Form 68C

(June 2010)

The **ACT**® 2009 | 2010

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ENGLISH TEST
45 Minutes—75 Questions

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

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

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

PASSAGE I

> The following paragraphs may or may not be in the most logical order. Each paragraph is numbered in brackets, and question 15 will ask you to choose where Paragraph 4 should most logically be placed.

This Writer Cooks

[1]

Mary Frances Kennedy Fisher said in the opening of her first collection of essays, *Serve It Forth*, "Now I am going to write a book. It will be about eating and about what to eat and about people who eat." But their work was much more than that. *Serve It Forth* and the wealth of books that followed its publication in 1937 changed the

1. **A.** NO CHANGE
   B. essays *Serve It Forth*,
   C. essays *Serve It Forth*
   D. essays: *Serve It Forth*,

2. **F.** NO CHANGE
   G. her
   H. there
   J. its

3. **A.** NO CHANGE
   B. then
   C. to
   D. of

way her many readers think about food and about life

in general. ☐4

[2]

Years later, as a student living in France,

she learned how to cook, her inspiration, springing
                    ————————————————————
                              5
from the breads and pastries of Dijon. She

with imagination and creative thought used every
——————————————————————————————————
                        6
source available to her. She had a passion for making

something delightful out of whatever she had at hand,

and she enjoyed a reputation for scouring local markets
————————————————————
          7

and shops for the better and freshest ingredients for her
                   ——————————————————
                          8

carefully prepared meals. ☐9 On the heater in her small

apartment, she dried sections of tangerines and oranges

and chunks of coconut, preparing them to be used in an

innovative dessert.

[3]

Eating and cooking in France taught her that the

sweetest pleasures are often the simplest, and that often

those found in one place cannot be found anywhere else.

Cauliflower and cream and Gruyère cheese when baked

on one side of the Atlantic she discovered, are not the
                   ——————————————————
                            10
same when baked on the other side.

4. At this point, the writer is considering adding the fol-
   lowing sentence in order to emphasize Fisher's experi-
   ence as a writer:

   > Fisher wrote books about eating good food,
   > and many people have read them.

   Should the writer make this addition here?

   F. Yes, because it contains important supporting
      information.
   G. Yes, because it indicates the range of Fisher's
      expertise.
   H. No, because it repeats information provided else-
      where in the paragraph.
   J. No, because it does not include the titles of
      Fisher's other books.

5. A. NO CHANGE
   B. cook, her inspiration
   C. cook her inspiration
   D. cook her inspiration,

6. F. NO CHANGE
   G. cleverly employed resourcefulness and
   H. used her aptitude for originality cleverly and
   J. ingeniously

7. A. NO CHANGE
   B. there was enjoyment of her reputation
   C. her reputation was developed
   D. a reputation was enjoyed by her

8. F. NO CHANGE
   G. best and freshest
   H. fresh and good
   J. better and fresher

9. At this point, the writer is considering adding the fol-
   lowing true statement:

   > Fisher wrote and published over twenty books.

   Should the writer make this addition here?

   A. Yes, because the essay is about Fisher's work as a
      writer.
   B. Yes, because it supports the claim that Fisher was
      passionate about writing.
   C. No, because it interrupts the sequence of events.
   D. No, because it is not specific about how many are
      cookbooks.

10. F. NO CHANGE
    G. Atlantic, she discovered
    H. Atlantic, she discovered,
    J. Atlantic she discovered

GO ON TO THE NEXT PAGE.

[4]

Once, as a young girl <u>fixes</u> supper for herself, Fisher
                              11
couldn't resist adding enough curry to hard-boiled eggs in

white sauce to completely change their appearance and

flavor. Each bite burned her tongue, <u>because</u> she was
                                          12
pleased with her accomplishment. The meal was far

from bland.

[5]

Fisher believed that a good cook could accomplish

in three simple courses what a famous chef might only

accomplish with a complicated menu. 13 Her writing

is based on the same philosophy. Charming, delectable,

and full of personality, Fisher's essays are short and

evocative, offering precisely enough to whet and satisfy

the reader's appetite. 14

11. A. NO CHANGE
    B. fix
    C. fixing
    D. fixed

12. F. NO CHANGE
    G. yet
    H. unless
    J. when

13. At this point, the writer is considering adding the following true statement to emphasize what Fisher accomplished with her cooking:

    It took her years to learn how to prepare a meal with several courses.

    Should the writer make this addition here?

    A. Yes, because it gives an example of the type of meal being discussed.
    B. Yes, because it shows how long it takes to learn to make a meal.
    C. No, because the paragraph as a whole is about Fisher's philosophy rather than her success with cooking.
    D. No, because the statement repeats an idea presented earlier in the paragraph.

14. Which of the following sentences, if added here, would best support Fisher's ideas as they are expressed in the essay?

    F. This book will prove what Fisher used to say—she has always been a reporter and, perhaps, a writer.
    G. Those who read her books agree that Fisher is far more than merely one of the world's most celebrated writers on food.
    H. Good writing, she seemed to say, was like good cooking, modest in proportion but generous in spirit.
    J. In her essays, Fisher says that she remembers everything in her life with equal clarity and writes easily about the first days in Dijon.

Question 15 asks about the preceding passage as a whole.

---

15. For the sake of the unity and coherence of the essay, Paragraph 4 should be placed:

    A. where it is now.
    B. after Paragraph 1.
    C. after Paragraph 2.
    D. after Paragraph 5.

PASSAGE II

Leader of the Pack

Customers call me a dog trainer, but really

I train people—to treat their dogs like dogs.

Dogs you see are pack animals. And every pack
16
has a pecking order, with one member clearly

at the top, as you might be able to imagine.
17

One of my clients, Andrew, had a young Irish

setter named Red. Who had never been taught any
18

commands. Red barked incessantly when Andrew
19
left home, jumped on Andrew's guests, and begged for

table scraps. Andrew had treated Red as an equal, letting

her lounge on his couch, sleep on his bed, and eating
20

whenever he wanted.
21

All this made Red believe she was the top dog.

However, canines associate physically high perches with
22
authority, so giving her couch and bed rights immediately

got things off on the wrong paw. Additionally, in a dog

pack the leader eats first (while the others wait), so

Andrew's behavior confused Red further. Andrew left her

illusions intact when he did not teach her any commands.

16. F. NO CHANGE
    G. Dogs you see,
    H. Dogs, you see
    J. Dogs, you see,

17. Which choice would best conclude the sentence to effectively emphasize the point about pack animals made earlier in the sentence?
    A. NO CHANGE
    B. ready to share leadership with fellow members of the pack.
    C. dominating those below.
    D. riding the wave.

18. F. NO CHANGE
    G. Red who,
    H. Red, who
    J. Red; who

19. A. NO CHANGE
    B. incessantly without interruption
    C. continuously without interruption
    D. constantly and all the time

20. F. NO CHANGE
    G. eat
    H. to eat
    J. is eating

21. A. NO CHANGE
    B. they
    C. it
    D. she

22. F. NO CHANGE
    G. Even so, canines
    H. Nonetheless, canines
    J. Canines

5

GO ON TO THE NEXT PAGE.

[1] Thus to Red, it seemed

<u>unnecessary and unessential</u> to heed Andrew's
23

"No!" <u>but</u> she considered him her underling.
24
[2] As pack leader, she felt obliged to assert her

authority <u>from</u> visitors by jumping up to put her paws
25
on their shoulders. [3] She did the best she could, barking

nonstop to try to call him back. [4] Likewise, a pack leader

must care for the other pack members, but how could Red

watch over Andrew when he was away? 26

When I first began working with him, Andrew

found it hard to discipline his dog. To teach Red that

"No!" means no, firmness was needed. Andrew eventually

learned it was effective, and not unkind, to leash Red for

a few minutes after she misbehaved.

<u>If he were to ask</u> Red to sit or stay became easy for
27

Andrew <u>once</u> he saw how much she enjoyed following
28
orders, for pack members take pride in their work. Red

initially <u>resisted giving up the couch and bed,</u> but once she
29

saw <u>that, Andrew was</u> truly in charge, she acquiesced. No
30
doubt Red sleeps better now, knowing that someone is

taking care of her, instead of the other way around.

23. A. NO CHANGE
    B. unnecessary
    C. not necessary and not needed
    D. not necessary and decidedly unessential

24. F. NO CHANGE
    G. because
    H. although
    J. whom

25. A. NO CHANGE
    B. of
    C. over
    D. as

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

27. A. NO CHANGE
    B. Asking
    C. Having asked
    D. Ask

28. Which of the following alternatives to the underlined portion would NOT be acceptable?
    F. as soon as
    G. when
    H. after
    J. but

29. The writer would like to provide a specific example of a problem with Red that Andrew had to overcome. Given that all the choices are true, which one would best accomplish that goal?
    A. NO CHANGE
    B. disappointed Andrew,
    C. caused some difficulties,
    D. objected,

30. F. NO CHANGE
    G. that Andrew was,
    H. that, Andrew was,
    J. that Andrew was

PASSAGE III

James Wong Howe, Cinematographer

[1]

To visually express elements such as mood and tone, movie directors rely on cinematographers to work closely with them. In this artistic field, few
<u>work closely with them.</u> In this artistic field, few
31

cinematographers rank <u>the higher for</u> James Wong Howe.
32

[2]

<u>To be born</u> in China in 1899, Howe moved with his
33
family to Washington State at the age of five. During his childhood, Howe became interested in photography. When he was twelve, he purchased his first camera and taught himself to develop film. In 1916, after moving to Los Angeles, Howe worked in a photography studio to improve his skills in developing film and shooting photographs.

[3]

Howe's fifty-seven-year career in cinematography began later, on the set of <u>famed director</u> Cecil B.
34
DeMille's 1919 film *Male and Female.* For a scene in which a lion attacks the <u>film's star,</u> DeMille needed
35
multiple cameras but was short on camera operators.

31. Given that all the choices are true, which one adds new information to the essay and most specifically describes the type of work cinematographers perform in the creation of a film?
   A. NO CHANGE
   B. manage lighting and set up camera shots.
   C. contribute to the visual appearance of a film.
   D. perform their job expertly during the shooting of a film.

32. F. NO CHANGE
   G. more highly for
   H. the highest as
   J. as highly as

33. A. NO CHANGE
   B. Born
   C. As he is born
   D. He was born

34. If the writer were to delete the underlined portion, the sentence would primarily lose information about:
   F. the prominence of Howe's first employer in the film industry.
   G. the reason for DeMille's fame as a director at that time.
   H. Howe's motivation for pursuing work in the film industry.
   J. an explanation of why DeMille wanted Howe on the set.

35. A. NO CHANGE
   B. films' star,
   C. film star's
   D. films star

He called in Howe, who was in
<u>36</u>

charge, of cleaning the camera room, to help shoot
<u>37</u>

the scene. DeMille, pleased with Howe's work that he
<u>38</u>
hired him as an assistant camera operator for his next

several films.

[4]

In addition to operating movie cameras, Howe also
<u>39</u>
photographed the actors on the set. The popular actress

Mary Miles Minter discovered Howe's talent when he

figured out how to keep her pale eyes from appearing

white in black-and-white photographs. He was soon hired

as the cinematographer for her films, which established

Howe's reputation as an expert in the field.

[5]

Howe worked on over 140 films. He earned the

nickname "Low-Key Howe," for the way he lowered the
<u>40</u>
height of studio lights to make interiors look dim and

moody. His camera work was also imaginative. During

filming for the boxing movie *Body and Soul*; for instance,
<u>41</u>
he roller-skated around the ring, shooting close-ups with

a small handheld camera.

[6]

For his artful cinematography, Howe

was awarded and won two Academy Awards, and
<u>42</u>

an additional eight more nominations were made.
<u>43</u>

36. F. NO CHANGE
    G. whom
    H. that
    J. which

37. A. NO CHANGE
    B. charge of cleaning the camera room
    C. charge, of cleaning the camera room
    D. charge of cleaning the camera room,

38. F. NO CHANGE
    G. work,
    H. work, and
    J. work

39. A. NO CHANGE
    B. cameras;
    C. cameras.
    D. cameras—

40. F. NO CHANGE
    G. nickname, "Low-Key Howe"
    H. nickname, "Low-Key Howe,"
    J. nickname "Low-Key Howe"

41. A. NO CHANGE
    B. *Soul*, for instance,
    C. *Soul*. For instance,
    D. *Soul*, for instance;

42. F. NO CHANGE
    G. won for his achievement
    H. received for his artistic work
    J. won

43. A. NO CHANGE
    B. additional nominations included another eight for his work.
    C. eight additional nominations were given.
    D. he was nominated for eight more.

Today, many cinematographers attribute mostly the best
_____
44
innovative camera techniques to James Wong Howe.

44. **F.** NO CHANGE
   G. some of the most
   H. the better of
   J. more of the

Question 45 asks about the preceding passage as a whole.

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

   He was also one of the first to experiment with camera shots taken from a helicopter, as seen in the 1955 film *Picnic*.

   This sentence would most logically be placed after the last sentence in Paragraph:

   A. 2.
   B. 3.
   C. 5.
   D. 6.

PASSAGE IV

A Mystery at 10,000 Feet Under the Sea

In 1999, a deep-ocean exploration team conducting an ocean-floor survey in the eastern Mediterranean Sea found something they didn't expect. In five places, their sonar system detected unexplained shapes at a depth of almost 10,000 feet when it is known as the Herodotus Abyssal
_____
46
Plain. Perplexed by the sonar data, the explorers lowered

a remote-controlled vehicle to collect at one of the sites
_____
47

video images. These images made it clear: that the
_____
48

mysterious object was a shipwreck. However,
_____
49

the team was still puzzled about it's age.
_____
50

Seeking an answer, the team sent the video and sonar images to the Institute of Nautical Archaeology

46. **F.** NO CHANGE
   G. that
   H. on what
   J. on which

47. The underlined portion could logically be placed in all of the following locations EXCEPT:
   A. where it is now.
   B. after the word *explorers*.
   C. after the word *vehicle*.
   D. after the word *images* (and before the period).

48. **F.** NO CHANGE
   G. clear
   H. clear—
   J. clear,

49. Which of the following alternatives to the underlined portion would NOT be acceptable?
   A. unidentified
   B. strange
   C. difficult
   D. baffling

50. **F.** NO CHANGE
   G. their age.
   H. its age.
   J. them.

9

GO ON TO THE NEXT PAGE.

at Texas A&M University. When archaeologists

analyzed the images, they recognized a group of
51

amphoras—ancient jars for holding wine and oil—
52

in the ship's hull. After the amphoras in the
53

wreckage compares favorably with known amphoras
54
from the end of the second century BC.

Although most of the ship was buried in ocean

sediment, a deck beam and a small piece of wooden

planking from the left forward portion of the wreck was
55

visible. Both the beam and the planking appeared to be
56
well preserved, analysts thought the rest of the left

side of the ship could be intact also, preserved by
57
the great depth and the cold. Archaeologists now

are particularly interested in getting more complete
58

data from this wreck since they want to know more.
59
Archaeologists had previously thought that ships of this

period always sailed close to coastlines because early

sailors did not have the navigational skills to cover long

distances over open water.

---

51. A. NO CHANGE
B. it, they recognized
C. the images, they were recognized as
D. them, it was recognized as

52. If the writer were to delete the underlined portion, the sentence would primarily lose:
F. an unnecessary explanation about how wine was transported in ancient times.
G. a definition that clarifies a possibly unfamiliar term.
H. an interesting detail about risks involved in ancient shipping.
J. a historical detail not relevant to the essay's focus on shipwrecks.

53. A. NO CHANGE
B. For example, the
C. Nevertheless, the
D. The

54. F. NO CHANGE
G. wreckage, compares
H. wreckage compared
J. wreckage, compared

55. A. NO CHANGE
B. were
C. is
D. are

56. F. NO CHANGE
G. Although both
H. Since both
J. If both

57. A. NO CHANGE
B. intact; also preserved
C. intact also preserved,
D. intact also preserved

58. Which of the following alternatives to the underlined portion would NOT be acceptable?
F. are interested, in particular,
G. have particularly interested
H. are interested particularly
J. have particular interest

59. Given that all the choices are true, which one most specifically helps to explain the significance of this shipwreck to archaeologists?
A. NO CHANGE
B. because it is a recent archaeological find.
C. now that they have been able to verify that it is a shipwreck.
D. since no other ship from that period has yet been found at such a depth.

The videotaped wreck lies midway between the ancient trading centers of Rhodes and Alexandria. The four other shapes in this area detected by the sonar are likely to be shipwrecks, too. If they are all from the same time period, these wrecks would be the first evidence of sustained traffic over open-water routes during ancient times, forcing historians to create a new theory of
60
ancient navigation.
60

60. Which phrase would most specifically indicate that a far-reaching change in scholars' thinking might result from information about these shipwrecks?

F. NO CHANGE
G. confirming that there were a lot of sailors back then.
H. telling people more about ancient shipwrecks.
J. providing historians with a lot of new information.

PASSAGE V

The following paragraphs may or may not be in the most logical order. Each paragraph is numbered in brackets, and question 75 will ask you to choose where Paragraph 5 should most logically be placed.

Aurora Mysterialis

[1]

The greatest light shows on Earth aren't fireworks displays [61] but rather the aurora borealis and aurora

61. At this point, the writer is considering adding the following phrases:

on some festive occasion, such as the Fourth of July in the United States,

Given that the revised sentence would still be accurate, should the writer make this addition here?

A. Yes, because it contributes specific information about fireworks displays.
B. Yes, because it makes clear what the main subject of the essay is.
C. No, because it adds unnecessary information that blurs the paragraph's focus.
D. No, because it mentions just one occasion at which fireworks can be seen.

australis, also known as the northern lights and
62
southern lights. These dazzling phenomena of

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

F. which are also called
G. also referred to as
H. these are also known as
J. known also as

shimmering colored lights, can be seen best near either
63
polar region, their beauty stretching six hundred miles into the air.

63. A. NO CHANGE
B. shimmering, colored lights
C. shimmering, colored, lights
D. shimmering, colored lights,

GO ON TO THE NEXT PAGE.

[2]

While legends about the lights abound, sometimes these old tales conflict with one another. For years, many people thought the lights were a form of reflected sunlight. Then, in 1899, Norwegian physicist Kristian Birkeland led a dangerous winter expedition to the Arctic Circle to observe the lights. Upon his return the following year, he became the first scientist to advance a comprehensive explanation of why auroras exist.

[3]

Birkeland posited that the lights are the result of electrically charged particles from the Sun interacting with Earth's magnetic field. While most of the particles streaming past Earth are deflected by its magnetic field, some follow the field lines toward the poles, producing light as they collide with oxygen and nitrogen in the atmosphere.

[4]

Further research has refined Birkeland's theory regarding the magnificent light show. Auroral studies by spacecraft have confirmed the close link between sunspot activity and the lights. They have also shown how the electrons that cause the northern and southern auroras create simultaneous—often mirror-image—light shows, one at each pole.

[5]

Many of the era's top scientists ridiculed Birkeland's work, who scoffed at the notion that electrons from the Sun could reach Earth's magnetic field from such a great distance.

64. Which choice would most effectively introduce the paragraph?
F. NO CHANGE
G. a complete scientific explanation has proven more elusive.
H. not enough is known about where the legends came from.
J. people still write new stories, songs, and poems about the auroras.

65. Which choice makes clear that Birkeland returned from the Arctic Circle in the year 1900?
A. NO CHANGE
B. Upon his return, the following year
C. That year following his return,
D. That year, following his return,

66. Which choice best clarifies that the particles, rather than the poles, produce the light?
F. NO CHANGE
G. poles that are producing
H. poles, which produce
J. poles that produce

67. A. NO CHANGE
B. auroras,
C. auroras and
D. auroras, and they

68. F. NO CHANGE
G. Birkeland's work was ridiculed by many of the era's top scientists,
H. Many top scientists of the era ridiculed the work by Birkeland,
J. Many top scientists ridiculed Birkeland's work during the era,

However, it wasn't until the 1960s,
_____
69

when satellites first proved the existence of a
_____
70
"solar wind" of particles sweeping past Earth,
_____
70
that Birkeland's central tenet was substantiated.

[6]

Though we now have a clearer picture of why the
_____
71

lights occur, it remains incomplete. Even as new findings
_____
72

emerge while no scientific explanation can fully capture
_____
73

the lights' silent majesty. 74

69. A. NO CHANGE
 B. Still, it
 C. First, it
 D. It

70. Given that all the choices are true, which one provides the most relevant and specific support for the essay's claim about the basic soundness of Birkeland's theory?
 F. NO CHANGE
 G. during which time scientists made rapid advances in satellite technology,
 H. a decade in which space programs around the world launched multiple satellites every year,
 J. a time when satellites such as Luna and Ranger sent back never-before-seen images of the Moon,

71. A. NO CHANGE
 B. Because we
 C. Since we
 D. We

72. Which of the following alternatives to the underlined portion would NOT be acceptable?
 F. unfinished.
 G. imperfect.
 H. partial.
 J. short.

73. A. NO CHANGE
 B. emerge with
 C. emerge, there is
 D. emerge,

74. As a way to conclude the paragraph, the writer is considering adding the following true statement:

> Of course, some people up through modern times have claimed they can "hear" the auroras, but scientists believe it's unlikely that the auroras themselves produce the sounds people report.

Should the writer make this addition here?
 F. Yes, because it contributes a valuable scientific fact about the auroras to the paragraph.
 G. Yes, because it logically wraps up the paragraph's description of the auroras' majestic appearance.
 H. No, because it clearly undermines the paragraph's claim that the auroras are silent.
 J. No, because it raises a largely irrelevant and anticlimactic point that weakens the paragraph.

_____
| Question 75 asks about the preceding passage |
| as a whole. |
_____

75. For the sake of the logic and coherence of the essay, Paragraph 5 should be placed:
 A. where it is now.
 B. after Paragraph 2.
 C. after Paragraph 3.
 D. after Paragraph 6.

END OF TEST 1

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

MATHEMATICS TEST
60 Minutes—60 Questions

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

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

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

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

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

---

1. The face of a fair spinner is divided into 24 sectors, each of which is 1 of 5 colors: Blue, Purple, Green, Orange, or Red. The table below gives each color and the probability that the spinner, when spun, will stop on that color. On which color shown in the table is the spinner LEAST likely to stop?

Color	Probability
Blue	$\frac{1}{4}$
Purple	$\frac{1}{8}$
Green	$\frac{1}{12}$
Orange	$\frac{3}{8}$
Red	$\frac{1}{6}$

A. Blue
B. Purple
C. Green
D. Orange
E. Red

2. Saul goes shopping and decides to buy 4 shirts at a price of $20.08 each. Which of the following expressions gives the total price, in dollars, of the 4 shirts?

F. $4 + 20 + 0.08$
G. $4 - (20 - 0.08)$
H. $4 + (20 - 0.08)$
J. $4(20) - 4(0.08)$
K. $4(20) + 4(0.08)$

3. Which of the following expressions is equivalent to $x^2 - 9$?

A. $\left(\frac{1}{2}x - 3\right)\left(\frac{1}{2}x + 3\right)$

B. $(\ x - 3)(\ x - 3)$

C. $(\ x - 3)(\ x + 3)$

D. $(\ x - 1)(\ x + 9)$

E. $(\ 2x - 3)(\ 2x + 3)$

DO YOUR FIGURING HERE.

DO YOUR FIGURING HERE.

4. In the figure below, E is on $\overleftrightarrow{AD}$, $\overrightarrow{EB}$ is perpendicular to $\overrightarrow{EC}$, and the measure of $\angle CED$ equals 38°. What is the measure of $\angle AEB$?
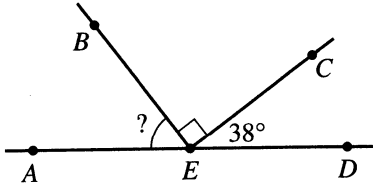
F. 38°
G. 45°
H. 52°
J. 71°
K. 76°

5. Janeece's average heart rate is 70 beats per minute. At this rate, how many times, to the nearest thousand, does her heart beat in 7 days?

A.   12,000
B.   29,000
C.   353,000
D.   706,000
E. 42,336,000

6. If $x = -7$, what is the value of $\dfrac{x^2 - 1}{x + 1}$?

F.   41

G. $7\frac{3}{4}$

H.   6

J.   −6

K.   −8

7. A point at $(-6,11)$ in the standard (x,y) coordinate plane is shifted right 11 units and down 6 units. What are the new coordinates of the point?

A. (−17,17)
B. (0, 0)
C. (5, 5)
D. (5,17)
E. (17,17)

8. If $7 + 4x = 31$, then $3x = $?

F.   6

G. 18

H. 20

J. 23

K. $\frac{57}{2}$

9. When Jamar purchased a houseplant for his room, it was 4 inches in height. For the next 6 weeks, the houseplant grew taller at a rate of $1\frac{1}{2}$ inches per week. Which of the following graphs best represents the houseplant's height, h inches, versus the number of weeks, w, after Jamar purchased the houseplant?

DO YOUR FIGURING HERE.

A.

B.

C.

D.

E.
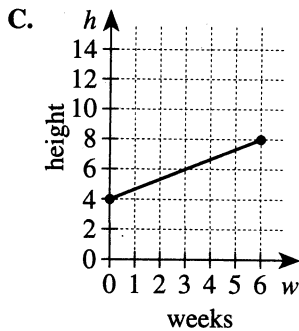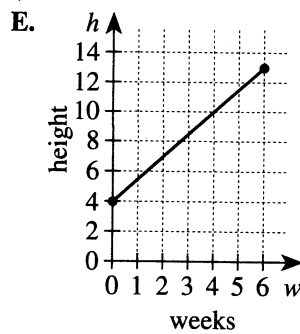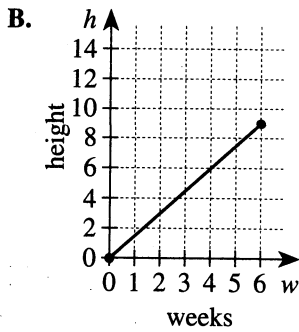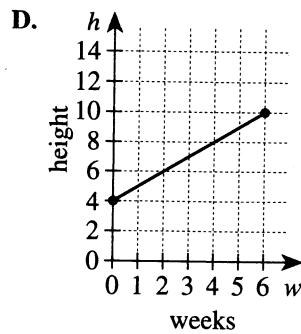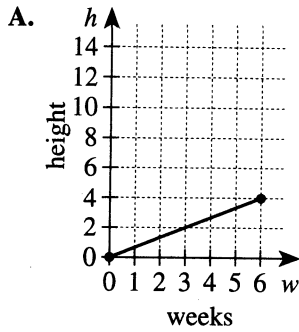
10. A function h of the variables a and b is defined as $h(a,b) = a^b - b^a$. What is the value of $h(3,2)$?

F.   −1
G.   0
H.   1
J.   3
K.   17

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DO YOUR FIGURING HERE.

11. In the figure below, $\angle BAC$ measures 35°, $\angle ABC$ measures 115°, and points B, C, and D are collinear. What is the measure of $\angle ACD$?
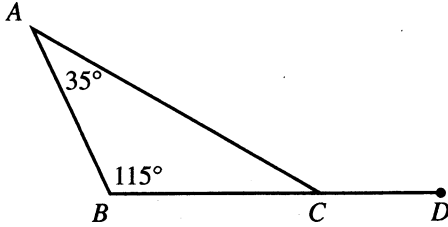
A. 115°
B. 120°
C. 125°
D. 145°
E. 150°

12. Koji had $50.00 to spend on school supplies. He bought a schoolbag for $18.50, a box of pencils for $2.50, and a package of pens for $4.00. Koji still must buy b binders at $3.50 each and n spiral notebooks at $0.75 each. Which of the following inequalities represents how many binders and spiral notebooks he can buy with the remaining money?

(Note: No tax is charged on school supplies.)

F. $3.5b + 0.75n \le 75$
G. $3.5b + 0.75n < 50$
H. $3.5b + 0.75n \le 50$
J. $3.5b + 0.75n < 25$
K. $3.5b + 0.75n \le 25$

13. In the figure below, $\angle AEB$ is congruent to $\angle DEC$ and $\overline{BE}$ is congruent to $\overline{CE}$. One of the following angle congruences completes what is needed to prove as directly as possible that $\triangle ABE$ is congruent to $\triangle DCE$ by applying the Angle-Side-Angle (ASA) property. Which one?
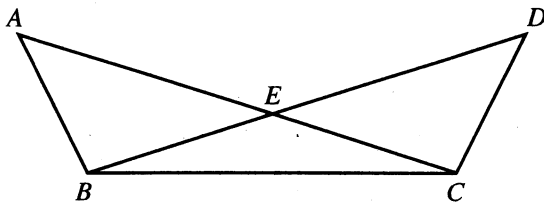
A. $\angle ABE \cong \angle CDE$
B. $\angle ABE \cong \angle DCE$
C. $\angle BAE \cong \angle BCD$
D. $\angle BCE \cong \angle BCD$
E. $\angle BCE \cong \angle BEC$

14. Of the 40 marbles in Dakarai's bag, all are solid in color and 16 are blue. The probability that he will randomly choose a yellow marble from the bag is $\frac{1}{8}$. How many yellow marbles are in Dakarai's bag?

F. 2
G. 3
H. 5
J. 16
K. 24

15. A square and a rectangle have the same area. The length of the rectangle is 36 centimeters, and the width of the rectangle is 4 centimeters. What is the length, in centimeters, of a side of the square?

A. $\sqrt{80}$
B. 12
C. 20
D. 80
E. 144

DO YOUR FIGURING HERE.

16. Arita played in 7 softball games. In the first 4 games, she had 2, 3, 1, and 3 hits, respectively. In the last 3 games, she had a total of 6 hits. What was her average number of hits per game in the 7 games?

F. 2

G. $\frac{15}{7}$

H. 3

J. $\frac{13}{4}$

K. $\frac{27}{7}$

17. A test has 50 questions and is worth 130 points. It consists of x 5-point questions and y 2-point questions. Which of the following systems of equations, when solved, gives the number of each type of question that is on the test?

A. $\begin{cases} x + y = 50 \\ x + y = 130 \end{cases}$

B. $\begin{cases} x + y = 130 \\ 2x + 5y = 50 \end{cases}$

C. $\begin{cases} x + y = 50 \\ 5x + 2y = 130 \end{cases}$

D. $\begin{cases} 2x + 5y = 50 \\ 2x + 5y = 130 \end{cases}$

E. $\begin{cases} 5x - y = 130 \\ 2x - y = 50 \end{cases}$

18. For what value of t is $4.5 = \frac{1}{t}$ true?

F. $\frac{2}{9}$

G. $\frac{9}{2}$

H. 7

J. 11

K. 18

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DO YOUR FIGURING HERE.

19. $(4a + 7b + 6c) - (6a + 6b - 3c)$ is equivalent to:

A. $-2a + b + 9c$
B. $-2a + b - 3c$
C. $-2a + 13b + 9c$
D. $-2a + 13b - 3c$
E. $8abc$

20. What is the least common multiple of 50, 30, and 70 ?

F. 50
G. 105
H. 150
J. 1,050
K. 105,000

21. The number of bricks, B, needed to build a wall of length L feet and uniform height H feet can be found by the equation $B = 7LH$. A wall of uniform height that is 30 feet long is constructed using 420 bricks. What is the height, in feet, of the wall?

A. 0.2
B. 1.4
C. 2
D. 14
E. 60

22. What is the slope of any line parallel to the line $5x + 7y = 7$?

F. -5

G. $-\dfrac{5}{7}$

H. $\dfrac{5}{7}$

J. 5

K. 7

23. In the figure below, right triangle $\triangle ABC$ has an area of 20 square inches, $\overline{BC}$ is 5 inches long, and $\angle B$ is a right angle. What is the length, in inches, of $\overline{AB}$?

A. 2
B. 4
C. 5
D. 7.5
E. 8

DO YOUR FIGURING HERE.
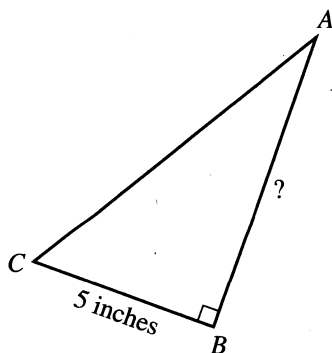
24. Reuben is standing 300 yards due east from the flagpole at his school and 400 yards due south from the oak tree in his front yard. What is the straight-line distance, in yards, from the flagpole to the oak tree?

   F. $10\sqrt{7}$
   G. $100\sqrt{7}$
   H. 100
   J. 500
   K. 700

25. $|9(-6) + 5(4)| = ?$

   A. −34
   B. 12
   C. 23
   D. 34
   E. 74

26. Given $6x - y = x + 5y$, which of the following is an expression for y ?

   F. $-\dfrac{5x}{6}$

   G. $\dfrac{5x}{6}$

   H. $\dfrac{6x}{5}$

   J. $\dfrac{x + 6y}{6}$

   K. $\dfrac{x + 5y}{6x}$

27. The lengths of the corresponding sides of 2 similar right triangles are in the ratio of 2:7. The hypotenuse of the smaller triangle is 10 inches long. How many inches long is the hypotenuse of the larger triangle?

   A. 9
   B. 14
   C. 15
   D. 19
   E. 35

28. Which of the following is equivalent to $x^5 \cdot x^{-(3^2)}$?

   F. x^{-45}
   G. x^{-4}
   H. x^{-1}
   J. x^{14}
   K. x^{45}

DO YOUR FIGURING HERE.

Use the following information to answer questions 29–31.

Kyla purchased 25 pieces of candy from Laszko's Candy Shop. Her purchase consists of 7 lollipops, 4 candy bars, 10 licorice sticks, and 4 gumballs. The unit price of each candy item is shown in the table below. Kyla's purchase, without sales tax, totaled $10.30. Laszko's charges an 8% sales tax on each purchase, which is calculated by multiplying the purchase total by 0.08 and rounding to the nearest $0.01.

Candy item	Unit price
Lollipop	$0.90
Candy bar	$0.60
Licorice stick	$0.10
Gumball	$0.15

29. Kyla gave the shop clerk $15.00. How much change should Kyla have received?

    A. $3.88
    B. $4.35
    C. $4.62
    D. $4.70
    E. $5.08

30. Without sales tax, what was the average price Kyla paid per piece of candy, to the nearest $0.01 ?

    F. $0.21
    G. $0.25
    H. $0.32
    J. $0.41
    K. $0.44

31. Kyla offers to sell 2 of the 25 pieces of candy to her brother Virgil. She lets Virgil have a choice of 2 pieces of the same candy item or 1 piece each of 2 different candy items. Kyla will have Virgil pay the same total cost for the 2 pieces that he would pay for the 2 pieces at Laszko's. How many different total costs (in dollars) are possible for Virgil's choice of 2 pieces?

    A. 8
    B. 10
    C. 12
    D. 14
    E. 16

32. The diameter of a circle is 36 yards, as shown in the figure below. What is the circumference of the circle, in yards?
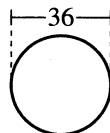
    F. 18π
    G. 36π
    H. 72π
    J. 324π
    K. $1,296\pi$

33. For all real x, $\dfrac{[3(x-2)]^2}{3} = ?$

   A. $x^2 + 4$

   B. $x^2 + 4x + 4$

   C. $3x^2 - 12$

   D. $3x^2 - 12x + 12$

   E. $3x^2 + 12x + 12$

34. Which of the following is a solution statement for the inequality $6x - 6 < 7 + 10x$?

   F. $-\dfrac{13}{4} < x$

   G. $-\dfrac{1}{4} < x$

   H. $-\dfrac{13}{4} > x$

   J. $\dfrac{13}{16} > x$

   K. $\dfrac{13}{4} > x$

35. The perimeter of a parallelogram is 68 inches, and 1 side measures 14 inches. If it can be determined, what are the lengths, in inches, of the other 3 sides?

   A. 14, 13, 13
   B. 14, 14, 26
   C. 14, 20, 20
   D. 14, 27, 27
   E. Cannot be determined from the given information

36. What is the slope of the line through both of the points $(5,2)$ and $(9,4)$ in the standard (x,y) coordinate plane?

   F. -7

   G. -2

   H. $-\dfrac{1}{2}$

   J. $\dfrac{1}{2}$

   K. 2

37. The hour and minute hands of the clock shown below move at constant speeds. What is the measure of the angle formed by the hour and minute hands at exactly 1:30 ?
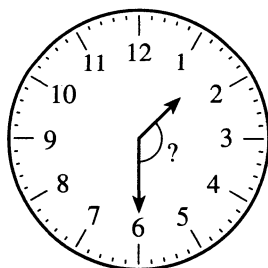

   A. $97.5°$
   B. $120°$
   C. $122.5°$
   D. $125°$
   E. $135°$

DO YOUR FIGURING HERE.

DO YOUR FIGURING HERE.

Use the following information to answer questions 38–40.

Shown below is an inflatable display (on level ground) of a Lion's Crest Cola can. A blower pumps air into the display at an average rate of 600 cubic feet per minute as it inflates the display. When fully inflated, the display is a right circular cylinder with a diameter of 12 feet and a height of 20 feet. Also shown below is 1 of the support ropes that anchors the display. The rope is attached to the top of the display and has an angle of elevation of 55°. The volume of air in the fully inflated display is equal to the display's height times the area of 1 of the circular bases.
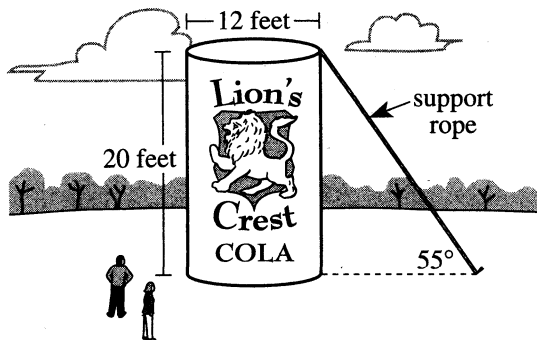
38. Which of the following is closest to the length, in feet, of the support rope?

(Note: sin 55° ≈ 0.82; cos 55° ≈ 0.57; tan 55° ≈ 1.43)

F. 24
G. 29
H. 32
J. 35
K. 40

39. The blower starts to pump air into the completely deflated display and continues until the display is fully inflated. To the nearest 0.1 minute, for how many minutes does the blower pump air?

A. 1.3
B. 2.5
C. 3.8
D. 5.0
E. 5.3

40. Inflatable Schemes, Inc., will manufacture a new inflatable display of a Lion's Crest Cola can that is geometrically similar to the display shown in the figure. The new display will have a height of 35 feet. What will be the diameter, in feet, of the new display?

F. 15
G. 21
H. 23
J. 27
K. 32

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41. The area of a rectangular garden in a city park is 162 square yards. The length of the garden is twice its width. What is the perimeter, in yards, of the garden?

A. 27
B. 36
C. 54
D. 162
E. 324

42. While shopping, Ashton decided to purchase a shirt on sale that was marked down 40% from its original price of $10.00. At the checkout, he used an in-store coupon for 10% off the sale price. What was the final price of the shirt before any tax was added?

F. $3.60
G. $4.00
H. $4.40
J. $5.00
K. $5.40

43. In the standard (x,y) coordinate plane, the graph of which of the following equations has the line $x = 2$ as a vertical asymptote?

A. $y = \dfrac{4x + 3}{2x}$

B. $y = \dfrac{4x + 3}{x + 2}$

C. $y = \dfrac{4x + 3}{x - 2}$

D. $y = \dfrac{x + 2}{4x + 3}$

E. $y = \dfrac{x - 2}{4x + 3}$

44. For what (x,y) pair is the matrix equation below true?

$$\begin{bmatrix} 3 & \frac{x}{2} \\ 0 & 1 \end{bmatrix} + \begin{bmatrix} x & 5 \\ 1 & 0 \end{bmatrix} = \begin{bmatrix} y & y \\ 1 & 1 \end{bmatrix}$$

F. (6, 0)
G. (5, 5)
H. (5, −2)
J. (4, 7)
K. (1, 4)

45. The marketing students at Fort Link Business Academy took a placement test for an accounting class. The mean of the test scores is 100 and the standard deviation is 15. In order to be accepted into the accounting class, a student must have attained a test score that is at least 1 standard deviation above the mean. What is the lowest test score a student could attain and still be accepted into the accounting class?
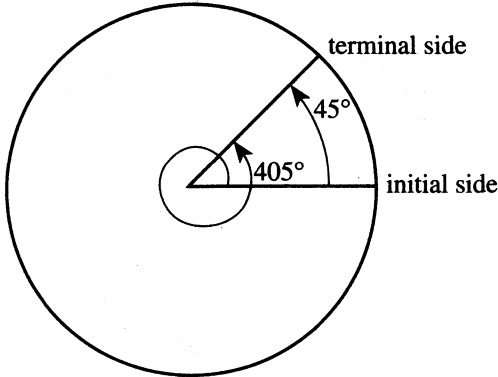
A. 15
B. 16
C. 101
D. 115
E. 116

DO YOUR FIGURING HERE.

GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

46. Two angles are *coterminal* if they have the same initial and terminal sides. For instance, the angles shown below with measures 45° and 405° are coterminal.

An angle with measure 30° is coterminal with a second angle. Which of the following measures could be that of the second angle?

F. 270°
G. 300°
H. 330°
J. 360°
K. 390°

47. In the standard (x,y) coordinate plane, the midpoint of $\overline{CD}$ is at $(5,-7)$ and point C is at $(3,-11)$. For point D at (a,b), what is the value of $a + b$?

A. −14
B. −10
C. −5
D. 4
E. 6

48. An airplane flies the 200 miles from Fairhaven to Locksboro along a straight line in a direction (shown below) that is 25° clockwise (↻) from due north. To the nearest mile, Locksboro is how many miles due east and how many miles due north from Fairhaven?

(Note: sin 25° ≈ 0.423, cos 25° ≈ 0.906)
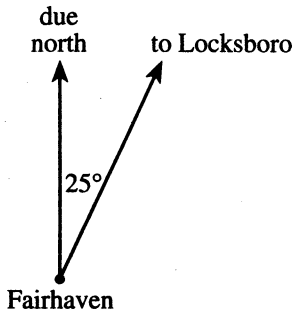
|	due east	due north
F.	85	181
G.	100	173
H.	141	141
J.	173	100
K.	181	85

DO YOUR FIGURING HERE.

49. The point (a,b) in the standard (x,y) coordinate plane lies on a curve that is symmetric with respect to the y-axis. Which of the following points must also lie on that curve?

A. $(-a,-b)$
B. $(-a, b)$
C. $(a,-b)$
D. $(-b, a)$
E. (b, a)

50. In the figure below, the square has side length 8 centimeters. Each vertex of the square is the center of a circle. The circles are congruent, and each circle is tangent to 2 of the other circles. The region that is interior to the square and exterior to all 4 circles is shaded. What is the area, to the nearest square centimeter, of the shaded region?
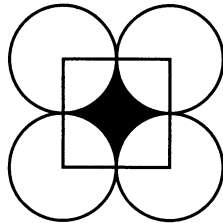

F. 51
G. 39
H. 32
J. 25
K. 14

51. The perimeter of a rectangle is P units and the width is w units. The length of the rectangle is x units longer than the width. Which of the following equations expresses x in terms of P and w ?

A. $x = \dfrac{P}{2} - w$

B. $x = \dfrac{P}{2} - 2w$

C. $x = \dfrac{P}{2} - 4w$

D. $x = P - 2w$

E. $x = P - 4w$

52. An angle with measure θ such that $\sin \theta = \dfrac{5}{13}$ is in standard position with its terminal side extending into Quadrant II as shown in the standard (x,y) coordinate plane below. What is the value of $\cos \theta$?

F. $-\dfrac{12}{13}$

G. $-\dfrac{5}{13}$

H. $\dfrac{5}{13}$

J. $\dfrac{13}{12}$

K. $\dfrac{13}{5}$
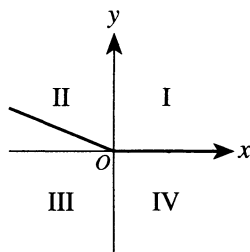
53. Let a and b be real numbers. If $(a + b)^2 = a^2 + b^2$, it *must* be true that:

   A. either a or b is zero.
   B. both a and b are zero.
   C. both a and b are positive.
   D. a is positive and b is negative.
   **E.** a is negative and b is positive.

DO YOUR FIGURING HERE.

54. The C & F Company manufactures cameras and rolls of film. The constraints on C & F's weekly production are shown on the coordinate plane below. The shaded region contains the feasible combinations of the number of cameras and the number of rolls of film produced in 1 week. Each vertex of the shaded region has integer coordinates (in thousands). The company makes a profit of $3 per camera sold and $1 per roll of film sold. Within the given constraints, what is the greatest possible profit, in dollars, from 1 week of C & F's production?
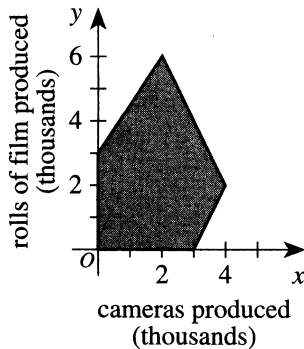
   F. $ 9,000
   G. $10,000
   **H.** $12,000
   J. $14,000
   K. $20,000

55. In the figure below, lines a and b are parallel, the angle measure y is in degrees, and $\angle 1$ and $\angle 2$ have the same measure. In terms of y, which of the following is equivalent to the degree measure of $\angle 3$?
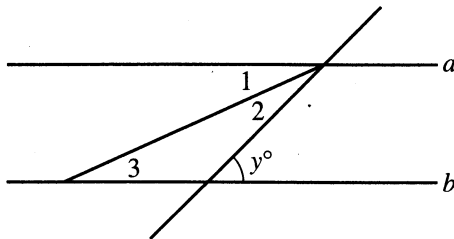
   A. $\dfrac{y^\circ}{2}$

   B. y°

   C. $90^\circ - y^\circ$

   D. $90^\circ - \dfrac{y^\circ}{2}$

   E. $189^\circ - y^\circ$

56. In the figure below, the vertices of rectangle *BCDE* lie on the circle and the vertices of rhombus *FGHI* are the midpoints of the sides of rectangle *BCDE*. Point *A* is at the center of the circle, rectangle, and rhombus.
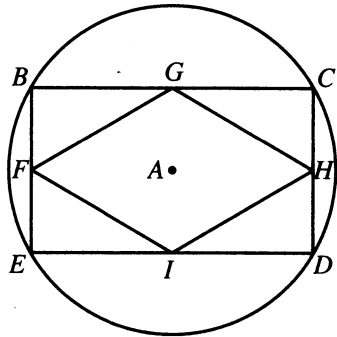
The radius of the circle is 4 feet. How long is a side of the rhombus, in feet?

F. 2
G. 3
H. 4
J. 6
K. 8

57. If $f(x) = \dfrac{3}{x^2 - 1}$ and $g(x) = x + 1$, which of the following number lines shows the domain of $f(g(x))$?

A.

B.

C.

D.

E.
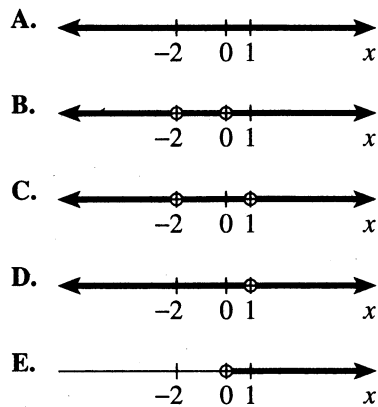
**58.** Which of the following is equivalent to $|x - 1| < B$?

F. $x - 1 < B$ and $1 - x < B$
G. $x - 1 < B$ and $1 - x > B$
H. $x - 1 > B$ and $1 - x < B$
J. $x + 1 < B$ and $1 - x < B$
K. $x + 1 < B$ and $1 - x > B$

DO YOUR FIGURING HERE.

59. The area, A, of a circle varies directly with the square of the radius, r. One of the following graphs shows the area, A, of a circle as the radius varies in the (r,A) coordinate plane. Which graph is it?

(Note: The (r,A) plane is the standard (x,y) coordinate plane with r along the horizontal axis and A along the vertical axis.)

A.

D.

B.

E.

C.
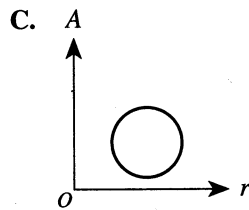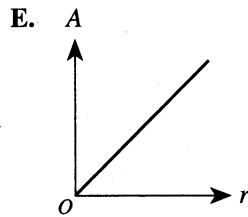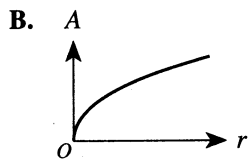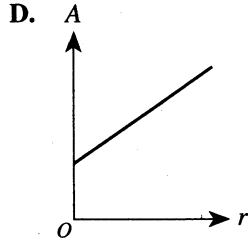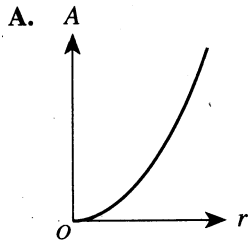
60. Susan discovered by trial and error that one root of the equation $2x^3 - 9x^2 + 16x - 12 = 0$ is 2. What are the other roots?

F. $\dfrac{5}{4} \pm \dfrac{\sqrt{23}}{4}$

G. $\dfrac{5}{2} \pm \dfrac{\sqrt{23}}{2}$

H. $\dfrac{5}{2} \pm \dfrac{i\sqrt{23}}{2}$

J. $\dfrac{5}{4} \pm \dfrac{i\sqrt{23}}{4}$

K. $-\dfrac{5}{4} \pm \dfrac{i\sqrt{23}}{4}$

END OF TEST 2

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

DO NOT RETURN TO THE PREVIOUS TEST.

READING TEST

35 Minutes—40 Questions

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

Passage I

PROSE FICTION: This passage is adapted from the novel *Queen of Dreams* by Chitra Banerjee Divakaruni (©2004 by Chitra Banerjee Divakaruni).

The narrator of the passage is a girl named Rakhi.

My father has been telling us stories all week, while he tries out snacks and sweets on us. I'm rusty, he claims. Got to get in shape. But I suspect he just loves to feed us. I enjoy the snacks, but it's the stories I really
5 crave. He has told us about his early days as a student in America, about the odd jobs he held to make money—a janitor in a hospital, a slot-machine repairman in a casino. About the people he met in these places. I would never have guessed that such a consum-
10 mate storyteller lay waiting all these years inside my father. He prolongs the suspense until we're about to shake him; he makes us burst out laughing at unexpected jokes. My favorite stories are about his life in India. But so far he has not told us any stories involving
15 my mother, though he does mention her—lovingly, ruefully—in passing.

From time to time my father sings as he cooks, mostly songs from the movies, though sometimes a haunting tune that sounds far older will wind like wood
20 smoke through the store. They make me restless, these tunes, as though there is something inside my chest that wants to escape. There's a feeling like pinpricks in my fingers, a need to paint—something I haven't been able to do since my mother's death.

25 When I ask, he tells me these are folk songs that field hands sing in Bengal. He picked them up during school holidays when he visited his uncle, who was the subestate manager for the royal family of Nataal. I sense a story there. No, stories tucked within the
30 envelopes of other stories, an entire post office worth of them, filling me with giddy anticipation.

But today my father tells us this is no time for lolling around, listening to foolish tales. Tomorrow's a big day. Flyers have been passed out via Marco and his
35 friends, advertisements have been placed in the *East Bay Express* and *India West*. I've given in and let my father deploy Sonny as our publicist, and he's been talking up our new concept at the nightclub. We must

be ready, my father insists. He needs to make another
40 batch of gawja, those crisp diamonds of fried dough crusted with sugar. He wasn't satisfied with the consistency of the melted sugar last time. We assure him that the gawjas were delicious, but he shakes his head. Nothing less than perfection will do for our grand
45 reopening, as he calls it. He assigns Belle the task of writing our new menu on the board. She asks if she should provide brief descriptions of the items, but he says no. No pandering to tourist types here, he adds sternly. This is a real cha shop. If people ask, you can
50 explain. But you'll be surprised at how much they know already—and how much they can learn on their own. Jespal, who has just come in, is set to dusting the furniture. As for me, he shoos me outside to paint. The new name has to be dry by the time we open tomorrow.
55 I comply, a little taken aback by his bustling, managerial manner. Is there no end to the personalities hiding inside my father's skin? Don't rush it, he warns as he disappears into the back room.

I trace the letters, then begin to fill them in. *Kurma*
60 *House.* My father is the author of this name. I pointed out to him that kurma is a dinner dish, something we don't plan to serve. He shrugged. We are artists, Rakhi, he said loftily. Must we be bound to literalities?

The heft of the brush in my hand, heavy with
65 paint, feels so right. Even though this isn't the same as composing a painting, there are resemblances. The dip of the wrist as I tap it against the edge of the can, the curve of the arm as I trace the top of the *K*. I hadn't realized how much my body had missed such
70 movements.

As I paint, my eyes stray to the inside of the store. Jespal has done a good job of cleaning the glass—it's almost as though it doesn't exist. He reads out items from a list my father has jotted down while Belle writes
75 them on the board. From time to time their eyes meet and they smile shyly. Suddenly it comes to me that within the year they will marry. (Is this prophecy, intuition, or just a guess? How far can I trust it, I who am not my mother?) Watching them, I feel at once happy
80 and lonely. It's not the loneliness of being without a mate, but something more primal. As though I were the only being left on this side of the glass, while the rest of the world—happy, uncaring—lived out its life on the other side. They were aware of my presence, they even

GO ON TO THE NEXT PAGE.

85 waved to me from time to time, as Belle was doing, but
    they didn't know how it felt to be looking in, waving
    back, unable to cross over.

1. Based on the passage, Rakhi's opinion of her father as
   a storyteller is that he is:
   A. a little rusty after years of not practicing but
      improving with every story he tells.
   B. compelling when describing events that really hap-
      pened but dull when making up tales.
   C. so gifted that she can hardly believe his talents
      have only recently come to her attention.
   D. amusing most of the time but occasionally silly in
      a way that embarrasses her.

2. Which of the following statements about Rakhi as a
   painter is NOT supported by the passage?
   F. The act of painting for the shop's reopening reac-
      quaints her with movements she has missed with-
      out realizing it.
   G. Listening to her father sing sometimes stirs in her
      the feeling that she needs to paint.
   H. From the time of her mother's death to the eve of
      the shop's reopening, she hasn't been able to paint.
   J. She had learned to paint from her mother, whose
      artwork will hang on the walls of the newly
      reopened shop.

3. In the passage, Rakhi compares some of her father's
   tunes to:
   A. smoke moving through the store.
   B. lovely paintings that inspire her.
   C. wind rustling in the trees.
   D. scary old movies.

4. In the third paragraph (lines 25–31), the father
   responds to Rakhi's question by:
   F. saying he is too busy getting ready for the shop's
      reopening to answer any questions.
   G. telling a story about a young field hand working
      for a royal family.
   H. claiming that the songs he sings were sent to him
      in envelopes inside of envelopes.
   J. explaining that he learned the songs of field hands
      when he visited his uncle in Bengal.

5. As presented by Rakhi in the last paragraph, the two
   people in the shop can accurately be described as all of
   the following EXCEPT:
   A. aware of her presence.
   B. sometimes shy in one another's company.
   C. engaged in tasks related to the shop's reopening.
   D. troubled by questions Rakhi asked them earlier.

6. As it is used in line 3, the statement "Got to get in
   shape" can best be described as the father talking to:
   F. himself quietly in an effort to resist eating another
      serving of sweets.
   G. his children in an effort to explain his recent burst
      of trying out treats on them.
   H. his children to encourage them to eat heartily in
      preparation for the tasks of the coming day.
   J. himself in the voice of a character from one of his
      children's favorite stories.

7. Rakhi states that the stories of her father's that she
   likes the most are the ones about:
   A. his job at a casino.
   B. her mother.
   C. his life in India.
   D. her childhood.

8. It is most reasonable to infer that the question in lines
   56–57 is prompted by Rakhi's feeling of:
   F. outrage over the seemingly endless demands her
      father is making of her.
   G. relief that the unpleasant work of the day is fin-
      ished and she is now free to do as she pleases.
   H. surprise in response to the ongoing changes in her
      father's behavior.
   J. pride as a result of being trusted by her father to
      perform an important job.

9. As it is used in line 57, the word it most nearly refers
   to the:
   A. telling of a story.
   B. decision to marry.
   C. making of a perfect batch of gawja.
   D. painting of the new name.

10. In the passage, the father refers to himself and Rakhi
    as:
    F. leaders.
    G. artists.
    H. storytellers.
    J. tourist types.

Passage II

Deep inside a five-thousand-square-foot concrete vault, buried below the streets of West Orange, New Jersey, lie the artifacts of one of history's greatest inventors: the notebooks, sketches, patents, contracts,
5 correspondence, invoices, prototypes, and blueprints of Thomas Alva Edison and his legendary "invention factory." Bob Rosenberg, the director of the Thomas A. Edison Papers Project, says he knew relatively little about Edison when he agreed to come here eighteen
10 years ago. He knows more now. But both he and Paul Israel, his longtime colleague on this endeavor, say they have a long way to go to fully understand the subject that has become their life's work.

In Edison, the historians have chosen a subject
15 whose image has been well kneaded by legend and worship. In the late nineteenth century, as his reputation as an inventor of genius began to take flight, Tom Edison had been seen as something of a mysterious figure, an alchemist scheming in a laboratory. But once the stream
20 of machines began to pour forth from his first major laboratory at Menlo Park, New Jersey (the phonograph, electric light, and an improved telephone were all invented there), people discovered them to be the kinds of inventions that brought them exciting new
25 conveniences.

Encouraged, in part, by Edison himself, who was a terrific self-promoter, the public that had once shied from him grew to see Edison as an American hero. Parents exhorted their children to follow his credo of hard
30 work, perseverance, and exploration. By the 1920s, Edison had become an American senior statesman, the Midwestern country boy who, along with his friend Henry Ford, built the modern American city and its vibrant, new, electric culture. Indeed, by the twenties,
35 Edison could witness the extraordinary impact of his labor: cities lit by his light, the sounds of a booming music industry created by his phonograph, a whole new form of popular culture—movies—established by his motion picture camera. Death did not diminish his rep-
40 utation; it enhanced it. By the mid 1930s, polls ranked Edison's popularity near that of Lincoln and Washington.

The best part of the Edison legend was its adventurous beginnings, with the young Edison leaving home
45 to ride the rails, selling candy and newspapers while setting up a small lab for electrical experiments in the baggage car. But the essence of Edison's broader appeal was that he had not simply been a "scientist"; he was a peculiarly *American* scientist: because he was largely
50 self-taught, he appealed to that innate American appreciation for the amateur; because he worked 112 hour weeks (and punched a clock just like the other workers), he confirmed the Yankee spirit for diligence and industry; because he focused his work on *applied*
55 science—inventions which had a future in the marketplace—at the expense of the theoretical, he separated his discoveries from those that shattered popular values and beliefs. In fact, Edison derided scientists who spent their lives "studying the fuzz on a bee" as morally sus-
60 pect and complained when one of his sons began to pursue theoretical physics.

By studying patents and drawings, ledger entries, and, especially, unbound scraps of paper upon which Edison and his associates recorded ideas in the midst of
65 research, Rosenberg and Israel have exposed some of the innocent fictions that have developed around the Edison story and slowly given human form to a figure who had long been left to caricature. Yet, amazingly, the man they have discovered is no less impressive and
70 perhaps even more representative of the national ethos. While Europeans have always considered invention a refined occupation, in America it was a utilitarian activity, inspired by necessity and dedicated to results. The papers have revealed Edison to be perhaps the most
75 representative figure of a technological style in the belief that if science is not serving humanity it is not worth pursuing.

By the 1970s, Edison's name had dropped down on the list of America's most admired. But, perhaps
80 because the waning days of the twentieth century and the first days of the twenty-first have defined a new "age of invention," one as dynamic and transforming as the one that occurred over a hundred years ago, interest in Edison has recently skyrocketed. Before Edison, the
85 image of the machine was as a behemoth, enslaver of humans; with Edison, the machine became a slave itself, to the human mind, an extension not of the muscles, but of the brain, from which naturally followed every major technological event, including the com-
90 puter. "Edison," says Rosenberg, "was quite simply the best inventor who ever lived."

11. The main purpose of the passage is to:
   A. describe aspects of the Edison legend and suggest how the Edison Papers Project is contributing to a better understanding of Edison.
   B. explain exactly how Rosenberg and Israel collected artifacts for the Edison Papers Project and describe the goal of their research.
   C. make clear that Rosenberg and Israel, through a thorough study of the myths surrounding Edison, plan to reinvent America's image of Edison.
   D. argue the merits of applied science over theoretical science, using Edison's approach to invention as support.

12. One of the main purposes of the second and third paragraphs (lines 14–42) is to describe how the American public's view of Edison evolved from:

F. slightly skeptical to reverent.
G. disdainful to almost accepting.
H. intrigued to slightly dismissive.
J. passionately critical to nearly worshipful.

13. It can most reasonably be inferred from the passage that Edison criticized scientists who spent their lives "studying the fuzz on a bee" (line 59) because he felt that those scientists weren't:

A. dedicated to advancing theoretical science.
B. focusing on shattering popular values and beliefs.
C. using their talents to serve human beings.
D. interested in sharing their research findings with other scientists.

14. It's clear from the passage that Rosenberg and Israel consider the Edison Papers Project and their study of Edison to be:

F. completed after eighteen years of hard work and research.
G. a work in progress that doesn't have a definite end point.
H. finally starting to seem worthwhile to them and to others who are interested in Edison.
J. an overwhelming task that soon will be passed on to a new team of historians.

15. The authors indicate that Americans in the early twentieth century held in high regard all of the following traits EXCEPT:

A. being committed to a job and working long hours.
B. having self-taught skills and succeeding as an amateur.
C. being focused on personal wealth.
D. creating marketable products.

16. As it is used in line 49, the word *peculiarly* most nearly means:

F. privately.
G. distinctly.
H. absurdly.
J. erratically.

17. The authors most likely include the parenthetical information in lines 52–53 to support the depiction of Edison as someone who:

A. wanted to appear to be like the typical U.S. worker.
B. felt as burdened and confined by workplace regulations as the typical U.S. worker.
C. encouraged U.S. workers to reevaluate their ideals and habits.
D. deeply resented having to work longer hours than the typical U.S. worker.

18. The passage implies that for the purpose of demystifying Edison, the most valuable Edison artifacts for Rosenberg and Israel have been:

F. entries in ledger books.
G. ideas written on unbound scraps of paper.
H. drafts of designs in blueprint form.
J. correspondence organized in envelopes.

19. The authors speculate that the resurgence of the American people's interest in Edison since the 1970s is a direct result of the:

A. Edison Papers Project.
B. discovery of Edison artifacts in West Orange, New Jersey.
C. current dramatic and transforming period of invention.
D. invention of the computer.

20. Which of the following is NOT described in the passage as having been invented at Edison's first major laboratory in Menlo Park, New Jersey?

F. A motion picture camera
G. The phonograph
H. An improved telephone
J. The electric light

Passage III

At dusk, a small black boat passes down a river through the city of Providence, Rhode Island. A crew member, dressed in black, beats slowly on a gong. Now other black boats appear, whose black-clad crews carry
5 torches. Disks of fire, each about a yard across, blossom on the river's surface. The flames, reaching up from braziers that appear to float on the water, breathe streamers of sparks into the air. Music just past the edge of memory (African drumming, arias from half-
10 forgotten operas, Indian ragas) mixes with the sputter and pop of burning firewood.

Tens of thousands of people line the riverbanks of downtown Providence to witness the curious civic ritual known as WaterFire, an event that occurs almost
15 every other Saturday from April to November and combines avant-garde performance art with a block party. People dance in the street to swing, salsa or tango on some nights, but mostly they watch the mock-mysterious spectacle of bonfires burning in a hundred
20 braziers, most of which rest on submerged floats that are anchored to the river bottom. Seven slow-moving boats make at least ten refueling runs from sundown to 1 A.M.

Depending on one's point of view, the event
25 evokes "the spirit of elemental beauty" or is "a campfire for the whole city." What's more, it has played an important role in the revival of downtown, which used to empty out in the evening. Now, on WaterFire nights large crowds fill the city's center. It used to be hard to
30 find anyone enjoying himself or herself on the banks of the Providence River, night or day. Actually, it used to be hard to find the Providence River, which had long since been largely covered over.

WaterFire started as a "fire sculpture installation"
35 by local artist Barnaby Evans, which he first presented in 1994, in the midst of the city's ten-year, $40 million effort to remove the bridges and roadways that had obscured the Providence River and the tributaries that feed it, the Woonasquatucket and Moshassuck Rivers.
40 WaterFire is thus the most flamboyant evidence of what urban planners call "daylighting," the growing practice of restoring long-obscured waterways.

Daylighting Providence's rivers has been such a success that practically everyone in the city is eager to
45 take credit for it. But the prime mover is generally recognized as local architect William Warner, who secured $100,000 in funding in 1982 to study the "fantasy" (his term) of restoring the abused waterways. By the middle of the 20th century, Providence's rivers had become so
50 fouled by sewage and industrial waste that the city decked them over with highways and parking lots. Opening the rivers, Warner argued, would create a cityscape as friendly to pedestrians as it had been to

cars. He formed a group of civic leaders, which regaled
55 city officials and others with slide shows of what the riverfront might look like if the rivers were exposed.

The largest urban renewal project in the city's history involved rerouting automobile traffic and building 12 new bridges. A downstream post office at the junc-
60 tion of the Woonasquatucket and Moshassuck Rivers could not be moved, so the rivers were redirected.

As it happened, Evans, the artist, created his second fire installation at an arts festival in 1996, around the time of the daylighting project's completion.
65 Then he kept hearing from residents who wanted to see the piece again; it was as though they'd never noticed the rivers before, he recalls. A nonprofit group, Water-Fire Providence, was started to continue staging the event. WaterFire, the *Providence Journal* editorialized
70 in 1997, is the most popular work of art in the city's history.

Does WaterFire mean anything in particular? Is it a take-off on a religious rite? A commentary on the lack of meaningful ritual in American life? Evans says it's
75 open to interpretation. "It is a ritual and a ceremony that refers to scores of religious festivals, as well as contemporary art," he says. "But I didn't want all that symbolism to get in the way of someone enjoying it simply for the beauty of it."

80 The music, emanating from invisible loudspeakers alongside the rivers, seems to come not from a single point but from all of Providence, as if the city were one instrument. The heat from the fires, the cedar smoke and the rhythms and chants seem to transport visitors to
85 another time and place. Around midnight, after the crowds have drifted away, people still sit by the riverbanks, staring into the flames. Not until the fires die do they seem to rediscover themselves, shake themselves out and head for home.

21. The main idea of the passage is that:
   A. WaterFire's success is attributable to several individuals, but Evans deserves most of the credit.
   B. WaterFire and a major urban renewal effort have revitalized downtown Providence.
   C. WaterFire's popularity has led Providence officials to consider supporting other public art.
   D. WaterFire is a curious civic ritual whose symbolic meaning is open to interpretation.

GO ON TO THE NEXT PAGE.

22. Which of the following best describes how the author uses the statement "Actually, it used to be hard to find the Providence River" (lines 31–32)?

   F. In a literal way to indicate that for decades the river had been obscured by construction
   G. In a literal way to indicate that poor city planning and inadequate maps made finding the river difficult for tourists
   H. In a metaphorical way to suggest that Providence residents had lost interest in the river and in downtown generally
   J. In a metaphorical way to suggest that sewage and industrial waste had fouled the river's waters

23. It can reasonably be inferred from the passage that which of the following events in Providence occurred first?

   A. Evans first presented a "fire sculpture installation" on the Providence River.
   B. The nonprofit group WaterFire Providence was established.
   C. The city began a ten-year effort to remove bridges and roadways.
   D. The Woonasquatucket and Moshassuck Rivers were redirected.

24. Within the passage, the main function of the first paragraph is to:

   F. provide vivid sensory details about WaterFire.
   G. explain how small boats are used in WaterFire.
   H. identify the rituals from which WaterFire draws its inspiration.
   J. describe a typical WaterFire performance, from start to finish.

25. The passage implies that compared to the appeal of watching WaterFire, the appeal of participating in the street dances held in downtown Providence is:

   A. stronger.
   B. weaker.
   C. about the same.
   D. variable, depending on whether the dance music is swing, salsa, or tango.

26. The details in the last paragraph primarily serve to illustrate the:

   F. ability of WaterFire to remind people of other times and places.
   G. unity that music can bring to a city such as Providence.
   H. current popularity of Providence's downtown.
   J. compelling hold WaterFire has on people.

27. The author presents the phrases "the spirit of elemental beauty" and "a campfire for the whole city" (lines 25–26) most nearly as:

   A. self-serving descriptions of WaterFire offered by its creator.
   B. conflicting points of view on WaterFire offered by city officials.
   C. people's varying perspectives on the essence of WaterFire.
   D. his own views of WaterFire's meaning and importance.

28. The author claims that the person or institution generally seen as deserving most credit for Providence's daylighting project is:

   F. Barnaby Evans.
   G. William Warner.
   H. the *Providence Journal.*
   J. WaterFire Providence.

29. The passage states that one argument initially used to promote the Providence daylighting project was that the project would:

   A. open up areas for public art installations.
   B. enhance the quality of the city's drinking water.
   C. improve car-traffic flow throughout the city.
   D. make the city more pedestrian friendly.

30. A *Providence Journal* editorial cited in the passage claims that of all the works of art in the city's history, WaterFire is the most:

   F. popular.
   G. controversial.
   H. expensive.
   J. innovative.

Passage IV

Prairie dogs evolved in the Pleistocene era and now represent the last of the Great Frontier. Histori-cally, prairie dog towns followed the bison, aerating the soil after the great stampedes. These towns could range
5 in size from one to one thousand acres. Many in the Great Plains seemed to spread as far as the horizon. Within these communities are family units called *coteries*. A coterie, consisting of a single adult male, one to four adult females, and offspring up to two years
10 old, can occupy a territory up to about an acre.

As above, so below. One could consider the double life of prairie dogs.

Above ground, prairie dog colonies literally change the land. Mounds created from the excavation
15 of burrows may be two feet high and ten feet in diame-ter. These serve as lookout posts and will keep the bur-rows dry from rain. Prairie dogs' communication system is sophisticated. Biologists have identified twelve different vocalizations and a variety of postures
20 and behavioral displays. One researcher studying a Utah prairie dog population near Bryce Canyon National Park noted specific calls, distinguishing between the calls made when a truck versus a coyote crossed into their territory. When danger is near, a
25 series of barks occurs in a prairie dog chorus, often led by sentinel dogs guarding the periphery of the colony. The word spreads. They quickly scramble and scurry across the desert and disappear into nearby holes. When danger seems to have passed, a prairie dog will care-
30 fully emerge, look in all directions, then stand on its mound and throw back its head, with its hands raised in what looks like a gesture of prayer, and give what has been called a *jump-yip* call that the coast is clear.

It is also common to see prairie dogs engage in
35 what looks like kissing. The "kiss" is used to distin-guish one coterie member from another. When prairie dogs recognize each other, they will participate in elab-orate grooming behavior. If one of the prairie dogs is an intruder, teeth may be bared, territory fought over,
40 claimed, or reclaimed by dominant males. In most cases the outsider flees.

Below ground, a burrow will typically be three to six feet deep and about fifteen feet long, although the size varies tremendously, depending on the landscape.
45 Prairie dogs will often dig small chambers to the side of the main burrow where they can listen to what is going on above. Deeper inside the burrows, they make nests out of grasses they have pulled under, where they will sleep, give birth, and care for their young (four is the
50 norm) in spring, with the babies usually not emerging until June. Native grasses make up 70 to 95 percent of their diet during the summer, changing to seeds and insects, even roots, as fall and winter approach.

Prairie dogs create habitat not only for themselves
55 but also for other grassland species. With their mounds and extensive burrowing systems (black-tailed prairie dogs typically have thirty to fifty burrow entrances per acre, while Gunnison's and white-tailed prairie dogs have fewer than twenty), their underground world is not
60 simply the haunt of prairie dogs but home to myriad other creatures as well. One study of black-tailed prairie dogs identified more than 140 species of wildlife associated with prairie dog towns. In a grass-land community historically tamped down by the
65 weight of stampeding bison, burrowing prairie dogs loosen and aerate the soil, keeping the land supple. In the spring and summer, they also spend most of their time foraging above ground. A single prairie dog may consume two pounds of green grasses and forbs per
70 week. Their hunger alters the landscape.

Prairie dogs' digging and scratching stimulates the soil, creating greater opportunities for seeds to germi-nate. With heightened water drainage due to the tun-nels, plants grow. Plant diversity follows. Animal
75 diversity follows the plants. Meadowlarks appear with an appetite for grasshoppers. Grasshopper sparrows appear in the abundance of seeds. Vacant or abandoned prairie dog burrows become the homes of cottontails, kangaroo rats, and deer mice. Burrowing owls, with
80 their long, spindly legs, stand on the former mounds of prairie dogs with an eye for the multiplying mice. One successful life inspires another, creating the strength of a grassland community. If the prairie dog goes, so goes an entire ecosystem, including the black-footed ferret
85 and burrowing owl, which now are endangered and threatened species. Prairie dogs create diversity.

31. The main function of the second paragraph (lines 11–12) is to:
   A. present a common assumption about prairie dogs that will be refuted in the next three paragraphs (lines 13–53).
   B. describe several aspects of the "double life" of prairie dogs.
   C. introduce the information that follows in the next three paragraphs (lines 13–53).
   D. outline the two controversial perspectives that will be debated in the rest of the passage.

32. Which of the following quotations best captures the third paragraph's (lines 13–33) main focus?
   F. "These serve as lookout posts" (line 16).
   G. "Prairie dogs' communication system is sophisti-cated" (lines 17–18).
   H. "When danger is near, a series of barks occurs in a prairie dog chorus" (lines 24–25).
   J. "They quickly scramble and scurry across the desert" (lines 27–28).

33. Which of the following questions does the passage never directly answer?

   A. What is the function of prairie dog "kissing"?
   B. In one study, how many species of wildlife have been associated with prairie dog towns?
   C. How many pounds of green grasses and forbs per week may a single prairie dog consume?
   D. Which prairie dog species are endangered or threatened?

34. Beginning with the sixth paragraph (lines 54–70), the primary focus of the passage shifts to:

   F. the effects of prairie dog behavior on the grassland ecosystem.
   G. the physical characteristics of the mounds that prairie dogs create.
   H. several theories that might explain prairie dogs' communication system.
   J. a discussion of how prairie dog behavior damages the environment.

35. The passage suggests which of the following about prairie dogs' response to danger?

   A. Only sentinel dogs can lead a prairie dog chorus.
   B. Prairie dogs in burrows on the periphery of the colony emerge from underground to keep watch when danger is present.
   C. The type of prairie dog danger-response call depends on the type of danger present.
   D. Each prairie dog has a unique burrow entrance into which it disappears when danger is near.

36. The passage indicates that a prairie dog from one coterie entering the territory of another coterie would most likely be:

   F. killed.
   G. threatened or attacked.
   H. unnoticed or ignored.
   J. welcomed.

37. The passage makes clear that prairie dogs' digging in and scratching on the soil produces all of the following EXCEPT:

   A. greater opportunity for seeds to germinate.
   B. new homes for animals such as cottontails and kangaroo rats.
   C. heightened water drainage.
   D. isolated areas of packed-down soil.

38. As it is used in line 3, the word *followed* most nearly means:

   F. came after.
   G. resembled.
   H. copied.
   J. set an example for.

39. The passage states that prairie dogs use the small chambers that they often dig to the side of the main burrow to:

   A. hide food.
   B. listen to what is going on above.
   C. store grasses that will be used to build nests.
   D. conceal their young when danger is present.

40. Which of the following does the passage most strongly suggest about prairie dog young?

   F. They're usually cared for by five female prairie dogs during their first year.
   G. They spend most of their first year building their own nests from grasses.
   H. They sleep almost all the time until they're about nine months old.
   J. They stay underground almost all the time for the first months after they're born.

END OF TEST 3

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

DO NOT RETURN TO A PREVIOUS TEST.

SCIENCE TEST

35 Minutes—40 Questions

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

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

Passage I

Scientists studied the effects of Drug A on cancer Cell Lines V–Z. Table 1 shows the organ of origin and the LD_{50} (the concentration necessary to kill 50% of cells) of Drug A for each cell line.

Table 1		
Cell Line	Organ of origin	LD_{50} of Drug A (μg*/L)
V	bladder	2.2
W	colon	6.9
X	colon	3.8
Y	prostate	70.0
Z	prostate	818.0
*$\mu g = 10^{-6}$ gram		

Six petri dishes were prepared, each with 1,000 cells from Cell Line V. Drug A was added to 5 of the dishes in different concentrations, and all 6 dishes were incubated for 72 hr. Then the drug was removed, and the surviving cells were incubated for 10 days. This procedure was repeated for Cell Lines W–Z. Figure 1 shows the *percent colony formation* (percent of the surviving cells that divided to form colonies) for each cell line at each concentration of Drug A.
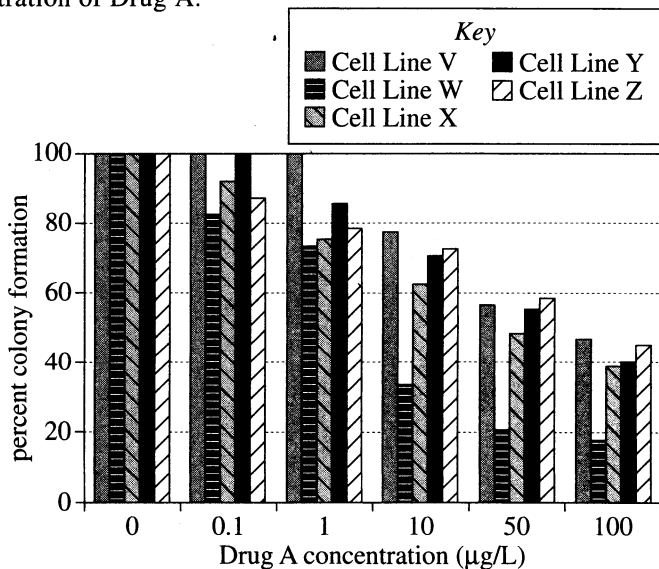

Key
Cell Line V   Cell Line Y
Cell Line W   Cell Line Z
Cell Line X

Figure 1

1. According to Figure 1, as the concentration of Drug A increased, the percent colony formation for Cell Line Z:

    A. increased only.
    B. decreased only.
    C. increased, then remained the same.
    D. decreased, then remained the same.

2. Based on Table 1, Cell Line W was formed from tissue found in which system of the human body?

    F. Circulatory system
    G. Digestive system
    H. Reproductive system
    J. Respiratory system

3. Based on Figure 1, if cells from Cell Line X had been treated with Drug A at a concentration of 200 μg/L, the percent colony formation would most likely have been:

    A. less than 40%.
    B. between 40% and 50%.
    C. between 50% and 60%.
    D. greater than 60%.

4. According to Table 1, the concentration of Drug A necessary to kill 50% of the cells from Cell Line Y was approximately 10 times the concentration of Drug A necessary to kill 50% of the cells from:

    F. Cell Line V.
    G. Cell Line W.
    H. Cell Line X.
    J. Cell Line Z.

5. At which of the following concentrations was Drug A completely ineffective in preventing the surviving Cell Line V cells from dividing to form colonies?

    A.   1 μg/L
    B.   10 μg/L
    C.   50 μg/L
    D. 100 μg/L

ACT-68C

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Passage II

Plants from Species X can be tall or short, and they can have red, pink, or white flowers. Height in Species X plants is controlled by Gene T, which has 2 alleles, T and t. Flower color in Species X plants is controlled by Gene R, which also has 2 alleles, R and r. To determine how height and flower color are inherited in Species X, a student conducted the following crosses.

Cross 1

Two tall Species X plants, each with the genotype Tt, were crossed. The numbers and phenotypes of the resulting offspring are shown in Table 1.

Table 1	
Number of offspring	Height phenotype
154	tall
46	short

Cross 2

Two pink-flowered Species X plants, each with the genotype Rr, were crossed, and the numbers and phenotypes of the resulting offspring are shown in Table 2.

Table 2	
Number of offspring	Flower phenotype
46	red
102	pink
52	white

Cross 3

Two Species X plants, each with the genotype $TtRr$, were crossed. The numbers, genotypes, and phenotypes of the resulting offspring are shown in Table 3.

Table 3			
Number of offspring	Genotype	Height phenotype	Flower phenotype
10	$TTRR$	tall	red
18	$TTRr$	tall	pink
11	$TTrr$	tall	white
19	$TtRR$	tall	red
41	$TtRr$	tall	pink
20	$Ttrr$	tall	white
12	$ttRR$	short	red
19	$ttRr$	short	pink
10	$ttrr$	short	white

6. The ratio of tall offspring to short offspring in Cross 1 is closest to which of the following?
   F. 1:1
   G. 1:3
   H. 3:1
   J. 1:2:1

7. What was the genotype for Gene T in the offspring from Cross 2 ?
   A. TT only
   B. Tt only
   C. tt only
   D. Cannot be determined from the given information

8. The percent of offspring from Cross 2 with pink flowers was closest to which of the following?
   F. 0%
   G. 25%
   H. 50%
   J. 100%

9. Suppose a gardener wants to produce tall pink-flowered Species X plants. Based on the results of Cross 3, which of the following pairs of plants, if crossed, would produce offspring with this phenotype?
   A. $TTRR$ and $TTrr$
   B. $TTrr$ and $Ttrr$
   C. $ttrr$ and $ttRR$
   D. $ttrr$ and $ttRr$

10. A student had hypothesized that the majority of the offspring from Cross 3 would be tall and have white flowers. Are the results shown in Table 3 consistent with this hypothesis?
    F. Yes; 31 of the offspring from Cross 3 were tall with white flowers.
    G. Yes; 119 of the offspring from Cross 3 were tall with white flowers.
    H. No; only 11 of the offspring from Cross 3 were tall with white flowers.
    J. No; only 31 of the offspring from Cross 3 were tall with white flowers.

11. Suppose a short red-flowered Species X plant is crossed with a short pink-flowered Species X plant. The percent of the resulting offspring with the genotype $ttRr$ will most likely be closest to which of the following?
    A. 0%
    B. 25%
    C. 50%
    D. 100%

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Passage III

In 3 studies, students investigated the stiffness of rectangular metal beams (see Figure 1).
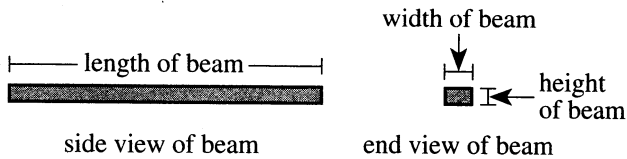

Figure 1

Using the apparatus shown in Figure 2, the students deformed each beam under a variety of conditions.
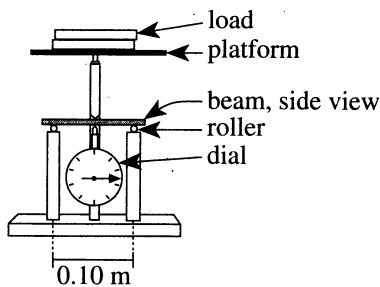

Figure 2

In each trial, the beam being tested was supported at 2 points that were 0.10 m apart and equidistant from the midpoint of the beam. The beam was subjected to a *load*, W, measured in newtons (N), at the midpoint of the beam. W was provided by weights placed on the platform of the apparatus. During deformation, each beam became slightly U-shaped (see Figure 3).

side view of beam before deformation

side view of beam deformed a distance D
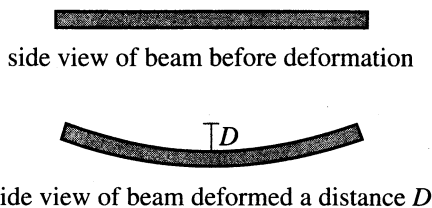
Figure 3

A dial on the apparatus registered the distance, D, the beam was deformed in multiples of 10^{-6} m. After D was measured, the load was removed, and the beam returned to its original shape.

The intrinsic stiffness of the metal composing a beam was represented by *Young's modulus*, E. The effect of the width and height of a beam (see Figure 1) on D was represented by the quantity I, given in m^4.

Study 1

In Trials 1–4, students determined D for beams with different I (see Table 1). In every trial, $W = 20$ N and $E = 50 \times 10^9$ N/m^2.

Table 1		
Trial	I (10^{-9} m^4)	D (10^{-6} m)
1	2.0	4.2
2	4.0	2.1
3	6.0	1.4
4	8.0	1.0

Study 2

In Trials 5–8, students determined D for beams composed of Metals S–V, respectively. Each metal had a different value of E (see Table 2). In every trial, $W = 20$ N and $I = 2.0 \times 10^{-9}$ m^4.

Table 2			
Trial	Metal	E (10^9 N/m^2)	D (10^{-6} m)
5	S	25	8.3
6	T	50	4.2
7	U	75	2.8
8	V	100	1.4

Study 3

In Trials 9–12, students determined D for different W (see Table 3). In every trial, $I = 2.0 \times 10^{-9}$ m^4 and $E = 50 \times 10^9$ N/m^2.

Table 3		
Trial	W (N)	D (10^{-6} m)
9	10	2.1
10	20	4.2
11	30	6.3
12	40	8.4

40

GO ON TO THE NEXT PAGE.

12. Which of the following diagrams of the side view of a beam correctly portrays the direction(s) of the 3 forces that the apparatus exerted on the beam?
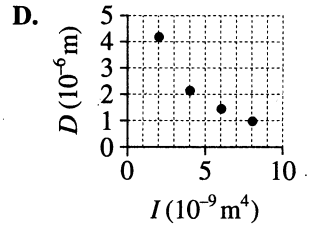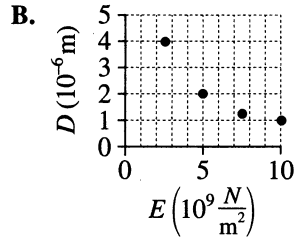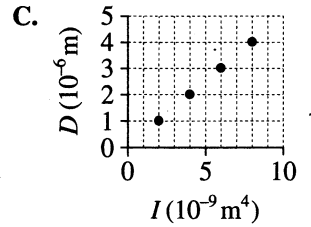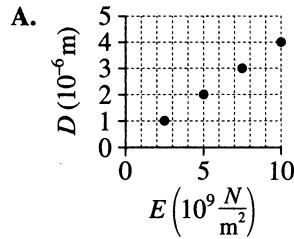
F. up ↑

G. up ↑

H. up ↑

J. up ↑

13. If, in Study 3, a trial had been conducted in which $W = 25$ N, D would most likely have been closest to which of the following?
A. 3.1×10^{-6} m
B. 5.2×10^{-6} m
C. 7.3×10^{-6} m
D. 9.4×10^{-6} m

14. If the amount of work done to deform a beam equaled $W \times D$, in which of the following trials was the amount of work the greatest?
F. Trial 2
G. Trial 4
H. Trial 6
J. Trial 8

15. The results of Study 1 are best represented by which of the following graphs?

A. D (10^{-6} m) vs $E\left(10^{9} \frac{N}{m^2}\right)$

C. D (10^{-6} m) vs I (10^{-9} m^4)

B. D (10^{-6} m) vs $E\left(10^{9} \frac{N}{m^2}\right)$

D. D (10^{-6} m) vs I (10^{-9} m^4)

16. The beam tested in Study 3 was most likely composed of which of the metals tested in Study 2 ?
F. Metal S
G. Metal T
H. Metal U
J. Metal V

17. Based on the results of Studies 1 and 2, for a given W, which of the following combinations of I and E would yield the stiffest beam?

	I (10^{-9} m^4)	E (10^{9} N/m^2)
A.	3.0	30
B.	3.0	40
C.	4.0	30
D.	4.0	40

Passage IV

When an oil is exposed to air, small amounts of reactive *peroxides* can form in the oil. If the peroxide concentration reaches a certain level, the oil will rapidly decompose to form acidic organic compounds such as formic acid. Scientists use an *accelerated oxidation apparatus*, AOA, to model this process on a short time scale (see diagram).
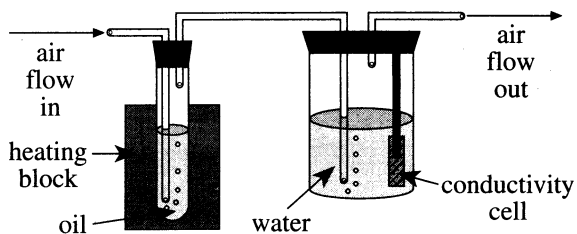

diagram of AOA

A 3 g oil sample is heated to a certain temperature. Starting at time = 0 min, dry air is bubbled through the sample at a constant rate. The flow of air carries organic acids produced in the sample into the flask containing water. The *conductivity* (ease of electric flow) of the water is monitored. The conductivity of the water stays relatively constant until the oil rapidly decomposes. As the oil rapidly decomposes, the conductivity sharply increases. The length of time from 0 min until this increase occurs is the *induction period*.

Biodiesels are renewable fuel oils typically made from soybeans. Scientists did 3 experiments to study 4 biodiesels (BD1–BD4). BD2 was a 50/50 mixture of BD1 and BD4 by volume.

Experiment 1

The induction period was determined for fresh samples of BD1–BD4 at 4 temperatures (see Figure 1).
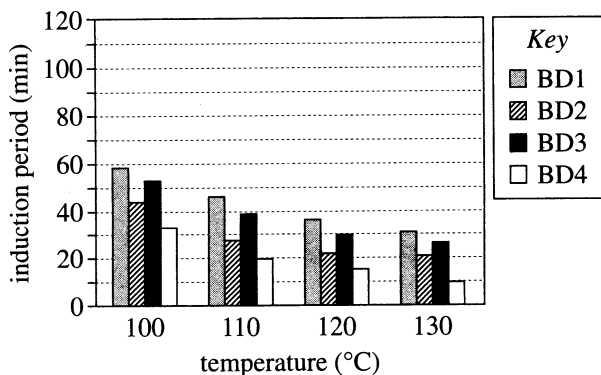

Figure 1

Experiment 2

The induction period was determined for fresh samples of BD1–BD4 at 110°C. Each sample contained 1 of 4 *antioxidants* at a concentration of 500 mg/kg (see Figure 2). Antioxidants are compounds that can inhibit the decomposition of oils exposed to air.
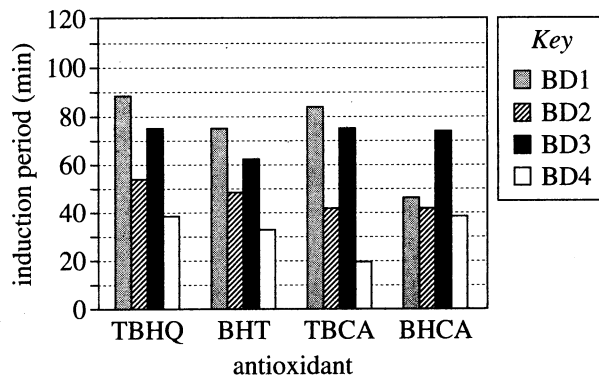

Figure 2

Experiment 3

The induction period was determined for fresh samples of BD1–BD4 at 110°C. Each sample contained a different concentration of the antioxidant TBHQ (see Figure 3).
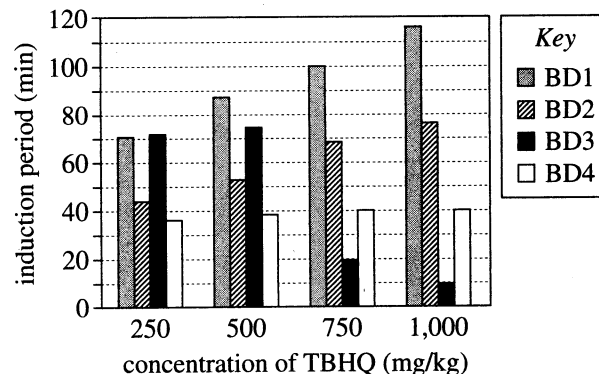

Figure 3

Figures adapted from S. R. Westbrook, *An Evaluation and Comparison of Test Methods to Measure the Oxidation Stability of Neat Biodiesel.* National Renewable Energy Laboratory, 2005.

18. In Experiment 3, which of the biodiesels having a TBHQ concentration of 750 mg/kg decomposed most quickly in the AOA ?

    F. BD1
    G. BD2
    H. BD3
    J. BD4

19. A chemist claims that if the antioxidant concentration in a biodiesel is increased from 500 mg/kg to 1,000 mg/kg, the biodiesel's stability will increase. The claim is *inconsistent* with the results in Experiment 3 for which biodiesel?

    A. BD1
    B. BD2
    C. BD3
    D. BD4

20. Suppose a set of trials had been done in Experiment 1 at 115°C. Which of the following would have been the most likely induction periods of BD2 and BD3 ?

	BD2	BD3
F.	25 min	35 min
G.	30 min	35 min
H.	35 min	25 min
J.	35 min	30 min

21. A sample of fresh BD1 is tested in the AOA as in Experiment 1 and is found to have an induction period of 65 min. At which of the following temperatures was the test most likely conducted?

    A. 95°C
    B. 105°C
    C. 115°C
    D. 125°C

22. In Experiments 1–3, the component of the air bubbling through the biodiesel sample that was primarily responsible for the breakdown of the sample was:

    F. H_2O.
    G. H_2.
    H. N_2.
    J. O_2.

23. Suppose BD5 is made by mixing 250 mL of BD1 with 750 mL of BD4. If a sample of BD5 containing 500 mg/kg of TBCA were tested as in Experiment 2, its induction period would most likely be:

    A. less than 20 min.
    B. between 20 min and 40 min.
    C. between 40 min and 80 min.
    D. greater than 80 min.

Passage V

In wetlands, the herbicides *atrazine* and *alachlor* are removed from the water by plant uptake or by adsorption onto soil particles and subsequent bacterial decomposition. Atrazine can also spontaneously break down to form *deethylatrazine* (DEA).

Three pairs of herbicide-free wetlands were established for a study: open water (O1, O2), submergent (S1, S2), and emergent (E1, E2), as described in Table 1. On 1 day, atrazine was added to O1, S1, and E1 and alachlor was added to O2, S2, and E2 to produce an initial herbicide concentration of 25 g/L in the water in each wetland. Atrazine, alachlor, and DEA concentrations in the water were measured at intervals over the next 120 days (see Figures 1–3).
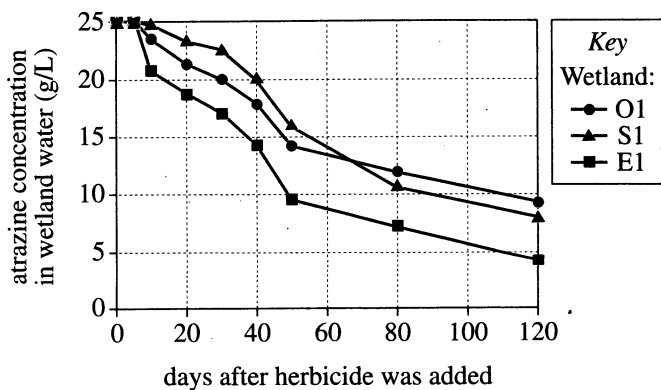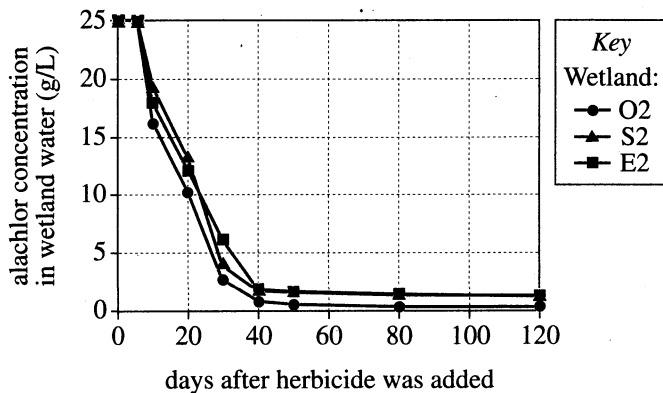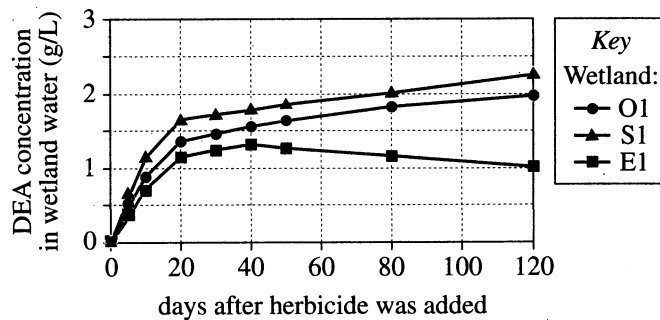
Figure 2

Figure 3

Figures adapted from K. E. Lee, D. G. Huggins, and E. M. Thurman, "Effects of Hydrophyte Community Structure on Atrazine and Alachlor Degradation in Wetlands." ©1995 by the American Water Resources Association and the American Society of Agricultural Engineers.

Table 1	
Wetland	Description of wetland
Open water (O1, O2)	Few if any plants present in the water
Submergent (S1, S2)	Abundant *submergent plants* (plants that grow beneath the surface of the water)
Emergent (E1, E2)	Abundant *emergent plants* (plants that are rooted beneath the water and have portions that grow out of the water)

Figure 1

24. Assume that the volume of water in each wetland remained constant over the 120 days of the study. According to Figure 2, 120 days after alachlor was added, what percent of the original alachlor concentration remained in the water in E2 ?

F. Less than 20%
G. Between 20% and 50%
H. Between 50% and 75%
J. Greater than 75%

25. According to Figure 1, 50 days after atrazine was added, its concentration in the water in S1 compared to its concentration in the water in E1 was about:

A. 7 g/L lower.
B. 16 g/L lower.
C. 7 g/L higher.
D. 16 g/L higher.

26. According to Figures 1 and 3, in S1, as the atrazine concentration decreased, the DEA concentration:

    F. increased only.
    G. decreased only.
    H. increased, then decreased.
    J. decreased, then increased.

27. Is the statement "Over the 120 days of the study, atrazine concentration was most reduced in the water in the open water wetland" supported by the data in Figure 1 ?

    A. Yes; 120 days after atrazine was added, its concentration was least in the water in O1.
    B. Yes; 120 days after atrazine was added, its concentration was least in the water in E1.
    C. No; 120 days after atrazine was added, its concentration was least in the water in O1.
    D. No; 120 days after atrazine was added, its concentration was least in the water in E1.

28. As shown in Figure 2, every time the alachlor concentrations in the water in O2, S2, and E2 were measured during the study, the concentrations in S2 and E2 were found to be very similar to the concentration in O2. The most likely explanation for this result is that in S2 and E2:

    F. plant uptake played a more significant role in removing alachlor than did adsorption onto soil particles followed by bacterial decomposition.
    G. plant uptake played a less significant role in removing alachlor than did adsorption onto soil particles followed by bacterial decomposition.
    H. adsorption onto soil particles followed by bacterial decomposition played a more significant role in removing alachlor than did breakdown to form DEA.
    J. adsorption onto soil particles followed by bacterial decomposition played a less significant role in removing alachlor than did breakdown to form DEA.

Passage VI

A science teacher tells students that a ball on a string is in motion, and that the speed of the ball, v, is measured twice in rapid succession and is found to be increasing. The teacher then asks each of 3 students to describe the ball's motion between and after the 2 measurements of v.

While analyzing the students' statements, consider the following information about the ball:

• The *amount of angular momentum* of the ball, AM, equals mvr, where m is the ball's mass and r is the distance of the ball from a reference point.

• The ball's *kinetic energy*, KE, equals $\frac{1}{2}mv^2$.

• The ball's *total mechanical energy*, TME, equals $KE + PE$, where PE is potential energy that is available to be converted into the ball's KE. If TME remains the same during the ball's motion, then TME is said to be *conserved*.

Student 1

The ball and string are suspended from a ceiling, forming a pendulum, and the pendulum is swinging without friction (see Figure 1).
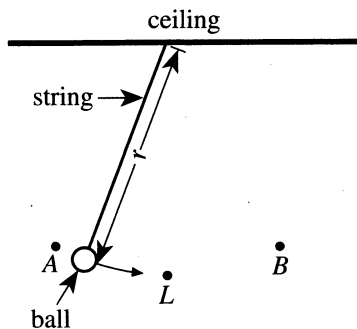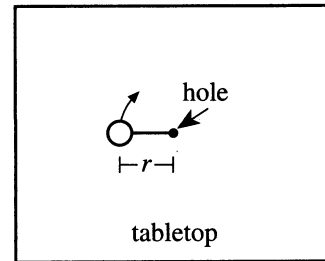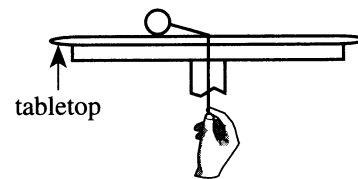

Figure 1

The speed v increases between the 2 measurements because the ball is approaching the lowest point in its path, Point L. At Point L, v has its greatest value; as the ball moves past Point L, v begins to decrease immediately. The decrease in v continues until the ball reaches one of the 2 end points of its path, Point A or Point B. Once the ball reaches an end point, it reverses its direction of motion, and v again begins to increase.

Student 2

One end of the string is threaded through a hole in a horizontal tabletop. While a student pulls down on the string, steadily decreasing r, the ball continuously slides without friction around the hole (see Figure 2).

Figure 2

The speed v increases between the 2 measurements because the product vr remains constant; v will continue to increase as r decreases.

Student 3

The ball is on a horizontal tabletop that is against a wall. The string, which is fastened to the wall, is elastic and has been stretched. The ball slides without friction toward the wall (see Figure 3).
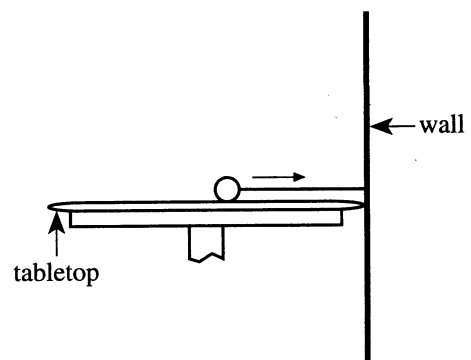

Figure 3

Between the 2 measurements, the string is contracting, so v increases. Once the string is no longer stretched, v remains constant until the ball hits the wall. After the ball bounces off the wall, v remains constant until the string begins to stretch again, at which time v begins to decrease.

29. Based on Student 1's description of the ball's motion, compared to the ball's *KE* at Point A or Point B, the ball's *KE* at Point L is:

A. greater, because v is greater at Point L.
B. greater, because v is less at Point L.
C. less, because v is greater at Point L.
D. less, because v is less at Point L.

30. Based on Student 3's description, when the ball is moving away from the wall and is slowing down, *PE* is accumulating. Where is the accumulating *PE* being stored?

F. In the ball
G. In the wall
H. In the table
J. In the string

31. Throughout the ball's motion as described by Student 1, does the amount of angular momentum of the ball, *AM*, remain constant?

A. Yes, because although v does not remain constant, m and r *do* remain constant.
B. Yes, because although r does not remain constant, m and v *do* remain constant.
C. No, because although m and v remain constant, r *does not* remain constant.
D. No, because although m and r remain constant, v *does not* remain constant.

32. Based on Student 2's description of the motion of the ball, as r decreases, how does the ball's *KE* change?

F. It increases, because v increases.
G. It increases, because v decreases.
H. It decreases, because v decreases.
J. It decreases, because v increases.

33. Speed v is momentarily zero at various times during the motion(s) described by which of the students?

A. Student 2 only
B. Student 3 only
C. Students 1 and 3 only
D. Students 2 and 3 only

34. Suppose that *TME* is conserved throughout the ball's motion. Based on the information given, if *TME* = 100 ergs, *KE* and *PE* can simultaneously have which of the following values?

	KE (ergs)	PE (ergs)
F.	10	10
G.	10	90
H.	125	25
J.	1,000	10

35. Suppose that when $r = 5$ cm, $v = 20$ cm/sec. Based on a statement by Student 2, when $r = 15$ cm, v equals a value closest to which of the following?

A. 3 cm/sec
B. 7 cm/sec
C. 15 cm/sec
D. 19 cm/sec

Passage VII

Consider an aqueous solution separated from pure H_2O by a membrane permeable to H_2O but impermeable to solute particles. H_2O will flow from the region of lower particle concentration (the pure H_2O) into the region of higher particle concentration (the solution). The pressure associated with this flow is the *osmotic pressure*, π, given in atmospheres (atm) by the equation

$$\pi = 0.0821 \times T \times i \times C$$

Table 1 defines the 3 variables in the equation.

Table 1	
Symbol	Definition
T	temperature, in kelvins (K), of the solution and the pure H_2O
i	number of particles (molecules or ions) formed per molecule or formula unit of a substance when it dissolves in H_2O
C	concentration (moles of a substance per liter of solution; 1 mole is 6.022×10^{23} molecules or formula units)

Table 2 lists, for 8 substances, the value of i and the *molar mass* (the mass of 1 mole of a substance).

Table 2		
Substance	i	Molar mass (g/mole)
NaCl	2	58.5
KCl	2	74.6
HCl	2	36.6
$MgCl_2$	3	95.2
K_2SO_4	3	174.0
Na_2SO_4	3	142.0
Glucose	1	180.0
Lactose	1	342.0

Figure 1 shows how π varies with C for aqueous NaCl solutions and aqueous glucose solutions at 3 temperatures.
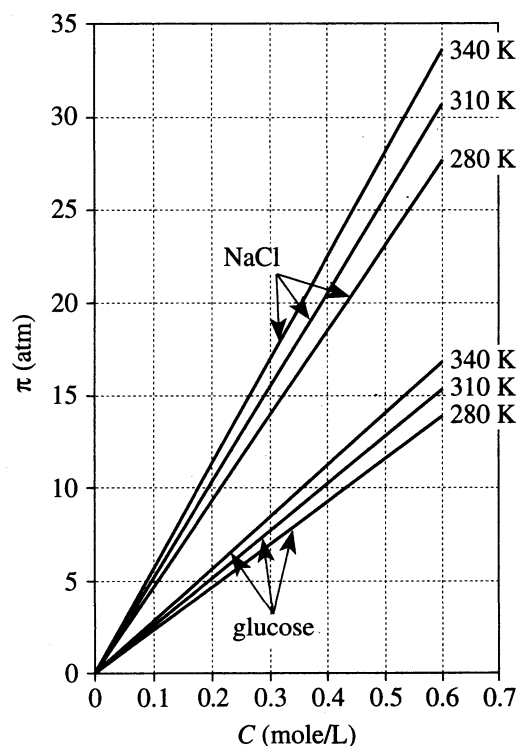

Figure 1

36. Consider a solution for which $C = 0.20$ mole/L and $\pi = 10$ atm. Based on Figure 1, this solution is most likely an aqueous solution of:

   F. NaCl at 280 K.
   G. NaCl at 310 K.
   H. glucose at 280 K.
   J. glucose at 310 K.

37. Compared to the mass of 1 molecule of glucose, the mass of 1 molecule of lactose is:

   A. smaller, because lactose has a smaller molar mass than does glucose.
   B. smaller, because lactose has a larger molar mass than does glucose.
   C. larger, because lactose has a smaller molar mass than does glucose.
   D. larger, because lactose has a larger molar mass than does glucose.

38. How does the value of i for HCl differ from the value of i for $MgCl_2$, and what is the meaning of the difference? The value of i for HCl is:

   F. lower, which means that each HCl dissolves in H_2O to form fewer particles than does each $MgCl_2$.
   G. lower, which means that each HCl dissolves in H_2O to form more particles than does each $MgCl_2$.
   H. higher, which means that each HCl dissolves in H_2O to form fewer particles than does each $MgCl_2$.
   J. higher, which means that each HCl dissolves in H_2O to form more particles than does each $MgCl_2$.

39. Suppose a 1 L solution is produced by dissolving 2 moles of KCl in H_2O. Based on the information provided, π, in atm, of this solution at 290 K can be calculated using which of the following expressions?

   A. $0.0821 \times 290 \times 1 \times 1$
   B. $0.0821 \times 290 \times 1 \times 2$
   C. $0.0821 \times 290 \times 2 \times 2$
   D. $0.0821 \times 290 \times 3 \times 2$

40. Suppose a new line showing how π varies for aqueous $MgCl_2$ solutions at 340 K were added to Figure 1. How would this new line compare to the lines shown in Figure 1 for aqueous NaCl solutions and aqueous glucose solutions at 340 K ?

   F. The y-intercept would remain the same, but the slope of the line would be greater.
   G. The y-intercept would remain the same, but the slope of the line would be smaller.
   H. The y-intercept would be greater, but the slope of the line would remain the same.
   J. The y-intercept would be smaller, but the slope of the line would remain the same.

END OF TEST 4

STOP! DO NOT RETURN TO ANY OTHER TEST.

Explanation of Procedures Used to Obtain
Scale Scores from Raw Scores

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

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

ACT Test 68C   **Your Scale Score**

English   _____

Mathematics   _____

Reading   _____

Science   _____

Sum of scores   _____

Composite score (sum ÷ 4)   _____

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

Scale Score	Test 1 English	Test 2 Mathematics	Test 3 Reading	Test 4 Science	Scale Score
36	75	59-60	40	39-40	36
35	73-74	58	39	—	35
34	72	57	38	38	34
33	71	56	37	37	33
32	70	55	36	36	32
31	69	54	35	—	31
30	68	53	33-34	35	30
29	66-67	51-52	32	34	29
28	65	49-50	31	32-33	28
27	63-64	47-48	30	31	27
26	61-62	44-46	29	30	26
25	59-60	41-43	28	28-29	25
24	56-58	38-40	26-27	26-27	24
23	54-55	36-37	25	24-25	23
22	51-53	34-35	24	23	22
21	48-50	32-33	22-23	21-22	21
20	45-47	30-31	21	19-20	20
19	43-44	28-29	19-20	17-18	19
18	41-42	26-27	18	15-16	18
17	39-40	23-25	17	14	17
16	36-38	18-22	16	13	16
15	33-35	14-17	15	12	15
14	31-32	12-13	13-14	11	14
13	29-30	9-11	12	10	13
12	27-28	8	11	9	12
11	25-26	6-7	9-10	8	11
10	23-24	5	8	6-7	10
9	20-22	4	7	5	9
8	17-19	—	6	4	8
7	14-16	3	5	—	7
6	11-13	2	4	3	6
5	9-10	—	3	2	5
4	7-8	1	—	—	4
3	5-6	—	2	1	3
2	3-4	—	1	—	2
1	0-2	0	0	0	1

07/16/10

ACT ASSESSMENT TEST INFORMATION RELEASE REPORT
TEST DATE = 06/10   TEST FORM = 68C   TEST CENTER = 23049

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                        1   1111111112  2222222223  3333333334  4444444445  5555555556  6666666667  77777
ITEM
NUMBER          1234567890  1234567890  1234567890  1234567890  1234567890  1234567890  1234567890  12345

ENGLISH
CORRECT ANSWER  AGAHBJAGCH  CGCHBJCHAG  DJBGCJBJAJ  BJBFAFDGAJ  BJDGCHAGCH  AGDHBHAGDF  CHBGAFAGDF  AJDJC
YOUR ANSWER     D+++++C+++  +++++++B++H  +++++++++++  C+++++++-+DH  D++J++B+D+  +++++++B++J  +FDF+++J+-  +++HA
SUBSCORE        UURURURURU  URRRURURU  URRRURURURU  RURRUUUUUU  URURURUURU  RRRURURUURR  RUURURUURR  RRURR

MATHEMATICS
CORRECT ANSWER  CKCHDKCGEH  EKBHBGCFAJ  CGEJDGEGAJ  BGDFCJEFCG  CKCJDKDFBK  BFAJAHBFAJ
YOUR ANSWER     ++++++++++  ++CGCF++D+  +++K++C+++  +JEGEKAHAJ  EJBKBHAJ+J  +K+GBGE+BG
SUBSCORE        AAATAAGAGG  TATATAGAAA  AGTTAATGAA  ATGGTGTTTA  AAGGATGTGT  ATAGTTGGGG

READING
CORRECT ANSWER  CJAJDGCHDG  AFCGCGAGCF  BFCFBJCGDF  CGDFCGDFBJ
YOUR ANSWER     BH+++++++  +JBHDH++++  CHB+C++++  A+C++C+A+
SUBSCORE        LLLLLLLLL  SSSSSSSSS  LLLLLLLLL  SSSSSSSSS

SCIENCE
CORRECT ANSWER  BGAGAHDHAJ  CGBHDGDHCF  AJBFCFDGAJ  DFCGBGDFCF
YOUR ANSWER     +++HBJ++++  B+++++A+B+  CF+-BGC++F  +G++DH+G+-
```

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

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

3rd Row: If the test includes subscores, one of the letters below
          indicates the category to which each item belongs:

          English: U = Usage/Mechanics
                    R = Rhetorical Skills
          Math: A = Pre-Algebra/Elementary Algebra
                    G = Intermediate Algebra/Coordinate Geometry
                    T = Plane Geometry/Trigonometry
          Reading: S = Social Studies/Sciences
                    L = Arts/Language

PLUS WRITING TEST FORM: 15R
1st RATER: 04   2nd RATER: 04

0003940