 2 | 405.00 |
| 3 | 364.50 |
| 4 | $?$ |

A. 314.50
B. 319.50
C. 324.00
D. 328.05
E. 354.50
28. Two sides of a triangle are each 5 meters long. Which of the following CANNOT be the length of the third side, in meters?
F. 3
G. 6.5
H. 8
J. 9
K. 10
29. Marty's Plumbing charges a fixed dollar amount per hour plus a fixed service fee per job. Phylicia's Plumbing charges $\$ 10$ less per hour than Marty's, but the fixed service fee per job she charges is $\$ 10$ more than Marty's. Marty's Plumbing took 5 hours to complete a job. Phylicia's Plumbing would also have taken 5 hours to complete the same job. Compared to Marty's Plumbing, Phylicia's Plumbing would have charged:
A. $\$ 40$ less.
B. $\$ 40$ more.
C. $\$ 50$ less.
D. $\$ 50$ more.
E. the same amount.
30. The Hillside High School band has 50 members, 7 of whom are drummers. Exactly 4 of these drummers play the piano. Exactly 12 band members play the piano. What percent of the band members play the piano and are NOT drummers?
F. $8 \%$
G. $10 \%$
H. $12 \%$
J. $16 \%$
K. $24 \%$

# TEST 3: READING TEST 30 Minutes-30 Questions 


#### Abstract

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


## Passage I

PROSE FICTION: This passage is adapted from the novel Animal Dreams by Barbara Kingsolver (©1990 by Barbara Kingsolver).
"What is this?" I was out of the truck, entranced, before he'd even set the brake.
"Kinishba," Loyd said. "Prehistoric condos."
That's just about what it looked like. Out
5 there, without a fence in sight, sat a long rectangular building made entirely of carefully set stone, no mortar. Dozens of small doors opened into it across the front.

The doors were no more than four feet high.
10 I ducked through one into a small, rectangular room with a dust floor. It was cool as a cave, and quiet. The door was a square of bright light with the silhouette of Loyd coming through. Even inside the room, the ceiling was low, just inches above my head. I touched it. "People were short back then."
"They would've had to build a special room for you, Codi. You would have been their queen."

I laughed, though it struck me I'd been comwhich was darker, having no openings to the outside. Two more doors led out of that room-one to the side, and one up through the ceiling, which was made of thick, curved trunks of small trees. There was another whole set of rooms on top of this one.

[^0]He shook his head. "I wouldn't trust those beams. They're kind of old."
"How old?"
"Eight hundred years."

I looked at him. "Are you kidding?"
"Nope."

We went from room to room, changing directions in the dark until the compass points were entirely lost to me. It was a maze. Loyd said there were more than two hundred rooms-a village under one roof. I tried to imagine the place populated: listening through all the noises of cooking and scolding and washing up for the sound of your own kids.

Without warning we came out into a bright courtyard in the center, surrounded by walls and doorways on all four sides. It was completely hidden from the outside-a little haven with a carpet of fine grass and an ancient ash tree. A treasure island. I was drawn to the shade. "We should've brought the picnic basket," I said, settling under the ash. The ground was cool. My brief vision of a living city was gone; it seemed ghostly again.
"So who built this place, eight hundred years ago?"
"My mama's folks. The Pueblo. They had their act together back then, didn't they?"

They did. I couldn't stop running my eyes over the walls and the low, even roofline. The 60 stones were mostly the same shape, rectangular, but all different sizes; there would be a row of
large stones, and then two or three thinner rows, then a couple of middle-sized rows. There was something familiar about the way they fit 65 together. In a minute it came to me. They looked just like cells under a microscope.
"It doesn't even look like it was built," I said. "It looks like something alive that just grew here."

70
"That's the idea." Loyd seemed as pleased as if he'd built it himself.
"Of what? The idea of Pueblo architecture?"
"Yep. Don't be some kind of a big hero. No Washington Monuments. Just build something nice that Mother Earth will want to hold in her arms."

1. Who is the narrator of the passage?
A. Codi
B. Loyd
C. A character in the story who is watching and explaining the actions of Codi and Loyd
D. A third-person narrator who knows the thoughts of both Codi and Loyd
2. What does the passage suggest about the number of times Loyd and Codi have visited Kinishba?
F. Neither of them has been at Kinishba before.
G. Both of them have been at Kinishba numerous times.
H. Loyd has been at Kinishba numerous times, but Codi has never been there before.
J. Codi has been at Kinishba numerous times, but Loyd has been there only once.
3. Which of the following statements about Loyd's attitude toward Kinishba is best supported by the passage?
A. He regrets that the rooms are no longer filled with a bustling village.
B. He's proud of the design and age of the structure.
C. He's surprised that the building is still standing centuries after it was built.
D. He's concerned because some people don't appreciate Pueblo traditions.
4. Which of the following words best describes Codi's first response to Kinishba?
F. Nervousness
G. Amusement
H. Uninterest
J. Awe
5. Loyd describes Kinishba to Codi as which of the following?
A. A grain elevator
B. A hidden cave
C. An ancient castle
D. Prehistoric condos
6. What reason does Loyd give Codi to keep her from going upstairs at Kinishba?
F. He doesn't trust the beams.
G. They don't have time to spend exploring.
H. It's too dark to see anything up there.
J. It would be considered disrespectful.
7. According to the passage, Kinishba was built about how long ago?
A. One hundred years
B. Two hundred years
C. Eight hundred years
D. One thousand years
8. What does Codi most likely mean when she says "the compass points were entirely lost to me" (lines 37-38)?
F. The compass she brought is broken and no longer points north.
G. She can't read her compass in the dark.
H. She lost her sense of direction as she followed Loyd through the rooms.
J. The doors to the rooms don't all face the same direction.
9. According to the passage, the way the stones of Kinishba fit together reminds Codi of:
A. cells under a microscope.
B. a treasure island.
C. the Washington Monument.
D. a bustling village.
10. Loyd most strongly suggests that Pueblo builders designed their housing structures to be:
F. monuments to their ancestral heroes.
G. private and spacious.
H. a natural part of the landscape.
J. representative of their wealth and prosperity.

## Passage II

SOCIAL SCIENCE: This passage is adapted from the article "Minds of Their Own" by Virginia Morell (©2008 by National Geographic Society).

In 1977 psychologist Irene Pepperberg set out to find out what was on another creature's mind by talking to it. She brought a one-year-old African gray parrot she named Alex into her lab language.

Certain skills are considered key signs of higher mental abilities: good memory, a grasp of grammar and symbols, self-awareness, under0 standing others' motives, imitating others, and being creative. Bit by bit, researchers have documented these talents in other species, gradually chipping away at what we thought made human beings distinctive. Alex the parrot turned out to be a surprisingly good talker.
"Some people called me crazy for trying this," Pepperberg said. "Scientists thought chimpanzees were better subjects, although, of course, chimps can't speak."

20 "Alex has to hear the words over and over before he can correctly imitate them," Pepperberg said, after pronouncing "seven" for Alex a good dozen times in a row. "I'm not trying to see if Alex can learn a human language," she added. "That's never been the point. My plan always was to use his imitative skills to get a better understanding of how birds think."

In other words, because Alex was able to produce a close approximation of the sounds of 30 some English words, Pepperberg could ask him questions about a bird's basic understanding of the world. She couldn't ask him what he was
thinking about, but she could ask him about his knowledge of numbers, shapes, and colors. To demonstrate, Pepperberg held up a green key and a small green cup to Alex's eye.
"What's same?" she asked.
Without hesitation, Alex's beak opened: "Co-lor." "ow whit is ripe or Pepperberg noted. "They need to categorize things-what's edible, what isn't-and to know the shapes of predators. And it helps to have a 5 concept of numbers if you need to keep track of your flock, and to know who's single and who's paired up."

Being able mentally to divide the world into simple abstract categories would seem a valuable skill. Is that ability, then, part of the evolutionary drive that led to human intelligence?
11. What best describes the main purpose of the passage?
A. To persuade readers that African gray parrots make good pets
B. To explain to readers what Pepperberg learned through her work with Alex
C. To convince readers that primates are smarter than birds like Alex
D. To entertain readers with a humorous story about teaching various bird species to talk
12. Based on the passage, which of the following best describes Alex's ability to talk?
F. Alex learns almost instantly how to say and use new words he hears.
G. Alex can pronounce words clearly but doesn't actually communicate.
H. Alex can only mimic Pepperberg by repeating words directly after she says them.
J. Alex communicates by correctly using words that he's heard repeated at least several times.
13. In the passage, what reason does Pepperberg give for wanting to teach an African gray parrot to talk?
A. To better understand how birds think
B. To see whether birds are able to learn a human language
C. To find out how skillful birds are at imitation
D. To observe whether birds are capable of lying
14. As it is used in line 5, the word produce most nearly means:
F. grow.
G. invent.
H. show.
J. make.
15. In the passage, Pepperberg notes that one advantage in using a parrot instead of a chimpanzee in her research was that parrots:
A. are easier to train than chimpanzees.
B. can speak, while chimpanzees can't.
C. haven't been studied as often as chimpanzees have been.
D. don't require specialized care the way chimpanzees do.
16. According to the passage, why did Alex scold one of the young parrots in Pepperberg's care?
F. It wasn't paying attention to the task.
G. It wanted a treat before performing.
H. It didn't pronounce a word correctly.
J. It selected the wrong object.
17. Which of the following best describes something parrots, great apes, and humans have in common that requires higher-level thinking skills?
A. They demonstrate an ability to speak clearly.
B. They protect and clean up their environment.
C. They live a long time in complex societies.
D. They are capable of explaining new ideas.
18. According to the passage, one reason parrots living in the wild need to be able to distinguish colors is so that they can:
F. recognize their mates.
G. pick out ripe from unripe fruit.
H. know which birds belong in their flock.
J. find their way back to their nests.
19. Which of the following is used in the passage as an example of why parrots living in the wild need to understand numbers?
A. To keep track of their flock and to know who's single and who's paired up
B. To estimate the number of miles left to reach their destination when migrating
C. To count the number of predators living in an area before settling there
D. To divide up equally any large supply of fruit the flock finds to eat
20. As it is used in line 71 , the word drive most nearly means:
F. community fund-raiser.
G. short trip.
H. powerful force.
J. private road.

## Passage III

HUMANITIES: This passage is adapted from Music Fell on Alabama by C. S. Fuqua (©2006 by C. S. Fuqua).

He liked to take credit for inventing jazz music, but neither he nor anyone else could ever prove the claim, so William Christopher Handy had to settle for being known as the "Father of the
5 Blues." Born in Florence, Alabama, in 1873, Handy fought an uphill battle to play his music. His father and grandfather were both Methodist preachers, and they expected the young Handy to follow them into the pulpit. But even after his 10 father forced Handy to trade in his first instrument, a guitar, for a dictionary, Handy never swayed from his determination to become a musician, and there was little the minister could do about it, especially when the boy got his hands on

He soon left Memphis and headed north, to St. Louis, where his luck seemed to run out. Sleeping on cobblestones and in poolrooms, he heard a man complain one night about how he hated to see the sun go down on another day. The complaint stuck in the composer's mind, and eventually became the basis for his most famous song, "The St. Louis Blues," which put Handy on the road to wealth and fame. The song, Handy once said, "reflects a life filled with hard times as

45 well as good times," a statement that could apply to most of his blues songs.

In 1918, Handy moved to New York City and opened Handy Brothers Music Company, Inc., a publishing company, where his fame con-
50 tinued to grow as a songwriter and conductor. But by 1941, Handy had become disillusioned with the blues, remarking to one reporter that the market for the music he created had vanished. But that didn't stop him from composing. Instead of 55 songs of hard times and trouble, he now turned to a song of dignity, a proclamation of allegiance and patriotism. "We're Americans, Too" rejoiced in the sacrifices blacks had made for America, the honor and pride they should take in being loyal Americans.

But music wasn't the only thing being published with Handy's name on it in 1941. The Macmillan Company that year released the composer's autobiography and, as a testament to the man's popularity, had to print a second edition within thirty days of releasing the first. RCA Victor also cashed in with Handy that year, issuing the Birth of the Blues album, containing eight of Handy's compositions.
21. The passage can best be described as:
A. a brief account of Handy's life as a musician.
B. an in-depth analysis of the lyrics of one of Handy's songs.
C. a story of a memorable event from Handy's childhood.
D. a discussion of the popularity of jazz music in the early twentieth century.
22. Which of the following statements about Handy and the invention of jazz is best supported by the passage?
F. With his song "Memphis Blues," Handy invented jazz.
G. Handy claimed that he'd invented jazz, but his claim can't be verified.
H. Handy had hoped he'd be credited with inventing the blues instead of jazz.
J. Handy is credited as the inventor of jazz, but he repeatedly denied that claim.
23. Which of the following musical activities is NOT mentioned in the passage as something Handy did?
A. Conducting
B. Writing songs
C. Playing instruments
D. Singing spirituals
24. The last two paragraphs (lines 47-69) most strongly suggest that between 1918 and approximately 1940, most of the songs Handy wrote would have been marketed as what kind of music?
F. Blues
G. Jazz
H. Patriotic
J. Religious
25. What does the last paragraph most strongly suggest about Handy's position in the music industry in 1941?
A. Handy was struggling to compose music.
B. Handy was a popular composer.
C. Handy was just starting his publishing company.
D. Handy's contributions were being overlooked.
26. According to the passage, when Handy was a young child, his father expected him to grow up to become a:
F. music conductor.
G. politician.
H. songwriter.
J. minister.
27. Which of the following is named in the passage as one of Handy's musical inspirations when Handy was young?
A. Songs sung by Southern blacks in railroad yards and factories
B. Songs sung by his father at home while preparing for church services
C. Blues music played at political rallies
D. Autobiographies of famous musicians
28. The passage states that Handy's inspiration for writing "The St. Louis Blues" came from:
F. his excitement about moving from Memphis to St. Louis.
G. music that Handy had heard and studied while in the Florence black public school.
H. remembering one of the songs Handy had composed in his youth.
J. a comment Handy had overheard while he was in St. Louis.
29. Which of the following statements captures how the passage characterizes most of Handy's blues lyrics?
A. They imitate the religious lyrics of spirituals.
B. They reflect both the good and difficult times in life.
C. They inspire honor and pride in citizens of the United States.
D. They attempt to persuade people to support specific political candidates.
30. According to the passage, what did Handy believe about the market for blues music in 1941?
F. It was richer than that for other types of music.
G. It was just beginning to gain momentum.
H. It had slightly declined.
J. It had disappeared.

## TEST 4: SCIENCE TEST 30 Minutes-28 Questions

DIRECTIONS: There are six passages in this test. Each passage is followed by several questions. After reading a passage, choose the best answer to each question and fill in the corresponding oval on your answer folder. You may refer to the passages as often as necessary.
You are NOT permitted to use a calculator on this test.

## Passage I

Scientists studied how conditions in Lake A change as the depth of the water changes. They collected a sample of lake water at the lake's surface (depth $=0 \mathrm{~m}$ ) and at 1 m intervals below the lake's surface. For each sample, the scientists determined the concentration of phytoplankton (microscopic organisms that use sunlight to make food) and the concentration of dissolved oxygen (see Figures 1 and 2 , respectively). The scientists also measured, at 1 m intervals below the lake's surface, the percent of sunlight that penetrated the water (see Figure 3).


[^1]
*mg/L = milligrams per liter
Figure 2


Figure 3

1. According to Figure 1, a Lake A water sample collected between which of the following depths will most likely contain the greatest concentration of phytoplankton?
A. 3 m and 4 m
B. 5 m and 6 m
C. 7 m and 8 m
D. 9 m and 10 m
2. A scientist claimed that there was not enough sunlight for the phytoplankton to survive at a depth of 12 m . Does Figure 3 support this claim?
F. No, because at 12 m , the sunlight penetration was $100 \%$.
G. No, because at 12 m , the sunlight penetration was $0 \%$.
H. Yes, because at 12 m , the sunlight penetration was $100 \%$.
J. Yes, because at 12 m , the sunlight penetration was $0 \%$.
3. According to Figure 3, the greatest change in sunlight penetration occurred over which of the following ranges of depth?
A. From 0 m to 1 m
B. From 1 m to 2 m
C. From 3 m to 4 m
D. From 4 m to 5 m
4. According to Figures 2 and 3, the lake water had a dissolved oxygen concentration of $8.5 \mathrm{mg} / \mathrm{L}$ and a sunlight penetration of $23 \%$ at what depth?
F. 2 m
G. 3 m
H. 4 m
J. 5 m

## Passage II

Two studies were done in a lab to investigate how the amount of carbon dioxide $\left(\mathrm{CO}_{2}\right)$ in a volume of gas affects the rate at which the temperature of the gas increases.

Two identical glass tanks with airtight lids (Tanks A and B) were opened, and the same quantity of black sand was added to each. To heat the gas in the tanks, a lamp with a 150 -watt lightbulb was placed at one end. A thermometer was set up at the other end so that the bottom of the thermometer would be in the gas and 5 cm above the top of the sand (see diagram).

diagram of setup for a tank

## Study 1

The lid of Tank A was closed after the sand was added. Five minutes (min) later, the temperature of the gas in the tank was recorded. (The pressure of the gas in the tank equaled atmospheric pressure.) Immediately afterward, the lamp was turned on, and the temperature of the gas in the tank, in degrees Celsius $\left({ }^{\circ} \mathrm{C}\right)$, was recorded every 30 seconds (sec) for 10 min . The results are shown in Figure 1.

## Study 2

The lid of Tank B was closed after the sand was added. Through a tiny hole made in the lid, all the gas that was present was removed from the tank and replaced with $100 \% \mathrm{CO}_{2}$ at atmospheric pressure. Immediately after the $\mathrm{CO}_{2}$ was added, the hole was sealed with an airtight material. Five min later, the temperature of the gas in the tank was recorded. Immediately afterward, the lamp was turned on, and the temperature of the gas in the tank was recorded every 30 sec for 10 min . The results are shown in Figure 2. (Note: The light received by Tank B was of the same brightness and at the same angle as the light that had been received by Tank A.)


Figure 1


Figure 2
5. According to the results of Study 1, the temperature of the gas in Tank A at 0 min was:
A. $22.0^{\circ} \mathrm{C}$.
B. $22.5^{\circ} \mathrm{C}$.
C. $23.0^{\circ} \mathrm{C}$.
D. $23.5^{\circ} \mathrm{C}$.
6. According to the results of Studies 1 and 2, the temperature of the gas in Tank A at 10 min was most nearly the same as the temperature of the gas in Tank B at:
F. 5 min .
G. 7 min .
H. $\quad 9 \mathrm{~min}$.
J. 11 min .
7. The temperature of the gas in which tank increased more quickly, and why?
A. Tank A, because the gas in that tank contained less $\mathrm{CO}_{2}$ than did the gas in Tank B.
B. Tank A, because the gas in that tank contained more $\mathrm{CO}_{2}$ than did the gas in Tank B.
C. Tank B, because the gas in that tank contained less $\mathrm{CO}_{2}$ than did the gas in Tank A.
D. Tank B, because the gas in that tank contained more $\mathrm{CO}_{2}$ than did the gas in Tank A.
8. Suppose that what occurred in Tanks A and B after the lamps were turned on was intended to model how the temperature of Earth's atmosphere changes as the amount of $\mathrm{CO}_{2}$ in the air changes. What would have been represented by the black sand and what would have been represented by the lamp's light?

## black sand

F. Earth's surface
G. Earth's surface
H. Earth's atmosphere
J. Earth's atmosphere

## lamp's light

Earth's atmosphere
Sun's energy
Earth's surface
Sun's energy
9. Were Studies 1 and 2, together, designed to determine if the brightness of light received by a volume of gas affects the rate at which the temperature of the gas increases?
A. No, because only Tank A had a light shining on it.
B. No, because the brightness of light received was the same for both tanks.
C. Yes, because only Tank B had a light shining on it.
D. Yes, because the brightness of light received was different for each tank.

## Passage III

A solid metal ball, initially at rest, was dropped from a height of 10.0 m above the ground. The ball's height, speed, gravitational potential energy (GPE), and kinetic energy (KE) were determined as the ball fell to the ground. Figure 1 shows how the ball's height changed over time. Figure 2 shows how the ball's speed, in meters per second ( $\mathrm{m} / \mathrm{sec}$ ), changed over time. Figure 3 shows how the ball's GPE and KE, both measured in joules (J), changed over time.


Figure 1


Figure 2


Figure 3
10. Based on Figure 1, approximately how long did it take for the ball to hit the ground?
F. 1.4 sec
G. 1.6 sec
H. 1.8 sec
J. 2.0 sec
11. According to Figure 3, at the moment the ball was dropped, its GPE was closest to which of the following?
A. 0 J
B. 50 J
C. 100 J
D. 150 J
12. Suppose that the sphere had been dropped from a height of 10.0 m above the Moon's surface. Based on Figure 2, 0.4 sec after the sphere was released, its speed would have been:
F. less than $4 \mathrm{~m} / \mathrm{sec}$, because gravity on the Moon is stronger than gravity on Earth.
G. less than $4 \mathrm{~m} / \mathrm{sec}$, because gravity on the Moon is weaker than gravity on Earth.
H. greater than $4 \mathrm{~m} / \mathrm{sec}$, because gravity on the Moon is stronger than gravity on Earth.
J. greater than $4 \mathrm{~m} / \mathrm{sec}$, because gravity on the Moon is weaker than gravity on Earth.
13. Based on Figures 1 and 3, the ball's GPE and the ball's KE were approximately equal when the height of the ball was:
A. $\quad 0.0 \mathrm{~m}$.
B. $\quad 1.0 \mathrm{~m}$.
C. $\quad 5.0 \mathrm{~m}$.
D. 10.0 m .

## Passage IV

Fruit size in the pear $P$. pyrifolia is determined by the number of cells that grow in the mesocarp (edible portion of the fruit) during the period of cell division (average number of days of active cell division following pollination). Table 1 lists fruit size at harvest, maturation period (average number of days from pollination to harvest), period of cell division, and average mass of the fresh fruit at harvest for 9 strains of $P$. pyrifolia (S1-S9).

Table 1
$\left.\begin{array}{|c|l|c|c|c|}\hline \text { P. pyrifolia } \\ \text { strain }\end{array} \quad \begin{array}{c}\text { Fruit } \\ \text { size }\end{array} \quad \begin{array}{c}\text { Maturation } \\ \text { period } \\ \text { (days) }\end{array} \begin{array}{c}\text { Period } \\ \text { of cell } \\ \text { division } \\ \text { (days) }\end{array} \begin{array}{c}\text { Average } \\ \text { fresh } \\ \text { mass } \\ \text { (g) }\end{array}\right]$

The average number of cells in a mesocarp sample is shown for each of the 3 fruit sizes at pollination (see Figure 1) and at harvest (see Figure 2).

*Sample was taken from the core to the fruit surface at the fruit's largest diameter.

*Sample was taken from the core to the fruit surface at the fruit's largest diameter.

## Figure 2

Table and figures adapted from Caixi Zhang et al., "The Impact of Cell Division and Cell Enlargement on the Evolution of Fruit Size in Pyrus pyrifolia." ©2006 by The Author.
14. According to Table 1, on average, a fruit of which P. pyrifolia strain will spend the least amount of time on a tree from pollination to harvest?
F. S1
G. S2
H. S 4
J. S 9
15. Based on Table 1, if a P. pyrifolia fruit were found to have a fresh mass of 810 g at harvest, would it more likely be sized as a small fruit or as a large fruit?
A. Small, because 810 g falls between the average fresh mass of S1 and the average fresh mass of S3.
B. Small, because 810 g falls between the average fresh mass of S7 and the average fresh mass of S9.
C. Large, because 810 g falls between the average fresh mass of S1 and the average fresh mass of S3.
D. Large, because 810 g falls between the average fresh mass of S7 and the average fresh mass of S9.
16. According to Table 1 and Figure 2, do the P. pyrifolia strains with the longest periods of cell division have the greatest number of cells in the mesocarp at harvest?
F. No; the large fruits have a greater number of cells in the mesocarp at harvest than do smaller fruits.
G. No; the small fruits have a greater number of cells in the mesocarp at harvest than do larger fruits.
H. Yes; the large fruits have a greater number of cells in the mesocarp at harvest than do smaller fruits.
J. Yes; the small fruits have a greater number of cells in the mesocarp at harvest than do larger fruits.
17. Which of Figures 1 and 2, if either, shows for P. pyrifolia the average number of cells in a mesocarp sample before the period of cell division?
A. Figure 1 only
B. Figure 2 only
C. Both Figure 1 and Figure 2
D. Neither Figure 1 nor Figure 2

## Passage V

Tooth decay is caused by bacteria in the mouth (such as lactobacilli and S. mutans) that turn sugars into acid that dissolves tooth enamel. Two studies involving these bacteria were performed.

## Study 1

Five students (Students A-E) chewed sterile rubber bands for 5 minutes ( min ) without swallowing, depositing their saliva in separate, sterile containers. They added 20 milliliters ( mL ) of sterile test agar (TA) to each of 7 test tubes. The TA contained sugar, other nutrients necessary for the growth of only lactobacilli, and the dye bromcresol green, which changes from green (G) to yellow (Y) if the amount of acid increases to a certain level. In addition, they added sterile water, lactobacilli, or 0.2 mL of a student's saliva to each tube. Finally, they incubated the tubes at $37^{\circ} \mathrm{C}$, noting the color of the TA at 24,48 , and 72 hours (hr) of incubation (see Table 1). The higher the concentration of lactobacilli in a student's saliva, the more quickly the TA changed from green to yellow.

| Table 1 |  |  |  |  |
| :---: | :--- | :---: | :---: | :---: |
| Tube | Contents | Color at: |  |  |
|  | TA and: | 24 hr | 48 hr | 72 hr |
|  | sterile water | G | G | G |
|  | lactobacilli | Y | Y | Y |
| 3 | Student A saliva | Y | Y | Y |
| 4 | Student B saliva | G | Y | Y |
| 5 | Student C saliva | G | G | G |
| 6 | Student D saliva | G | G | Y |
| 7 | Student E saliva | G | G | Y |

## Study 2

The students tested the effects of baking soda and hydrogen peroxide $\left(\mathrm{H}_{2} \mathrm{O}_{2}\right)$ on the growth of S. mutans. They set up 4 growth plates, then added to each plate 2 or more of the substances listed in Table 2. Finally, they incubated the plates at $37^{\circ} \mathrm{C}$, counting the number of bacteria present in each plate every 5 hr for 30 hr (see Figure 1).

| Table 2 |  |  |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Plate | Nutrient <br> broth <br> $(\mathrm{mL})$ | Sugar <br> solution <br> $(\mathrm{mL})$ | S. mutans <br> culture <br> $(\mathrm{mL})$ | Baking <br> soda <br> solution <br> $(\mathrm{mL})$ | $\mathrm{H}_{2} \mathrm{O}_{2}$ <br> solution <br> $(\mathrm{mL})$ |  |
| W | 1 | none | 0.5 | none | none |  |
| X | 1 | 0.5 | 0.5 | none | none |  |
| Y | 1 | 0.5 | 0.5 | 0.5 | none |  |
| Z | 1 | 0.5 | 0.5 | none | 0.5 |  |



Figure 1

Table 2 and Figure 1 adapted from Kelly J. Silhacek and Kristin R. Taake, "Sodium Bicarbonate and Hydrogen Peroxide: The Effect on the Growth of Streptococcus mutans." ©2005 by The American Dental Hygienists' Association.
18. According to Table 2, in which of the following ways did Plates X and Y differ in regard to what was added to them?
F. Baking soda was not added to Plate X but was added to Plate Y.
G. Baking soda was not added to Plate Y but was added to Plate X .
H. $\mathrm{H}_{2} \mathrm{O}_{2}$ was not added to Plate X but was added to Plate Y .
J. $\mathrm{H}_{2} \mathrm{O}_{2}$ was not added to Plate Y but was added to Plate X.
19. Based on the results of Study 2, mouthwash with which of the following ingredients would best prevent tooth decay?
A. Sugar
B. S. mutans
C. Baking soda
D. Nutrient broth
20. In Study 1, why did the students chew sterile rubber bands for 5 min ?
F. To prevent the development of tooth decay
G. To encourage the growth of lactobacilli
H. To stimulate the flow of saliva
J. To increase the rate at which acid formed
21. In Study 1, the student whose saliva contained the lowest concentration of lactobacilli was the one whose TA was:
A. yellow at 24 hr and yellow at 48 hr .
B. green at 24 hr and yellow at 48 hr .
C. green at 48 hr and green at 72 hr .
D. green at 48 hr and yellow at 72 hr .
22. In Study 1, which of the following is the most likely reason that the containers used to collect the saliva needed to be sterile?
F. To avoid infecting the students with bacteria from their own saliva
G. To collect bacteria from the surrounding environment in addition to bacteria from the students' saliva
H. To prevent unwanted bacteria from entering the test tubes
J. To ensure proper mixing of the students' saliva

## Passage VI

A teacher placed a beaker containing 100 g of tap water at room temperature on a heat source. After 8 minutes (min), the water began to boil. After 4 min of boiling, the beaker was removed from the heat source. The teacher then asked 4 students to explain why bubbles formed in the water during boiling and what was inside the bubbles. She also asked them to predict whether the mass of the water in the beaker changed over the 4 min of boiling.

## Student 1

When a liquid is heated, it absorbs the heat, causing its temperature to increase. A given amount of a liquid can absorb only a certain amount of heat. If additional heat is added, bubbles of heat will form and exit the liquid. Therefore, the bubbles that formed during the boiling contained heat only. Heat has no mass, so the mass of the water did not change.

## Student 2

Each water molecule is made up of 2 hydrogen $(\mathrm{H})$ atoms and 1 oxygen $(\mathrm{O})$ atom. When water boils, it splits apart into H atoms and O atoms. The free H atoms bond to form $\mathrm{H}_{2}$ molecules and the free O atoms bond to form $\mathrm{O}_{2}$ molecules. The bubbles that formed during the boiling contained $\mathrm{H}_{2}$ and $\mathrm{O}_{2}$ only. Thus, the mass of the water decreased.

## Student 3

Liquids normally contain some dissolved air. As the temperature of a liquid increases, its ability to dissolve air decreases. When a liquid reaches its boiling point, air bubbles will form and exit the liquid. Therefore, the bubbles that formed during the boiling contained air only. Air has no mass, so the mass of the water did not change.

## Student 4

When a liquid is heated to its boiling point, it will start to change from a liquid to a gas. Bubbles of gas form and escape the liquid. The bubbles that formed during the boiling contained water vapor only. Thus, the mass of the water decreased.
23. Student 2 implied that, while the water boiled, the mass of the water:
A. decreased because air has mass.
B. decreased because $\mathrm{H}_{2}$ and $\mathrm{O}_{2}$ have mass.
C. increased because air has mass.
D. increased because $\mathrm{H}_{2}$ and $\mathrm{O}_{2}$ have mass.
24. Which of the students implied that the water underwent only a change of state during boiling?
F. Student 1
G. Student 2
H. Student 3
J. Student 4
25. After the water was boiled for 4 min , the mass of the water in the beaker was 94 g . This finding is consistent with the explanations given by:
A. Students 1 and 2 only.
B. Students 1 and 3 only.
C. Students 2 and 3 only.
D. Students 2 and 4 only.
26. Which of the students implied that the water underwent a chemical reaction during boiling?
F. Student 1
G. Student 2
H. Student 3
J. Student 4
27. The teacher repeated the demonstration, except that the 100 g of tap water was boiled for 8 min . Which of the following sets of values for the final mass of the water in the beaker, in the original demonstration and in the new demonstration, is most consistent with Student 1's explanation?

|  | original <br> demonstration |  | new <br> demonstration |
| :--- | :---: | :---: | :---: |
|  | A. | 88 g |  |
| B. | 95 g |  | 85 g |
| C. | 95 g |  | 100 g |
| C. | 100 g |  | 100 g |

28. Glycerin is a liquid with a boiling point of $182^{\circ} \mathrm{C}$. A 50 g sample of glycerin at $20^{\circ} \mathrm{C}$ was heated to $70^{\circ} \mathrm{C}$. No bubbles formed in the liquid, and the mass of the sample at $70^{\circ} \mathrm{C}$ was 50 g . Is this result consistent or inconsistent with the explanations given by Students 1 and 3 ?

Student 1 Student 3
F. consistent consistent
G. consistent inconsistent
H. inconsistent consistent
J. inconsistent inconsistent

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

## Directions

This booklet contains tests in English, Mathematics, Reading, and Science. These tests measure knowledge and skills related to performance in many junior high and middle school classes and your readiness for high school study.

The questions in each test are numbered, and the suggested answers for each question are lettered. On the answer folder, the rows of ovals are numbered to match the questions, and the ovals in each row are lettered to correspond to the suggested answers.

For each question, first decide which answer is best. Next, locate on the answer folder the row of ovals numbered the same as the question. Then, locate the oval in that row lettered the same as your answer. Finally, fill in the oval completely. Use a soft lead pencil and make your marks heavy and black. DO NOT USE INK OR A MECHANICAL PENCIL.

Mark only one answer to each question. If you change your mind about an answer, erase your first mark thoroughly before marking your new answer. For each question, make certain that you mark in
the row of ovals with the same number as the question.

Only responses marked on your answer folder will be scored. Your score on each test will be based only on the number of questions you answer correctly during the time allowed for that test. You will NOT lose credit for guessing. IT IS TO YOUR ADVANTAGE TO ANSWER EVERY QUESTION EVEN IF YOU MUST GUESS.

You may work on each test ONLY when your room supervisor tells you to do so. If you finish the test before time is called for that test, you should use the time remaining to reconsider questions you are uncertain about in that test. You may NOT look back to a test on which time has already been called, and you may NOT go ahead to another test.

Lay your pencil down immediately when time is called at the end of each test. You may NOT for any reason fill in or alter ovals for a test after time is called for that test.

Do NOT fold or tear the pages of your test booklet.


[^0]:    "Can we go upstairs?"

[^1]:    *L $=$ liter

