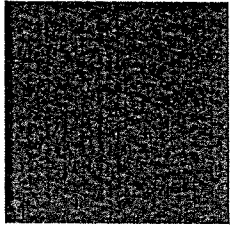# Form G01

(September 2023)

ACT® 2023 2024

In response to your request for Test Information Release materials, this booklet contains the test questions, scoring keys, and conversion tables used in determining your ACT scores. Enclosed with this booklet is a report that lists each of your answers, shows whether your answer was correct, and, if your answer was not correct, gives the correct answer.

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 G01   **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	Raw Scores				Scale Score
	Test 1 English	Test 2 Mathematics	Test 3 Reading	Test 4 Science	
36	73-75	58-60	39-40	39-40	36
35	71-72	56-57	37-38	38	35
34	70	54-55	36	37	34
33	69	53	35	—	33
32	68	52	34	36	32
31	67	50-51	33	35	31
30	66	49	—	34	30
29	65	47-48	32	—	29
28	64	45-46	31	33	28
27	63	42-44	30	32	27
26	61-62	40-41	—	30-31	26
25	59-60	37-39	29	29	25
24	57-58	35-36	27-28	27-28	24
23	54-56	33-34	26	25-26	23
22	51-53	31-32	25	23-24	22
21	48-50	30	23-24	22	21
20	46-47	28-29	22	20-21	20
19	43-45	26-27	20-21	18-19	19
18	42	23-25	19	17	18
17	39-41	20-22	18	15-16	17
16	36-38	17-19	16-17	14	16
15	32-35	13-16	15	12-13	15
14	30-31	10-12	13-14	11	14
13	27-29	8-9	12	10	13
12	25-26	6-7	10-11	9	12
11	21-24	5	9	8	11
10	17-20	4	7-8	7	10
9	14-16	—	6	6	9
8	12-13	3	—	5	8
7	10-11	—	5	4	7
6	8-9	2	4	3	6
5	6-7	—	3	—	5
4	5	1	—	2	4
3	3-4	—	2	1	3
2	2	—	1	—	2
1	0-1	0	0	0	1

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

Celebrating Powwows

Pauwau is an Algonquin word that once referred to medicine men, who danced, during [1] tribal ceremonies. However, Europeans

whom witnessed these ceremonies for the first [2] time thought the word referred to the whole event

and began calling the events "powwows," the term [3] now used by most American Indians. These early

ceremonies were held, by individual tribes to cure [4]

disease or to ensure success in battle or hunting. [5] At modern-day powwows, people gather to dance,

sing, socialize, and witness ceremonies honoring

the achievements of individuals or groups.

At most modern powwows, the main focus is

dance. Attendees can be apart of the competitive [6] dances or the open social dances called intertribals.

1. A. NO CHANGE
   B. men; who danced
   C. men who danced,
   D. men who danced

2. F. NO CHANGE
   G. who witnessing
   H. witnessing
   J. which witnessed

3. A. NO CHANGE
   B. begun
   C. would began
   D. will begin

4. F. NO CHANGE
   G. held by individual tribes
   H. held by individual tribes,
   J. held by, individual tribes,

5. A. NO CHANGE
   B. ensuring
   C. by ensuring
   D. for ensuring

6. F. NO CHANGE
   G. become apart of
   H. take part within
   J. take part in

The participants danced to the music of drums.
__7__

Each group of people who sit around a large skin

drum, singing and playing the drum in unison, is
__8__

known as a "Drum." These Drums provide the music

for each powwow activities. While smaller powwows
__9__

may host only one Drum, larger powwows (which
__10__

can last for days) usually involve several Drums.
__10__

Many American Indians mark important events

of their lives at powwows. At a recent powwow

at Stanford University, one family paid tribute to

their son, who was soon to graduate from law school.

A special dance was announced, and the crowd

grew quiet. The young man's father stepped up to

the microphone and began describing his son's many

achievements. When he was finished, a Drum began

to sing and play. Some of the young man's family

members began to dance in a circle. Before that,
__11__

people came from out of the crowd to shake hands

with the young man and dance with his family. In

this way, his achievements were honored by the

entire community.

Today, American Indians attend powwows

due to the fact that they want to celebrate their culture
__12__

as well as the achievements of their family members.

Powwows provide and afford a chance to mark
__13__

important transitions, to visit with old friends and

meet new ones, dance and singing take place, and to
__14__

celebrate the future as well as the past.

7. A. NO CHANGE
   B. dance
   C. were dancing
   D. would have danced

CSE — correct tense

8. F. NO CHANGE
   G. drum, singing and playing the drum in unison
   H. drum singing and playing the drum in unison,
   J. drum singing, and playing the drum in unison

CSE — Comma

9. A. NO CHANGE
   B. every
   C. all
   D. this

CSE — Correct determiner = modifies A Noun

10. F. NO CHANGE
    G. lasting for days, larger powwows usually involve several Drums.
    H. larger powwows usually involve several Drums lasting for days.
    J. larger powwows usually involve (which can last for days) several Drums.

CSE — Concision

11. A. NO CHANGE
    B. For example,
    C. In particular,
    D. Soon,

POW — Match the purpose, of the story pattern, organization

12. F. NO CHANGE
    G. in order to be there
    H. because of their desire and wish
    J. DELETE the underlined portion.

KLA — Be consistent in Tone! Maintain the tone. Being precise or Concise. Less is more

13. A. NO CHANGE
    B. a chance
    C. the opportunity for a chance
    D. a chance and opportunity

KLA — Less is more.

14. F. NO CHANGE
    G. for dancing and singing,
    H. to dance and sing,
    J. dancing and singing are enjoyed,

CSE — Comma

[handwritten: Do you know what the Author said— Did they say it? were they effective? First off! Yes... or No... Pow her go!]

Question 15 asks about the preceding passage as a whole.

15. Suppose the writer had intended to write a brief essay on an American Indian tradition that has been modified and continues to the present day. Would this essay successfully fulfill the writer's goal?

  A. Yes, because the essay describes tribal ceremonies that predated the arrival of Europeans and the powwows that are a modern adaptation of those ceremonies.
  B. Yes, because the essay explains in considerable detail the concept of the Drum and its central role in present-day powwows.
  C. No, because the essay states that the powwows that exist today serve entirely different purposes from those of the earlier tribal ceremonies.
  D. No, because the essay points out that the word *powwow* originally referred to medicine men and then doesn't indicate whether their role still exists today.

PASSAGE II

Edward O. Wilson's Ants

Careful of where he steps, carrying tweezers, vials notebooks and pencils, Edward O. Wilson has
16

looked over, under, and into the world of ants. He

has discovered that the influence of ants' behavior
17

on their success as a species is as great as their

number is vast. By thinking about and contemplating
18

ants, which are among the planet's smaller creatures,

Wilson has arrived at significant conclusions about

their social organization and survival.

[1] Wilson studies patterns of organization and

behavior in whole ant colonies. |19| [2] Because ants

resume normal behavior quickly, ant colonies are

easy to maintain and study in a laboratory. [3] By

observing ants in a few colonies in the field and in

the lab, Wilson can describe an entire species.

16. F. NO CHANGE   *[handwritten: Comma - List]*
  G. vials, notebooks and pencils
  H. vials, notebooks, and pencils,
  J. vials, notebooks, and pencils

[handwritten: CSE]

17. A. NO CHANGE
  B. will have discovered
  C. had discovered
  D. discovers

[handwritten: CSE]

18. F. NO CHANGE
  G. thinking
  H. studying   *[handwritten: Defined]*
  J. study about

[handwritten: KLA]

19. If the writer were to delete the phrase "in whole ant colonies" from the preceding sentence, it would primarily lose:
  A. an interesting illustration.
  B. redundant information.
  C. unnecessary overstatement.
  D. a defining detail.

[handwritten: Pow ??]

[4] He designs his studies with two questions in
the notebooks of his mind. [5] First, how do colony

members differentiate and divide labor? [6] And

second, why has some combinations of these

divisions of labor more successful than others?

[7] Wilson has found that worker ants are at the

center of a colonies success. [8] They integrate the

colony and provide labor specialization. [9] Some

worker ants dedicate their lives to feeding the colony,

foraging for and retrieving fifteen to twenty times

their weight in food daily. [23] [10] Additionally,

has = singular → he, she, it

Have = plural I, you, we, they

some foraging ants work in pairs. [11] In another

example of individual sacrifice for colony welfare,

worker ants that specialize as guards devoting their

lives to the protection of the colony's territorial

boundaries. [26]

20. F. NO CHANGE
   G. mind.
   H. his processing unit.
   J. his consciousness.

21. A. NO CHANGE
   B. do
   C. have
   D. are

22. F. NO CHANGE
   G. colony's
   H. colonys
   J. colonies'

23. The writer is considering adding the following to the end of the preceding sentence (placing a comma after the word *daily*):

   usually bits of human food debris.

   Should the writer make this addition here?
   A. Yes, because it adds an important detail that helps answer Wilson's questions.
   B. Yes, because it shows how hard ants are able to work.
   C. No, because it distracts from the focus on the specialization of the ant population.
   D. No, because it does not provide a measure of how much debris equals the weight of one ant.

24. Given that all the choices are true, which one indicates most specifically a contribution made to the colony by worker ants?
   F. NO CHANGE
   G. a majority of worker ants do not reproduce, offering their eggs to feed larvae and the queen.
   H. when they are out of the nest, ants find each other by following lingering vapor trails.
   J. every day a mature ant colony uses as much vegetation as a mature cow.

25. A. NO CHANGE
   B. devote
   C. devoted
   D. were devoting

26. If the writer were to divide this paragraph into two—one about what Wilson is looking for and another about his findings—where should the new paragraph begin?
   F. Sentence 4
   G. Sentence 5
   H. Sentence 7
   J. Sentence 8

Wilson identifies this selfless behavior among worker
27

ants as *altruism*. Dedication to the benefit of the colony

is, in his view the single most important feature of ant
28

social behavior. In his observations, Wilson has seen

ants alter colony populations by adjusting their

foraging and feeding patterns, exemplifying their

zeal to survive. Ant societies can be fragmented and

divided, Wilson has discovered, but their devotion
29

to their queen and colony ensures that ants are cool.
30

27. Which of the following alternatives to the underlined portion would NOT be acceptable?
   A. labels
   B. says
   C. speaks of
   D. describes

28. F. NO CHANGE
   G. is, in his view,
   H. is in his view,
   J. is in, his view

29. A. NO CHANGE
   B. otherwise,
   C. in contrast,
   D. for the purposes of his study,

30. Which choice would best conclude this sentence so that it emphasizes one of the essay's main points about Wilson's investigations of ants?
   F. NO CHANGE
   G. some ants become workers and some become queens.
   H. without a doubt, ants are everywhere.
   J. ants will prevail.

PASSAGE III

The Pleasure of Tea

[1]

Much has been written about the Japanese tea

ceremony and its sophisticated ritual. It is very beautiful,

though unavailable to most people in the United States.

Equally inaccessible are the British afternoon tea in the
31

company of friends, with its bone china, cucumber

sandwiches, and outstretched pinkies. What I found
32

utterly pleasurable though, is my solitary microwave tea.
33

31. A. NO CHANGE
   B. being
   C. were
   D. is

32. F. NO CHANGE
   G. find
   H. had found
   J. will be finding

33. A. NO CHANGE
   B. pleasurable, though
   C. pleasurable, though,
   D. pleasurable, though:

GO ON TO THE NEXT PAGE.

[2]

It is this ritual tea that has taught me to take pleasure in the familiar. Often in the past, I would find myself waiting for the big event, the grand finale that would solve all my problems and make everything perfect. In time I have come to learn that there are no fairy-tale endings: I must find joy in the things I do every day. And my three-part ritual evening tea is special because of that.

[3]

I reach for my mug and choose the tea—will it be a Darjeeling or the special-occasion jasmine? I slowly poured the water over the teabag, set the mug in the
$\overline{34}$
microwave, and punch the familiar sequence, wait for the start of the hum, and watch the carousel turn—these are all part of that magic ceremony. Next comes the two minutes of absolute freedom, time in which I can do
$\overline{35}$

anything I want: listen to a bit of news on the radio, [36] wash the cereal bowl from breakfast, or just lean back against the counter, close my eyes, and take a few

deep breaths. [37]

34. F. NO CHANGE
 G. would pour
 H. had poured
 J. pour

35. Which choice best summarizes the writer's attitude toward this two-minute period, as described in the rest of this sentence?
 A. NO CHANGE
 B. of complete inactivity,
 C. of decision time,
 D. for finishing my chores,

36. At this point, the writer is considering adding the following clause:

   which my sister Chitra does not like at all because of the noise,

 Should the writer make this addition here?
 F. Yes, because it introduces another character into this essay.
 G. Yes, because it provides information about the writer's family.
 H. No, because the sudden reference to family is a digression from Paragraph 3's primary focus.
 J. No, because it does not give a complete picture of the writer's family.

37. The writer wants to add a sentence here that would emphasize this sense of relaxation. Which of the following would most effectively accomplish this purpose?
 A. There is nothing like a few deep breaths.
 B. I can feel my tension draining away.
 C. Any of these will work for me.
 D. It is a slow time.

[4]

Therefore, the *ding* of the microwave
<u>   </u>
   38

POW

38. F. NO CHANGE
    G. However,
    H. Then,
    J. Nevertheless,

Notice the organization of the essay — He's listing. So "Then" works best!

<u>announcing</u> the end of the first part of the ritual and the
  39

beginning of the next. I pull out the teabag, wring out the

last few drops, toss it into the wastebasket with a wet

thwop, spoon in the sugar, stir in the milk, in the rehearsed

CSE

39. A. NO CHANGE
    B. was announced
    C. announces
    D. is announced

motions of a familiar choreography. <u>Finally, satisfied with</u>
                           40

the bright orange-brown color that the well-made cup

CSE

40. F. NO CHANGE
    G. Finally satisfied;
    H. Finally satisfied,
    J. Finally, satisfied,

of tea must have, I <u>took</u> the mug to my couch and set it
             41

down on a marble coaster.

CSE

41. A. NO CHANGE
    B. had taken
    C. am taking
    D. take

TAKE · TOOK correct TENSE like #32 · TAKEN

[5]

Now I am ready for the <u>third and best part of</u>
                    42

CSE

42. F. NO CHANGE
    G. third, and best part
    H. third, and, best part
    J. third, and best part,

my ritual: sipping the tea <u>while I reflect on whatever</u>
                        43

NOTICE their use of colon!

takes my fancy. It is the <u>best and most perfect way</u>
                    44

to end my day.

CSE

43. Which of the following alternatives to the underlined portion would NOT be acceptable?
    A. while reflecting
    B. while I'm reflecting
    C. as I reflect
    D. as one reflects

Everything is I

KLA

44. F. NO CHANGE
    G. perfectly best
    H. best and perfect
    J. perfect

(+)(−)

Question 45 asks about the preceding passage as a whole.

POW

45. The writer is considering inserting the following sentence at the beginning of Paragraph 3:

> The first part of my ritual includes several steps.

The writer should add this sentence because it will:

    A. provide an effective transition and serve to distinguish one part of the ritual from the others.
    B. reinforce the idea that the writer's solitary microwave tea is a special ritual.
    C. introduce the idea that there is more than one part to the ritual.
    D. further support the idea of the writer's taking pleasure in the familiar, mentioned in Paragraph 2.

PASSAGE IV

Everyday People

Rita Dove's poems are sometimes described as

intimate. They are identified as such because they
                    ———————————
                         46

focus on people involved in the pure and simple act

of being human. An African American writer, Dove

tackles stuff that crosses and undermines racial
        ————
         47

boundaries. Her vision includes ordinary people from

diverse walks of life as she explores the depth of their

reactions to the world. An example of this perception
                —————
                   48

is her poetry collection *Thomas and Beulah,* for

which she won a Pulitzer Prize in 1987.

Seventy-nine pages long, *Thomas and Beulah*

is loosely based on the lives of Dove's maternal

grandparents. [49] Their story is neither tragic nor

dramatic, but it does portray people who Dove states
                                      ————
                                       50

have been "ignored and lost." Although the characters,

Thomas and Beulah, live together for decades; the
                                   ——————————
                                        51

poems reveal lives that rarely link. [52]

46. F. NO CHANGE
    G. identified, as such,
    H. identified, as such
    J. identified as such:

47. A. NO CHANGE
    B. contemporary substance
    C. topics of concern
    D. subject matter

48. F. NO CHANGE
    G. world, an
    H. world, one
    J. world one

49. If the writer were to delete the phrase "Seventy-nine
    pages long," the preceding sentence would primarily
    lose:
    A. a sense of the length and complexity of Dove's
       grandparents' lives.
    B. an indication of the literary importance of this
       book.
    C. information about how long it took Dove to write
       this book.
    D. nothing of significance, since this information is
       irrelevant here.

50. F. NO CHANGE
    G. whose
    H. and
    J. as

51. A. NO CHANGE
    B. decades. These
    C. decades. The
    D. decades, the

52. In order to clarify the preceding sentence's main point,
    the writer has decided to add a phrase to the end of that
    sentence (replacing the period after *link* with a
    comma). Given that all the following are true, which
    one would best accomplish this purpose?
    F. with a chronology of family history providing
       helpful background information.
    G. the couple living out their years in Akron, Ohio, as
       Dove's grandparents did.
    H. the husband and wife more often moving along
       their own separate paths.
    J. as personal and social history are gracefully
       combined.

Divided into two sections, consisting of
twenty-three and twenty-one poems, respectively,
the volume opens with an explanation from Dove
that the poems "tell two sides of a story and are
meant to be read in sequence." In telling this story,
the skillful revelation of lives are disjoined by a lack
of understanding or shared perspectives. For example,
while Beulah is pregnant with their third daughter,
Thomas plans what he will teach a son. Although
Thomas certainly loves his daughters, his longing for
a son whom he can teach to be a man, according to
his conception of what it means to be a man, is
evident. Beulah's life, on the other hand, is centered
around her daughters.

Dove conveys the sadness in Thomas and Beulah's
relationship, but she helps ourselves to accept their
marital differences by depicting the grace and goodness
of their individual lives. In *Thomas and Beulah*, Dove
demonstrates her ability to highlight the vitality and
insight that reside in her otherwise unremarkable
characters. At it's heart, *Thomas and Beulah* offers
us a testament to the human spirit.

53. Given that all the choices are true, which one best
helps the writer to continue developing the point made
in the last sentence of the preceding paragraph?
A. NO CHANGE
B. the first told from Thomas's perspective and the
second from Beulah's,
C. which combine to tell the story of Thomas and
Beulah Hord,
D. entitled "Mandolin" and "Canary in Bloom,"

54. F. NO CHANGE
G. lives are skillfully revealed by Dove
H. Dove skillfully reveals lives
J. skillfully revealed lives are

55. A. NO CHANGE
B. In the meantime,
C. After all,
D. Besides,

56. Which of the following alternatives to the underlined
portion would be LEAST acceptable?
F. conversely,
G. additionally,
H. in contrast,
J. however,

57. A. NO CHANGE
B. ourselves with accepting
C. us for accepting
D. us to accept

58. F. NO CHANGE
G. their
H. its'
J. its

59. A. NO CHANGE
B. standing ovation
C. big cheer
D. high five

must really understand the Author's intent!

Examples of ACT english "usually most difficult" + subjective Questions

Question 60 asks about the preceding passage as a whole.

60. After reviewing this essay, the writer is considering adding the following true statement at the end of the opening paragraph:

> In her senior year in high school Rita Dove was honored at the White House as one of the one hundred Presidential Scholars.

Should the writer add this sentence there?

F. Yes, because it adds relevant and interesting background information about Dove.
G. Yes, because it helps to explain how Dove became a successful writer.
H. No, because it would cause the paragraph to stray from its focus on Dove's writing.
J. No, because it fails to explain exactly what a Presidential Scholar is.

PASSAGE V

The Compost Pile

I never met a true gardener who won't break into

PAST TENSE

philosophical rapture when the topic of conversation was compost. To avid gardeners, the compost pile—a heap of decomposing kitchen scraps and yard waste—is at once the most profound and practical of beasts.

A compost pile may look like just a mound of decaying muck—apple cores, coffee grounds, and grass clippings, for example—but they are host to a community of living things. Indeed, it teems with microscopic beings whose business it is to eat and excrete. By doing things to a variety of dead organic matter, these microbes supply the nutrients plants need to grow.

61. A. NO CHANGE
B. didn't *must match tense*
C. doesn't
D. will not

62. F. NO CHANGE
G. subject of controversy
H. reason to be alarmed
J. topic of dispute

63. A. NO CHANGE
B. their
C. it is *best option*
D. its

64. Which choice best helps the reader conceptualize a specific process?
F. NO CHANGE
G. digesting
H. modifying
J. altering

In as little as four to six weeks, the omnivorous
65
microbes recycle kitchen waste into a rich, black,

crumbly soil. When finished compost, or humus, are
66

raked into garden beds flowers and vegetables are
67
almost guaranteed to be healthy and productive. Besides

providing nutrients, humus, while acting like a sponge,
68

retaining water and giving plant roots access to air.
69

Thus, composting completes the cycle of life: new
70
life grows out of the broken-down elements of the old.
That is why gardeners love compost. Of course, the

compost pile also helps them hide their mistakes. [71]

Gardeners also enjoy the hidden, unseen complexity
72
of compost. Some people rake their leaves to the curb
and are happy when the truck hauls them away, while
composters use their leaves and their ingenuity. Compost
needs a balanced diet of leaves and other "fresh"
ingredients. But other conditions must be carefully
balanced as well for the microbes to perform their best.

65. Which choice provides the most logical transition to
this new paragraph?
A. NO CHANGE
B. Meanwhile,
C. Until this happens,
D. On the other hand,

66. F. NO CHANGE
G. were
H. is
J. was

67. A. NO CHANGE
B. beds, flowers, and vegetables,
C. beds, flowers, and vegetables
D. beds, flowers and vegetables

68. F. NO CHANGE
G. humus, which acts
H. humus, acting
J. humus acts

69. A. NO CHANGE
B. holding and retaining
C. retaining by holding
D. retaining which holds

70. Which of the following alternatives to the underlined
portion would NOT be acceptable?
F. life; that is, new
G. life, new
H. life. New
J. life; new

71. The writer is considering adding to the end of the pre-
ceding sentence the following statement (deleting the
period):

—like the vegetable they planted that no one
in the family would eat!

Should this addition be made here?
A. Yes, because it helps explain what the writer
means by "mistakes."
B. Yes, because it informs the reader about which
vegetables should not be planted.
C. No, because it contradicts the essay's assertion that
compost guarantees productive vegetable gardens.
D. No, because it fails to maintain the paragraph's
focus on why gardeners love composting.

72. F. NO CHANGE
G. hidden complexity
H. hidden complexity and intricacy
J. hidden, intricate complexity

12

Is the compost too wet? Too dry? Does it need to be

turned? [73] Only experience and experimentation can

tell for sure.

Pow

If it's not decomposing properly, a compost pile

can literally stink. That's just one reason why some
      ___
       74
gardeners treat this voracious beast as attentively as

a pet. When I feed mine potato peels, I can almost   *Pow*

hear it purr.

73. The writer is considering deleting the preceding three
    questions from this paragraph. Should the writer delete
    these sentences?

    A. Yes, because they provide an unnecessary repeti-
       tion of previously stated ideas.
    B. Yes, because they cause a disruption in the flow of
       the paragraph.
    C. No, because they clarify what is meant by
       "conditions."
    D. No, because they support the essay's focus on the
       ease of composting.

74. Given that all the choices are true, which one most
    specifically describes a particular negative effect of
    improper composting?

    F. NO CHANGE
    G. can produce problems.
    H. creates an unpleasant outcome.
    J. doesn't work very well.

Question 75 asks about the preceding passage
as a whole.

---

75. Suppose the writer's goal had been to write a personal
    essay comparing her favorite hobbies. Would this
    essay fulfill that goal?

    A. Yes, because the essay focuses on comparing the
       natural processes of the compost pile to that of the
       cycle of life.
    B. Yes, because the essay focuses on describing how
       compost piles work, which is an important hobby
       to the writer.
    C. No, because the focus of the essay is on how other
       gardeners like composting, not on the writer's per-
       sonal feelings about the hobby.
    D. No, because although the writer expresses enthusi-
       asm for composting, the essay does not focus on
       comparing this activity to other hobbies.

END OF TEST 1

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

Finish the TEST strong! They hit you w/ 3 "go back and read it" questions

Pow

73-75 are taxing your mental stamina!

Finish Strong! :)

Scoring Keys for Form G01

Use the scoring key for each test to score your answer document for the multiple-choice tests. Mark a "1" in the blank for each question you answered correctly. Add up the numbers in each reporting category and enter the total number correct for each reporting category in the blanks provided. Also enter the total number correct for each test in the blanks provided. The total number correct for each test is the sum of the number correct in each reporting category.

Test 1: English—Scoring Key

*Reporting Categories
POW = Production of Writing
KLA = Knowledge of Language
CSE = Conventions of Standard English

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

Key		POW	KLA	CSE
39.	C			—
40.	F			—
41.	D			—
42.	F			—
43.	D			—
44.	J		—	
45.	A	—		
46.	F	—		
47.	D		—	
48.	F			—
49.	D	—		
50.	F			—
51.	D			—
52.	H	—		
53.	B	—		
54.	H			—
55.	A	—		
56.	G	—		
57.	D			—
58.	J			—
59.	A		—	
60.	H	—		
61.	B			—
62.	F			—
63.	C		—	
64.	G			—
65.	A	—		
66.	H			—
67.	D			—
68.	J			—
69.	A		—	
70.	G			—
71.	A	—		
72.	G			—
73.	C	—		
74.	F	—		
75.	D	—		

Handwritten notes:

POW = Topic development - Id parts of text. Did it meet the goal - relevance.
(Math in Engl) (Addition by subtraction)

KLA = ensure precision, consision
No Runons - No Redundance
Effect lang. usage
Commas

CSE = S/V Agreement
Tense
Semi color
color em-DASH

w/who/whi whose
It's Its
they their they'r
Lay, Laid Law

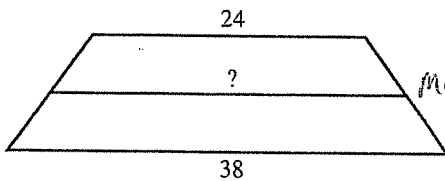| Number Correct (Raw Score) for:	
Production of Writing (POW) 24	(24)
Knowledge of Language (KLA) 11	(11)
Conventions of Standard English (CSE) 40	(40)
Total Number Correct for English Test (POW + KLA + CSE)	(75)

1. Tisha is building a wooden drying rack. The top of the rack is in the shape of a trapezoid. The trapezoid's bases are 24 inches long and 38 inches long, respectively. Tisha will add a brace that joins the midpoints of the trapezoid's 2 nonparallel sides to support her drying rack, as shown in the figure below. How many inches long will the brace be?

(handwritten) Geom

24

?

38

A. 26
B. 28
C. 31
D. 32
E. 33.5

DO YOUR FIGURING HERE.

(handwritten) Median = middle of the data set!

(handwritten) median = is the Average = ½ (24+38)

(handwritten) = ½ (62) = 31

(handwritten) C

(handwritten) Remember: Midpoint means Proportional

2. Five different stores have different prices for a particular brand and style of T-shirts. Those prices are shown in the table below. Which of the 5 stores offers the lowest price for 6 of these T-shirts?

(handwritten) IES

Store	Price
1	$7.00 each *—x6 = 42⁰⁰*
2	2 for $14.99 *— x3 = 44.97*
3	3 for $20.95 *= 41.90*
4	6 for $41.95 *41.95*
5	Buy 2 for $21.10, get 1 free

(handwritten) lowest price →

(handwritten) Just quickly do this w/ your calculator

(handwritten) 21.10

(handwritten) 42.20

F. 1
G. 2
H. 3
J. 4
K. 5

3. What is the cost of $4\frac{4}{5}$ pounds of apples at $1.50 per pound?

(Note: No sales tax is charged.)

A. $4.40
B. $5.40
C. $6.00
D. $6.30
E. $7.20

IES

DO YOUR FIGURING HERE.

I convert 4⅘ to 4.80 so I can multiply easier

4.80
×1.50
$7.20

or do fractions $\frac{24}{5} \times \frac{1.50}{1}$

24 × .3 = 7.20

4. A ball was dropped from a table, and the maximum rebound height, in inches, after each of the first 4 bounces was measured and recorded in the bar graph below. One of the following values is the mean of the 4 recorded heights. Which one?

IES + MDL
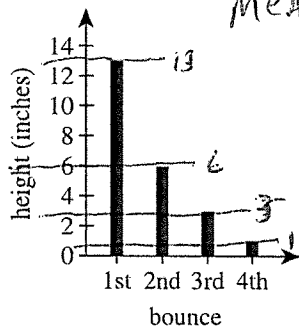
Mean = Average of DATA set

F. 2.30
G. 2.50
H. 4.50
J. 5.75
K. 7.00

13
+6
+3
+1
—
23

5.75
4)23

5. Matt works for the city of Centerville checking for expired parking meters. When checking meters, he travels a rectangular path that starts and ends at the corner of Main Street and 1st Avenue, as shown in the figure below. Matt travels this path 15 times in a typical day. In traveling this path 15 times, about how many miles does Matt travel?

(Note: 1 mile = 5,280 feet)

IES
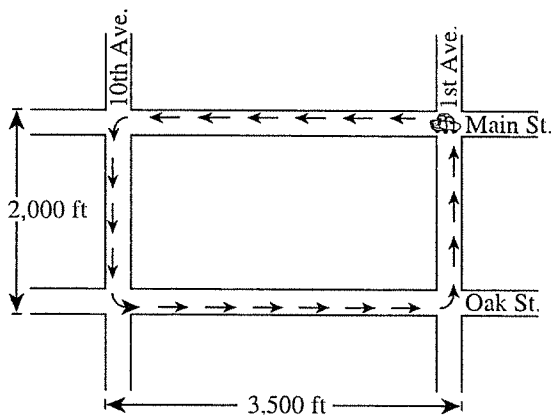
A. 13
B. 16
C. 31
D. 88
E. 352

Find the perimeter!

2B + 2H

4,000
7,000
———
11,000
× 15
————
165,000 ÷ 5280 feet =

31.25

Answer Ⓒ

DO YOUR FIGURING HERE.

6. Brian had $12.80 to spend at the flea market. He bought a portable CD player for $5.50 and wants to buy some CDs that are $0.75 each. Brian can determine n, the number of CDs he can buy, using which of the following inequalities?

F. $0.75n \le 12.80$
G. $n - 5.50 \le 12.80$
H. $n + 5.50 \le 12.80$
J. $0.75n - 5.50 \le 12.80$
K. $0.75n + 5.50 \le 12.80$

N CDS cost is .75¢ per

$N(.75) + 5.5C$ *This has to ≤ 12.80*

Part. 1
CD player

7. What is the value of $y - x$ when $y = -\frac{11}{16}$ and $x = \frac{18}{32}$?

=Reduce to $\frac{9}{16}$

A. $\frac{7}{32}$
B. $\frac{1}{8}$
C. $-\frac{1}{8}$
D. $-\frac{5}{4}$
E. $-\frac{29}{32}$

.69 - .56

Pretty obvious you can reduce

$-\frac{11}{16} - \frac{9}{16} = -\frac{20}{16}$ *Reduce by 4* $= -\frac{5}{4}$

So you can get to this

8. Ms. Clark is scoring her class's geography test. The test had 30 questions, each worth 1 point. Ms. Clark is currently scoring Tomás's test paper. So far, she has marked 24 of his answers correct and 3 incorrect. What is the maximum percent correct, to the nearest percent, that Tomás can earn on the test?

F. 80%
G. 88%
H. 89%
J. 90%
K. 97%

$\frac{24}{27} = \frac{27}{30} = 90\%$

$\frac{30 \text{ TOTAL}}{24 \text{ correct}}$
3 Incorrect $=$ Max is the last 3

9. Chris can paint $\frac{1}{6}$ of a fence per hour. Sandy can paint $\frac{1}{8}$ of the same fence per hour. What fraction of the fence will be painted when Chris and Sandy work at these rates for 2 hours?

A. $\frac{1}{12}$
B. $\frac{2}{7}$
C. $\frac{7}{24}$
D. $\frac{7}{12}$
E. $\frac{7}{8}$

.16
.13
‾‾‾‾
.29 = .58 *A little over half of the fence in 2 hours*

I set this to decimals or you need to know how to add (subtract) fractions

I use my calculator to do this. $\frac{7}{12} = .58\%$
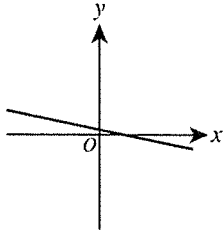
GO ON TO THE NEXT PAGE.

10. The scales on both axes of the standard (x,y) coordinate plane below are the same. Of the following values, which one is the best estimate for the slope of the line graphed in the plane?

F. -5

G. $-\frac{1}{5}$

H. $\frac{1}{5}$

J. $\frac{3}{5}$

K. 5

DO YOUR FIGURING HERE.

First sentence means that the units are the same for x and for y.

1. We notice it is a negative slope so "F" + "G"

2. No where getting to J

So ... $\left(-\frac{1}{5}\right)$

11. What is the value of $|(-2)(-3)(-2)| - |-3 - 12|$?

A. -3

B. -2

C. 3

D. 22

E. 27

$+6 (-2)$ Remember when we do absolute value

$|-12| - |15|$ $12 - 15 = \boxed{-3}$

12. $(k + 2m)(3k - 2m)$ is equivalent to:

F. $3k^2 - 4m^2$

G. $3k^2 + 4m^2$

H. $3k^2 + 2km - 4m^2$

J. $3k^2 + 3km - 4m^2$

K. $3k^2 + 4km - 4m^2$

Foil

$(k + 2m)(3k - 2m)$

$3k^2 - 2mk + 6mk - 4m^2$

13. The dimensions of a hallway floor are shown below. Each pair of adjacent walls meets at a right angle. Teresa plans to completely carpet this entire hallway floor. At a cost of \$2 per square foot, how much will carpeting this hallway floor cost?
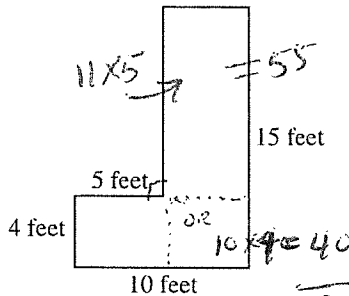
Area $\square = B \times H = ?$

you are basically adding 2 $\square$s and then multiply by \$2$^{\underline{oo}}$ for total cost.

11 × 5 = 55

15 feet

5 feet

4 feet   0.2   10 × 4 = 40

10 feet

95
× 2
\$190^{oo}

A. \$ 95

B. \$150

C. \$190

D. \$285

E. \$300

NOTE: Perimeter is Not Area

Area is NOT Perimeter

14. If $2x + 3y = 7$, then which of the following is an expression for y in terms of x ?

DO YOUR FIGURING HERE.

F. $\dfrac{-2x+7}{3}$

G. $\dfrac{2x-7}{3}$

H. $-6x + 21$

J. $-2x + \dfrac{7}{3}$

K. $\dfrac{2}{3}x - 7$

Here we are trying to isolate $y =$
— order of operations

$2x + 3y = 7$

$\dfrac{3y = 7 - 2x}{3} =$ *Now to get y alone — we divide by 3*

$y = \dfrac{7 - 2x}{3}$

Alg

15. Which of the following is a possible sum of the complex numbers $\sqrt{-9}$ and $\sqrt{-16}$?

A. $7i$
B. $5i$
C. 7
D. 5
E. -5

Numb + Quant

$\sqrt{9} \cdot \sqrt{-1} + \sqrt{16} \cdot \sqrt{-1}$

$\sqrt{3} \cdot i + \sqrt{4} \cdot i$ $\}$ $3i + 4i = 7i = \boxed{A}$

Do you know how an imaginary Number is formed ??

Direct Rules ??

16. What is the solution for w in the equation $4(2w + 3) = \frac{1}{2}(-4w + 9)$?

F. $-\dfrac{3}{4}$

G. $-\dfrac{3}{10}$

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

J. $\dfrac{3}{5}$

K. $\dfrac{33}{20}$

Alg

$4(2w + 3) = \frac{1}{2}(-4w + 9)$ *First mult. both sides by 2*

$8(2w + 3) = -4w + 9$

$16w + 24 = -4w + 9$ $\qquad$ $w = \dfrac{-15}{20}$ $\qquad$ $w = -\dfrac{3}{4}$

$20w = -15$

MUST Follow:
ORDER of OPERATIONS

17. Which of the following values is equal to $4\sqrt{24} - 5\sqrt{54}$?

A. $-29\sqrt{6}$
B. $-7\sqrt{6}$
C. $-2\sqrt{6}$
D. $-\sqrt{30}$
E. $-\sqrt{1,296}$

Numb

Simplify this Radical Expression!

$4\sqrt{24} - 5\sqrt{54}$

18. The cost of 2 notebooks and a package of pencils is $7.00. The cost of 3 notebooks and 2 packages of pencils is $11.00. What is the cost of 1 notebook and 1 package of pencils?

$N =$ Note Books $\qquad$ $P =$ Pencils

F. $1.00
G. $3.00
H. $4.00
J. $4.40
K. $4.66

Alg

$2N + 1P = \$7$
$3N + 2P = \$11$

So $1N + 1P = \$4$

$3N + 2P = 11$
$2N + 1P = 7$
$\overline{}$
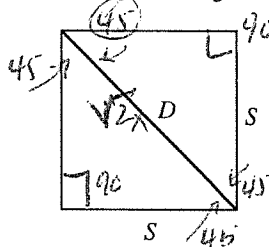$1N + 1P = \$4$

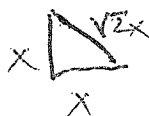**GO ON TO THE NEXT PAGE.**

Rate to Triangles (handwritten)

19. Which of the following equations expresses a relationship between D, the length of the diagonal of the square shown below, and S, the length of a side of the square?

A. $D = S$
B. $D = \sqrt{2}S$
C. $D = \sqrt{3}S$
D. $D = 2S$
E. $D = 3S$

DO YOUR FIGURING HERE.

Here we have 2 Right Isosceles Triangles (handwritten)

Ratios (handwritten)

$D = \sqrt{2}S = $ (D) (handwritten)

20. One neon sign flashes every 6 seconds. Another neon sign flashes every 8 seconds. Given that the signs sometimes flash simultaneously, how many seconds are there between consecutive simultaneous flashings?

F. 2
G. 7
H. 14
J. 24
K. 48

How much time has elapsed? (handwritten)

6, 12, 18, 24, 30, 36, 42, 48 (handwritten)
8, 16, 24, 32, 40, 48, 54 (handwritten)

21. What is the slope of the line passing through the points $(-1,4)$ and $(2,-1)$ in the standard (x,y) coordinate plane?

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

Slope formula $= M = \dfrac{y_1 - y_2}{x_1 - x_2}$ (handwritten)

Really it is $M = \dfrac{y_2 - y_1}{x_2 - x_1}$ (handwritten)

$M = \dfrac{4 - -1}{-1 - 2} = \left(M = \dfrac{5}{-3} \right)$ (handwritten)

22. Each side of square $ABCD$ has a length of 48 m. A certain rectangle whose area is equal to the area of $ABCD$ has a width of 12 m. What is the length, in meters, of the rectangle?

F. 36
G. 48
H. 60
J. 144
K. 192

$= 2304$ (handwritten)
60, 60, (handwritten)
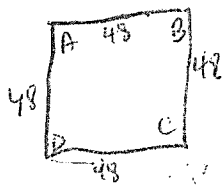
23. How many miles does a jet plane travel in 30 seconds if its speed is 840 miles per hour?

A. 7
B. 16
C. 28
D. 32
E. 60

30 seconds (handwritten) *How?* (handwritten)
840 mph (handwritten)
1 hour = 60 min = 60 × 60 sec (handwritten)

$\dfrac{840}{1 hr} = \dfrac{42 840}{60 \times 60} \times \dfrac{30 seconds}{2} = 7$ (handwritten)

GO ON TO THE NEXT PAGE.

24. The cost of a hotel room, y dollars, based on the rating, x, provided by a travel agency is modeled by the linear equation y = 2.34x + 67.75. Which of the following statements describes the rate of change of this model?

F. For every increase of 1.00 in the rating, the cost increases by $2.34.

G. For every increase of 1.00 in the rating, the cost increases by $67.75.

H. For every increase of 2.34 in the rating, the cost increases by $1.00.

J. For every increase of 2.34 in the rating, the cost increases by $67.75.

K. For every increase of $1.00 in the cost, the rating increases by 2.34.

DO YOUR FIGURING HERE.

25. In a 145-member choir of only altos and sopranos, there are 37 more altos than sopranos. What is the ratio of altos to sopranos?

A. 54:91
B. 54:145
C. 91:54
D. 91:145
E. 108:37

26. For the triangle shown below, what is tan ∠A ?

F. $\frac{3}{5}$

G. $\frac{5}{3}$

H. $\frac{3}{\sqrt{34}}$

J. $\frac{5}{\sqrt{34}}$

K. $\frac{\sqrt{34}}{5}$
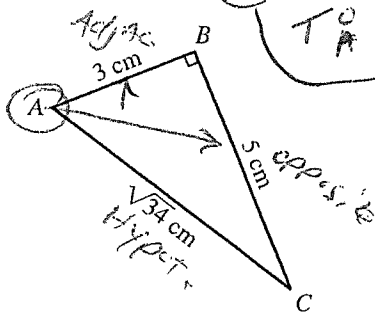
27. Hoshi is building a circular pond in a square section of her backyard. The square section measures 20 feet on each side. The pond touches all 4 sides of the square section. Approximately what is the total area, in square feet, of the region inside this square section but outside the circular pond?

A. 86
B. 126
C. 314
D. 337
E. 714
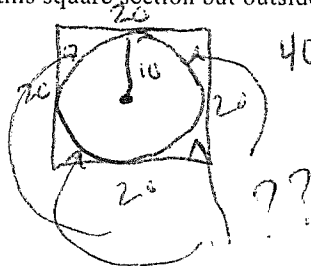
Use the following information to answer questions 28–30.

DO YOUR FIGURING HERE.

Consider the function $f(t) = -10t^2 + 20t + 80$, graphed in the coordinate plane below.

(handwritten: QUAD. function)
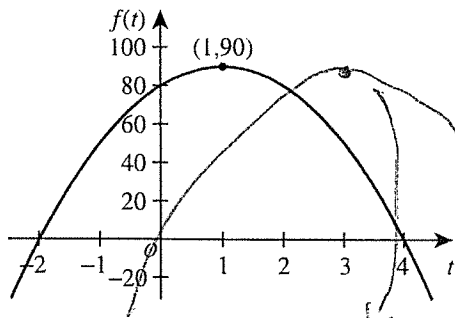
(handwritten: just put in (-10) for everything you see "t")

(handwritten:)
$$f(t) = -10t^2 + 20t + 80$$
$$f(t) = -10(-10)^2 + 20(-10) + 80$$
$$= -1000 - 200 + 80$$
$$= -1200 + 80$$
$$= -1120$$

28. What is the value of $f(-10)$?

F. $-1,280$
G. $-1,120$
H. -720
J. -10
K. 80

(handwritten: Func)

29. Which of the following is the set of all possible values of t for which $f(t)$ is defined?

A. $\{t: t \geq 4\}$
B. $\{t: t \geq -2\}$
C. $\{t: t \leq 90\}$
D. $\{t: -2 \leq t \leq 4\}$
E. $\{t: t \text{ is any real number}\}$

(handwritten: Func) *(handwritten: ??)*

(handwritten: What is the domain? of this function)
$$f(t) = -10t^2 + 20t + 80$$

30. In order to obtain the graph of a new function, $g(t)$, the graph of $f(t)$ is translated 2 units to the right and then reflected over the x-axis. The point $(1,90)$ on the graph of $f(t)$ corresponds to what point on the graph of $g(t)$?

F. $(3, -90)$
G. $(-3, 90)$
H. $(-1, -90)$
J. $(-1, 90)$
K. $(90, 3)$

(handwritten: Geom)

(handwritten: Reflective)
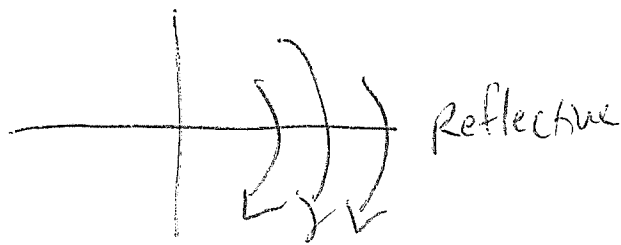
31. For 2 similar triangles, $\triangle ABC$ and $\triangle DEF$, such that $\angle A$, $\angle B$, and $\angle C$ correspond to $\angle D$, $\angle E$, and $\angle F$, respectively, how many feet long is $\overline{DE}$ when $AB = 10$ ft, $BC = 12$ ft, $AC = 15$ ft, and $DF = 12$ ft ?

A. 8
B. 10
C. 12.5
D. 14.4
E. 15

(handwritten: another way to do this?) *(handwritten: Geom)*

(handwritten: These correspond)

(handwritten:)
$$\frac{DE}{10} = \frac{12}{15} = \frac{DE}{10} = \frac{4}{5} =$$
$$\frac{DE}{10} = \frac{4}{5}$$
$$DE = \frac{4}{5} \cdot 10 = 8$$

21

GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

32. Rafael wrapped a gift box l inches long, w inches wide, and h inches high. He tied a decorative rope around it and used an extra 6 inches for a tie at the top, as shown below. On both the top and the bottom, he formed right angles where the rope crossed. About how many inches of decorative rope did Rafael use?
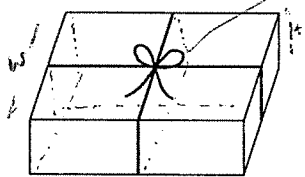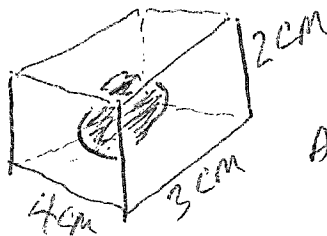
F. $2l + 2w + 2h$
G. $2l + 2w + 2h + 6$
H. $2l + 2w + 4h + 6$
J. $2l + 4w + 2h + 6$
K. $4l + 2w + 2h + 6$

33. A piece of chocolate candy enclosing an almond in the center is made in a rectangular mold that has inside dimensions 4 cm, 3 cm, and 2 cm. If the volume of the almond is 2 cubic centimeters, what is the maximum volume, in cubic centimeters, of the chocolate in the piece of candy?

A.   7
B.   12
C.   16
D.   22
E.   24

34. An automobile gasoline tank is $\frac{3}{8}$ full. After 6 gallons of gasoline are added to the tank, it is $\frac{3}{4}$ full. Gasoline sells for $1.50 per gallon. If the tank is empty, what would be the cost to fill it $\frac{3}{4}$ full?

F. $ 6.00
G. $ 9.00
H. $15.00
J. $18.00
K. $24.00

35. In a certain triangle that has an area of 12 square inches, the length of one altitude is $\frac{2}{3}$ the length of its corresponding base. What is the length of that base, in inches?
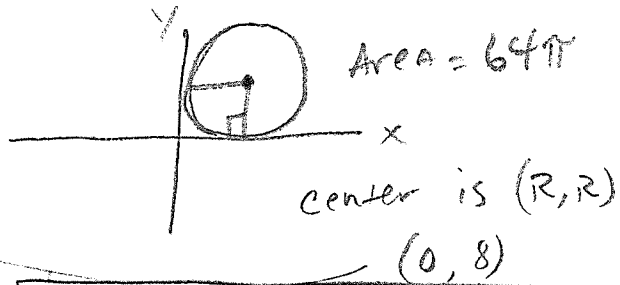
A.   2
B.   3
C.   6
D.   9
E. $\sqrt{18}$
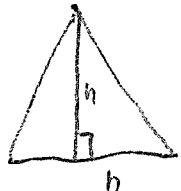
36. A circle is tangent to the x-axis and to the y-axis. The coordinates of its center are both positive. The area of the circle is 64π. What are the coordinates of the point of tangency on the y-axis?

F. (0, 4)
G. (0, 8)
H. (0, 16)
J. (0, 32)
K. (0, 64)

DO YOUR FIGURING HERE.

37. The probability distribution for both values of a random variable X is given in the table below.

Value of X	Probability of X
12	$\frac{1}{3}$
k	$\frac{2}{3}$

Given that the expected value of X is 20, what is the value of k?

A. 6
B. 8
C. 16
D. 24
E. 28

38. For what values of x, if any, is $-|-x| < 0$ true?

F. No real values of x
G. Only negative values of x
H. Only positive values of x
J. All real values of x except 0
K. All real values of x

39. Two functions, f and g, are defined over all real numbers by $f(x) = 2x - 1$ and $g(x) = 3x^2 - 7$. What is $g(f(5x))$?

A. $150x^2 - 15$
B. $300x^2 - 60x - 4$
C. $60x^3 - 60x^2 - 20x$
D. $750x^3 - 75x^2 - 70x + 7$
E. $30x^4 - 15x^3 - 70x^2 + 35x$

40. An investment doubles in worth every 7 years. The worth of this investment was $24,000 exactly 21 years after the investment was made. The worth of the investment exactly 8 years after the investment was made was between:

F. $ 0 and $ 3,000
G. $ 3,000 and $ 6,000
H. $ 6,000 and $ 9,000
J. $ 9,000 and $12,000
K. $12,000 and $24,000

GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

41. You want to list all the positive two-digit numbers for which the units digit is larger than the tens digit and for which the sum of the digits is 12. How many two-digit numbers should be on your list?

    A. 1
    B. 3
    C. 5
    D. 6
    E. 7

42. Which of the following points is NOT on the graph of the function $y = |2x| - 4$ in the standard (x,y) coordinate plane?

    F. $(-2, 0)$
    G. $(-1, 2)$
    H. $(1, -2)$
    J. $(2, 0)$
    K. $(4, 4)$

43. Five points $(P, Q, R, S,$ and $T)$ are on a line in the order given. The length of $\overline{PR}$ is 12 inches, the length of $\overline{QT}$ is 15 inches, $\overline{QR}$ is the same length as $\overline{ST}$, and $\overline{PQ}$ is the same length as $\overline{RS}$. How many inches long is $\overline{PT}$?

    A. 18
    B. 21
    C. 24
    D. 27
    E. 30
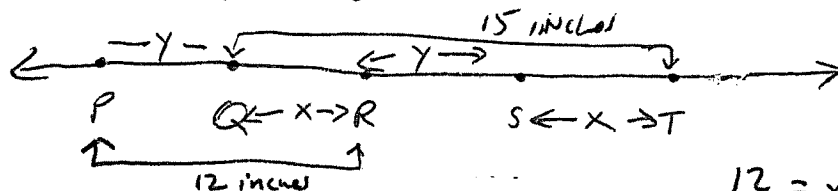
44. Let K and J be independent events. Given that $P(K) = 0.40$ and $P(J) = 0.20$, what is the probability that K and J will both occur?

    (Note: $P(A)$ is the probability that Event A will occur.)

    F. 0.08
    G. 0.20
    H. 0.40
    J. 0.52
    K. 0.60

45. Vector $\overrightarrow{AB}$ is shown in the standard (x,y) coordinate plane below. Point C will be placed on $\overline{AB}$ so that $\overrightarrow{AC} = \frac{1}{4}\overrightarrow{AB}$. What will be the coordinates of point C ?

    A. $\left(\frac{1}{2}, \frac{5}{2}\right)$
    B. $\left(1, \frac{5}{2}\right)$
    C. $\left(2, \frac{3}{2}\right)$
    D. $(3, 4)$
    E. $\left(5, \frac{11}{2}\right)$
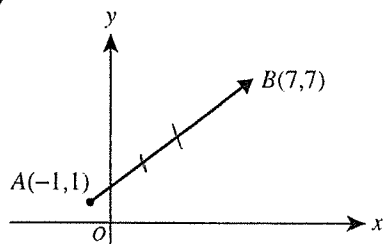
46. Let a and b be unknown nonzero constants such that the equation below is true for all values of θ.

$$a \sin^2 \theta + a \cos^2 \theta = b$$

What is the value of $\frac{b}{a}$?

Both the Same + one snother = 1

F. -1

Funct.

G. 0

H. $\frac{1}{2}$

J. 1

K. 2

47. What is the area, in square millimeters, of a triangle whose side lengths are 5 millimeters, 5 millimeters, and 6 millimeters?

Geom

A. 6

B. 12

C. 15

D. 25

E. 30

Isoscelese Trangle
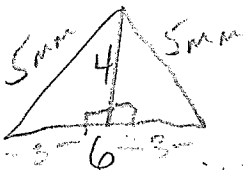
So the base should be in two equal parts

$\frac{1}{2}(6)(4) = 12$

48. Matrix A has dimensions 3×2, and matrix B has dimensions 2×3. One of the following matrices is the matrix product AB. Which one?

Dumb Quant

F. $[290]$

G. $\begin{bmatrix} 105 & 90 \\ 0 & 0 \end{bmatrix}$

H. $\begin{bmatrix} 9 & 3 & 0 \\ 1 & 7 & 5 \end{bmatrix}$

J. $\begin{bmatrix} 9 & 0 \\ 8 & 0 \\ 5 & 2 \end{bmatrix}$

K. $\begin{bmatrix} 81 & 27 & 0 \\ 72 & 24 & 0 \\ 47 & 29 & 10 \end{bmatrix}$
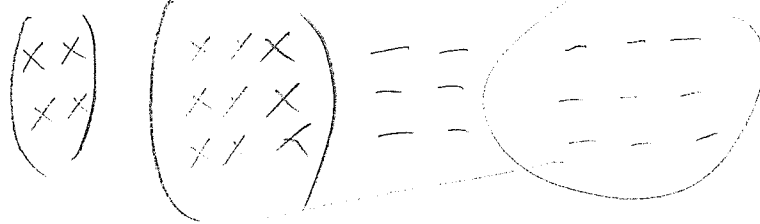
49. Two of the sides of a triangular garden have lengths of 100 feet and 80 feet, respectively. The angle formed by these 2 sides measures 60°. Which of the following is closest to the length, in feet, of the 3rd side of the garden?

(Note: The law of cosines states that for any triangle with vertices A, B, and C, where the sides opposite those vertices have lengths a, b, and c, respectively, $c^2 = a^2 + b^2 - 2ab \cos C$; $\cos 60° = 0.5$.)

A. 60

B. 90

C. 92

D. 120

E. 156
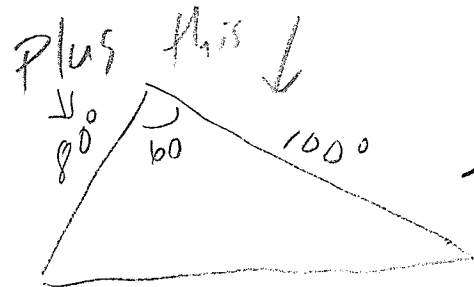
Plus this

This takes a pro! 2 Minutes

INTO

$C^2 = a^2 + b^2 - 2ab (\cos C)$

$C^2 = 80^2 + 100^2 - 2(80)(100)\cos 60°$

$= 92$

DO YOUR FIGURING HERE.

GO ON TO THE NEXT PAGE.

DO YOUR FIGURING HERE.

Use the following information to answer questions 50–52.

The table below gives the average daily attendance for each grade level at JFK High School for 4 months of the current school year. The boxplots below show the distribution of JFK's total daily attendance figures for the previous school year (180 days) and for half of the current school year (90 days).

Grade	Month			
	Sept.	Oct.	Nov.	Dec.
9th	267	295	310	244
10th	425	414	395	341
11th	382	398	395	389
12th	441	384	414	407

current |—[|]—|

previous |—[|]—|

1,200   1,300   1,400   1,500   1,600

Negative means Attendance is dropping
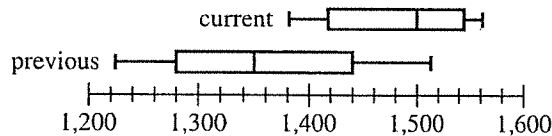
50. Considering only the attendance for the months given in the table, which grade level, if any, has the *strongest negative* linear correlation between the number of months into the current school year and the average daily attendance for the month?

STATS

F. 9th
G. 10th
H. 11th
J. 12th
K. No grade level has a negative correlation.

51. The number of school days at JFK High School in each of the 4 months is given below.

Month	School days
September	20
October	20
November	18
December	15

IES

Using the attendance numbers in the table, which of the following expressions gives the average daily attendance for the 9th grade for this 4-month period?

A. $\dfrac{267 + 295 + 310 + 244}{4}$

B. $\dfrac{20(267 + 295) + 18(310) + 15(244)}{20 + 18 + 15}$

Average

C. $\dfrac{20(267 + 295) + 18(310) + 15(244)}{4(20 + 18 + 15)}$

D. $\dfrac{20(267 + 295) + 18(310) + 15(244)}{20(2) + 18 + 15}$

#Students! / Total Days

E. $\dfrac{20(267) + 20(295) + 18(310) + 15(244)}{4}$

GO ON TO THE NEXT PAGE.

52. One of the following statistics is greater for the data from the previous school year than for the data from the current school year. Which one?

Need to understand these words -

DO YOUR FIGURING HERE.

STATS

F. 1st quartile
G. 3rd quartile
H. Median ✓
J. Maximum ✓
K. Variance ✓

Take 1-18

Look at the extremes -

53. If $-2 \le x \le 4$ and $-1 \le y \le 5$, what is the maximum value of $|x - y|$?

Algebra

A. 9
B. 7
C. 6
D. 5
E. 4

54. In the triangular arrangement of fractions below, the first and last fraction in row n is $\frac{1}{n}$. Any other entry is the sum of the 2 fractions on either side of that entry in the row directly beneath it. What is the 3rd fraction in the 5th row?

$$\frac{1}{1}$$
$$\frac{1}{2} \quad \frac{1}{2}$$
$$\frac{1}{3} \quad \frac{1}{6} \quad \frac{1}{3}$$
$$\frac{1}{4} \quad \frac{1}{12} \quad \frac{1}{12} \quad \frac{1}{4}$$
$$\frac{1}{5} \quad \frac{1}{20} \quad ? \quad \frac{1}{20} \quad \frac{1}{5}$$

F. $\frac{1}{4}$
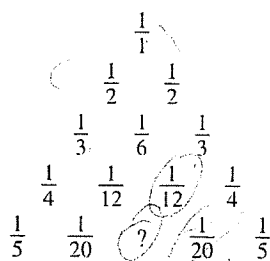
G. $\frac{1}{15}$

H. $\frac{1}{25}$

J. $\frac{1}{30}$

K. $\frac{1}{100}$

55. Of the 300 juniors at Northeast High School, 130 are taking both math and English, 139 are taking both science and English, 119 are taking both math and science, and 98 are taking all 3 courses. Only 18 students are taking none of the 3 courses. The data are shown in the Venn diagram below.
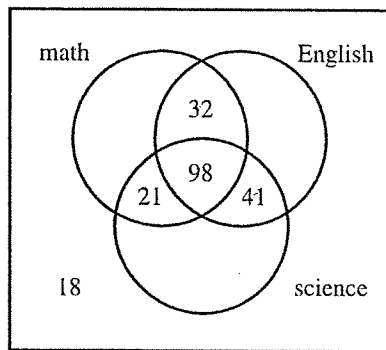
One of the juniors from Northeast High School will be chosen at random. What is the probability that the chosen student is taking exactly 1 of these 3 courses?

A. 0.30
B. 0.33
C. 0.36
D. 0.64
E. 0.67

56. What is the value of x in the equation $\log_3 54 - \log_3 2 = \log_2 x$?

F. 3
G. 8
H. 9
J. 52
K. 108

57. The rational equation $\dfrac{y}{y-4} + \dfrac{2}{y+1} = \dfrac{y-5}{y^2-3y-4}$ has the same solution set as which of the following equations?

A. $y(y+1) + 2(y-4) = y-5$
B. $y(y+1) + 2(y-4) = y^2 - 3y - 4$
C. $y(y+1) + 2(y-4) = (y-5)(y^2-3y-4)$
D. $y(y-4) + 2(y+1) = (y-5)(y^2-3y-4)$
E. $(y+2)(y^2-3y-4) = (y-5)(y-4)(y+1)$

58. For what positive value of k will the expression $9x^2 + kx + 25$ factor into the form $(ax+b)^2$ for some real number a and some real number b ?

F. 30
G. 16
H. 15
J. 8
K. 2

28

59. A class of 32 students took a 10-point quiz. The frequency distribution of their scores is given below. What was the median score for the class?

DO YOUR FIGURING HERE.

Score	Frequency
0	0
1	0
2	1
3	3
4	5
5	2
6	3
7	5
8	6
9	4
10	3

A. 3
B. 5
C. 6
D. 7
E. 8

60. For certain positive integers a and b, the greatest common divisor of a and b is 1, and $9a = 4b$. If it can be determined, which of the following statements *must* be true for a and b ?

F. 2 is a prime factor of a, and 3 is a prime factor of b.

G. 2 is a prime factor of a, and 3 is not a prime factor of b.

H. 2 is not a prime factor of a, and 3 is a prime factor of b.

J. 2 is not a prime factor of a, and 3 is not a prime factor of b.

K. Cannot be determined from the given information

END OF TEST 2

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

DO NOT RETURN TO THE PREVIOUS TEST.

Test 2: Mathematics—Scoring Key

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

Combine the totals of these columns and put in the blank for PHM in the box below.

*Reporting Categories
PHM = Preparing for Higher Math
  N = Number & Quantity
  A = Algebra
  F = Functions
  G = Geometry
  S = Statistics & Probability
IES = Integrating Essential Skills
MDL = Modeling

Number Correct (Raw Score) for:	
Preparing for Higher Math (PHM) (N + A + F + G + S)	____ (35)
Integrating Essential Skills (IES)	____ (25)
Total Number Correct for Mathematics Test (PHM + IES)	____ (60)
Modeling (MDL) (Not included in total number correct for mathematics test raw score)	____ (16)

READING TEST

35 Minutes — 40 Questions

DIRECTIONS: There are several passages in this test. Each passage is accompanied 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

LITERARY NARRATIVE: This passage is adapted from the title story of the collection *Hunger* by Lan Samantha Chang (©1998 by Lan Samantha Chang).

I often dream about the restaurant where I first met Tian. Late at night, the memory flickers up before me, dim and silent, never changing. I see the simple neon sign that reads "Vermilion Palace." The drifting
5 snow blows up against the scarlet double doors. I see myself walking toward those doors—a slight, brown girl with hair like an inkbrush, tilted eyes, and a wary mouth.

For my first few months in New York City, I
10 could not stay warm. I wore a heavy coat and wound myself in woolen scarves, but the chill went deep beneath my skin, and the winter wind found every crevice as I walked to the restaurant on numb feet, past the subway stop, the university, and the music school,
15 my gaze fixed on the icy pavement to keep myself from falling. I could not taste my food or feel the softness of my narrow bed. I had been in the city for two months before I even noticed the music school. And then one evening I heard a student practicing. Walking past a
20 basement window, I caught the thread of a violin melody, high and sweet. The sound rose up through a crack in the window and between the safety bars; it shimmered through me, a wave of color, blooming past the gray tenements and toward the narrow sky. I drew
25 one cold, sweet breath of air and truly understood that I had arrived in America.

A few days later, I saw Tian. He might have been to the restaurant a dozen times before, but I do not remember seeing him until after the music. I noticed
30 him on a stormy evening near the end of winter. I was standing at the window, watching the falling snow make bright flecks in the headlamps of the taxicabs, when a man appeared in the doorway, carrying a violin case.

35 "One person," he said, in confident English. At that time, in 1967, many new Chinese had come to live on Manhattan's Upper West Side. Most of them turned up at the restaurant, sooner or later. But not many spoke English with such ease. He wore a brown felt
40 hat, and his overcoat seemed cut to fit his shoulders; most of the other men seemed content to wear whatever would make do.

"Come with me," I replied, in Mandarin.

I seated him and poured his tea, looking down at
45 the swirl of leaves in the water. I felt the heat of the steam in my face, the warm steel handle in my hands; I watched the tea leaves drift and slide against the blue and white cup. He thanked me in Chinese. His dark eyes followed me. For the first time, I felt warm.

50 Before I left Taiwan, my mother had said, "Beware a man whose cheekbones are too high or low. Watch out for one who smiles too much." Her warnings implied that I had a choice; that these things lay under my control. But when I was a child she had often talked
55 about the Chinese myth that every man and every woman was joined at birth to their mate by an invisible, enchanted thread. With this story, she said that there could be no controlling fate.

The man ordered beef noodle soup and drank it
60 quickly. He had placed his violin case in the opposite chair, upright and facing him. Then he glanced at his watch. He flung down a dollar, seized his coat and violin, and walked out the door. I looked twice to make sure it was true: he had forgotten his hat on the chair.

65 To this day I don't know why I kept Tian's hat. Perhaps his solitude gave me strength. I looked around to make sure no one watched me. Then I slipped over to his table and picked up the hat, brought it back behind my counter. He had printed his name inside:
70 Tian Sung.

Late that night, the man reappeared in the doorway. I still remember his bare, wet head and sodden trench coat, creased with snow. He walked over and stood before me.

75 "You might have something of mine," he said, in Mandarin this time.

"I don't think so."

"Would you please take a look?"

I bent and looked under the counter. There was the
80 hat, where I had put it. I knelt and took it into my hands. Seconds passed.

I could not give him the hat. My hands grew cold; I could not breathe. I looked at him. The storm had

GO ON TO THE NEXT PAGE.

streaked his hair into his eyes—surely the blackest eyes
85 of any man I'd ever met, the eyelashes laid flat with
melting snow. They held an expression of deep and
painful privacy. And at that moment I believed I knew
what would come to be. When I returned the hat, I
would exchange it for the man who wore it. My senses
90 opened; I grew large. I believed I heard, in the howling
wind, a voice of admonition, but in the end I listened to
the plunge and whistle of my blood. I put the hat into
his beautiful, long-fingered hands.

1. The passage is best described as telling the story of:

A. two people who meet in a restaurant, but who,
because of an odd twist of fate, will never meet
again.
B. a person who loses his hat in a restaurant and of
the restaurant worker who searches hard for it and
then returns it.
C. a meeting in a restaurant that leads to something
very close to love at first sight for one of the two
people.
D. a hat that is misplaced and of the love that emerges
in a man when he meets the woman who recovers
the hat for him.

2. Which of the following phrases best describes how the
concepts of coldness and warmth are used in the
passage?

F. In a literal way to describe the narrator's physical
discomfort in the United States
G. In a literal way to illustrate the need for the layers
of clothing worn by Tian and the narrator
H. In both a metaphorical and an ironic way to sug-
gest that the narrator eventually came to enjoy the
cold weather she had at first disliked
J. In both a literal way to describe the narrator's
physical state and a metaphorical way to suggest
her emotional state

3. In describing the first time she remembers seeing Tian
at the restaurant, the narrator most nearly implies that
for him, the visit was:

A. enjoyable.
B. complicated.
C. hurried.
D. entertaining.

4. The *wave of color* the narrator describes in line 23
refers to:

F. snow reflecting against buildings in Manhattan.
G. the sound of a violin from the music school.
H. the exterior of the tenements she is walking past.
J. the sky above the Manhattan street she is walking
on.

5. Upon first meeting Tian, the narrator most nearly
judges him to be:

A. arrogant.
B. ordinary.
C. contented.
D. confident.

6. All of the following aspects of Tian make a strong
impression on the narrator EXCEPT his:

F. smile.
G. eyes.
H. hands.
J. eyelashes.

7. The narrator states that her dreams about the Vermilion
Palace are:

A. colorful and noisy.
B. almost surreal to her.
C. warm and comforting.
D. the same every time.

8. Which of the following best captures the literal mean-
ing of the phrase *caught the thread* (line 20)?

F. Could almost hear the sound
G. Understood the unusual tone
H. Recognized the faint sound
J. Witnessed the powerful feeling

9. It can reasonably be inferred from lines 79–83 (ending
with the word *breathe*) that at that moment, the narra-
tor felt:

A. analytical.
B. anxious.
C. annoyed.
D. assertive.

10. What does the narrator most likely mean by her state-
ment in lines 88–89?

F. Giving back the hat means that she will never see
Tian again.
G. Giving back the hat is the right thing to do because
it belongs to Tian.
H. Giving back the hat is symbolic of becoming an
American.
J. Giving back the hat means that Tian will become a
part of her life.

[handwritten: I look for these passages! And give them any good time: 10-12 minutes — why — I know the format!]

Passage II

[handwritten: These Are Comparative Passage]

Passage A by Alan Williams

Alice Guy, later Guy Blaché, has fascinated film critics and historians since the publication of her memoir in 1976, eight years after her death and more than fifty years after her last activities as a professional
5 filmmaker. Guy is a compelling figure for several relatively distinct reasons. There are very few obvious, clear "firsts" in film history. But Guy was definitely, unquestionably the first woman filmmaker in the history of cinema. Guy had wanted, with her memoir, to
10 reestablish her position in film history, and this is exactly what happened in the archives after 1976. For it turns out that many of her films were there all the time, but had not been *identified* as hers. This was and is the fate of most early filmmakers. Film prints had a dis-
15 tressing tendency to lose beginnings and endings with repeated showing, and directors were almost never identified in the initial titles that did survive. But armed with her book, and with a list she provided researchers of the films that she could remember making, it has
20 been possible to put her name to many "orphan" prints.

But her importance goes well beyond her films: a second way in which she is a compelling figure is her decisive participation in the elaboration of film production as an organized, industrial process. When cinema
25 first appeared as a for-profit enterprise, filmmaking followed an artisanal model. Louis Lumière, who first clearly demonstrated the commercial possibilities of the new medium, trained his operators to photograph his cinematographer's celebrated "views," to develop them
30 and make positive contact prints, and to project them to a paying audience: all the work of one person, with a single machine. George Méliès made more elaborate works, but he also did almost everything himself: he was scriptwriter, set designer, cinematographer, publi-
35 cist, and star. When Guy proposed to Léon Gaumont that his company make its own films, and that she do the job, she did most work herself, assisted by a camera operator. By the time she left the company ten years later, in 1907, production had been organized, and Guy
40 was, in modern terms, the company's head of production. She hired, oversaw, and coordinated the work of set designers, directors, actors, and so forth, though she herself continued to direct her own films.

Passage B by Joan Simon

Alice Guy's confidence in her ability to write a
45 story was one of the factors in Léon Gaumont's granting her permission to make her first film. As she said, "In the beginning, everyone was always shooting street scenes, parades or moving trains, which I did not find terribly interesting. So one day I said to Monsieur
50 Gaumont: 'It seems to me we could do something

better.' Gaumont and Lumière were both inventors, and they were not interested in developing new possibilities. They were content with their technical achievement. Gaumont said to me: 'OK . . . if you would like
55 to . . . it's a young girl's thing! You want to make a film. You want to do something. Have you written a story?', 'Yes, I can write a story; I think I'm capable of doing something.'" Like many young people to this day who work at a second job to explore their independent
60 creative work apart from the more quotidian ways of earning a living, Guy followed up Gaumont's permission by working a second shift. And so, at the age of twenty-three, by her own account, Alice Guy made her first film, *La Fée aux choux* (The Cabbage Fairy).

65 The complexities of specifically dating her first film have puzzled historians. A more fundamental question seems to be this: how would a young woman, with no experience, have thought to suggest making a film, and one with a story? The short answer is that she asked
70 and that Gaumont already had confidence in her administrative skills. The slightly longer version is that Gaumont had little reason to say no. Guy assured Gaumont that her filmmaking would not interfere with her secretarial chores. Moreover, what she proposed
75 didn't yet exist. At the time Gaumont saw motion-picture filmmaking as an adjunct to selling cameras, and the thought of projected motion pictures being a commercial endeavor as popular entertainment was not yet on the horizon. This "young girl's thing"—what he
80 may have meant by this specifically is not clear—seems to refer to something apart from the other uses of the motion-picture and other cameras, the scientific demonstrations, for example, in which Guy herself as well as Gaumont had taken part. Indeed, had commercial
85 potential been envisioned permission might not have been so easily granted to her.

[handwritten: Think: ① How do they agree ② How do they disagree? Boom.]

Questions 11–15 ask about Passage A.

---

11. It can reasonably be inferred from Passage A that the organized industrial process of filmmaking differed from the artisanal model in that artisanal filmmaking was accomplished through the work of:

A. a head of production and numerous film crew artists.

B. one person doing almost all of the film production jobs.

C. one set designer and a company owner.

D. a publicist, a scriptwriter, and a star.

IKI = Comparison Questions

12. Passage A most strongly suggests that Guy is primarily recognized for her role as:

F. a writer of film history.
G. a camera technician at Gaumont studios.
H. the first woman filmmaker.
J. Lumière's favorite cinematographer.

13. Based on Passage A, what is one reason many early film prints lost their beginnings and endings?

A. Repeated showings
B. Researchers' handling of films
C. The quality of the archive storage facility
D. Directors' lack of skill in film production

14. The author of Passage A indicates that researchers were able to identify some early film prints as Guy's partly because:

F. each film was shelved alphabetically by the film-maker's name.
G. Guy created a list of the films she made.
H. the prints had original labels with Guy's name written on them.
J. historians and film critics kept accurate records.

15. As it is used in line 20, the word *put* most nearly means:

A. position.
B. deposit.
C. assign.
D. gauge.

Questions 16 and 17 ask about Passage B.

---

16. The main purpose of the last paragraph in Passage B is to:

F. describe how Guy's filmmaking career came to an end.
G. detail Gaumont's confidence in Guy's technical abilities as a filmmaker.
H. explain why Guy was given the opportunity to make films.
J. clarify the differences between Guy's and Gaumont's work as filmmakers.

17. Details in Passage B most strongly suggest that Guy was initially employed by Gaumont as:

A. an inventor of cameras.
B. a camera salesperson.
C. a film publicist.
D. a secretary.

Questions 18–20 ask about both passages.

---

18. Compared to Passage B, Passage A provides more information about the:

F. complexities of identifying the early films of Guy and other filmmakers.
G. films Guy made with her husband later in her career.
H. process leading up to Guy making her first film.
J. tasks Guy carried out for Lumière and Gaumont.

19. Which of the following statements is supported by both passages?

A. Guy made her first film at the age of twenty-three.
B. Guy believed that many films in the historical film archives were hers.
C. Guy wrote her memoir to reestablish her place in film history.
D. Guy helped to shape the role of filmmaker in the early days of film.

20. Which of the following statements best captures a main difference in the focus of the passages?

F. Passage A focuses on Guy's overall importance to film history, while Passage B focuses on the details regarding her start in filmmaking.
G. Passage A focuses on Guy's work in the early part of the twentieth century, while Passage B focuses on her work in the 1970s.
H. Passage A focuses on Guy's work with Lumière, while Passage B focuses on her work with Gaumont.
J. Passage A focuses on Guy as a camera operator, while Passage B focuses on her work as a film producer.

Notice: Passage A vs Passage B Always have same format. 1st few Quest are about A — Next few are About B — Then last 3/4 are about Both Compared.

Passage III

In 1926, Martha Graham's first company, billed as "Martha Graham and Dance Group," made its debut. Most of the dances, with titles like *The Three Gopi Maidens* and *Maid with the Flaxen Hair,* were reminis-
5 cent of her Denishawn days, though there were sparks of freshness and originality. Newspaper critics found Martha and her trio of dancers "decorative, pretty and undisturbing." Graham herself would later describe those early dances as "childish things, dreadful."

10   In the next few years her dances would prove daring and innovative. From 1926 through 1930 she created seventy-nine new dances for herself and her Dance Group.

In 1927 she stunned her audience with a short solo
15 called *Revolt,* a dance that was anything but "decorative, pretty and undisturbing." *Revolt* was Martha's first dance of social protest, a stark, forceful comment on injustice and the outraged human spirit.

The 1920s were a decade of experimentation in all
20 the arts—in painting, music, literature, and the theater—and a new breed of young dancers wanted to speak for the changing times in which they lived. While they respected classical ballet as an art, they felt that it could never say enough about the pressing con-
25 cerns of contemporary life.

Classical ballet dated back more than three hundred years to its origins as an elegant spectacle in the royal courts of Europe. With its five basic positions of the feet, prescribed positions of the body, and geomet-
30 ric relationships among the dancers, ballet was a highly controlled dance form.

To the rebellious young American dancers of the time, traditional European ballet seemed decadent and undemocratic. They regarded its dashing princes and
35 dying swans as escapist and antiquated, and its elaborate formal technique as artificial and restricting. In place of ballet's fanciful stories they explored serious themes dealing with ordinary people and modern life. They did away with glamorous costumes and scenery
40 and danced in simple outfits on bare stages. Their dances were meant to be challenging and disturbing.

In 1929 Martha Graham and Dance Group gave the first performance of *Heretic,* regarded today as her earliest major work. Dressed in white, and with loose,
45 flowing hair, Martha danced in opposition to a double row of women clad in black Puritan garb, their hair drawn straight back and knotted, their stern faces set like white masks. Again and again the solitary heretic struggles to advance, trying to break through a barrier
50 formed by the women in black. But each time they move rigidly in unison, blocking her way like automatons, as their bare feet slam down onto the floor. Some

of the dancers lunge at the heretic, some seem to be spitting at her, while others turn their backs. *Heretic*
55 was meant to be provocative. The dance can be seen as a powerful condemnation of intolerance, especially toward people who are different in some way—a theme that Graham would return to again. "To many people, I was a heretic," she wrote. "In many ways, I showed
60 onstage what most people came to the theater to avoid."

This new kind of dance wasn't to everyone's liking. It was neither beautiful nor romantic. Some critics complained that Graham's spare, stark, unsmiling
65 dance style seemed tortured and distorted.

Martha and her fellow "modern" dancers were often the butt of ridicule and hostile jokes. Women in America had won the right to vote only a few years earlier, in 1920, and many people were still uncomfortable
70 with the image of the "new woman" who sought a career, spoke out on social issues, and went knowledgeably to the polls. It was all right to be a high-kicking, scantily clad chorus girl, but a woman who ran a dance company and created works that commented on
75 war, poverty, and intolerance seemed unnatural and suspicious.

Martha's work was so startlingly different, people did not always know how to react. After one of her early recitals, a friend from her Denishawn days went
80 backstage and said, "Martha, dear, how long do you expect to keep up this dreadful dancing?"

"As long as I have an audience," Martha replied.

Graham's last complete work, composed when she was ninety-six years old, is one of her most joyful.
85 *Maple Leaf Rag,* a self-mocking commentary on human foibles and on her own legend, is set to the ragtime tunes of Scott Joplin. At the time of her death, she was working on a new dance, commissioned by the government of Spain.

90   "Many people have asked me if I have a favorite role," Graham once said. "To which I always answer that my favorite role is the one I am dancing now."

21. Which of the following statements best describes the nature of this passage?

A. A biographical sketch that gives nearly equal attention to both Graham's work and her personal life
B. A chronological account of Graham's life beginning with her early childhood and ending with her Denishawn days
C. A description of Graham's work and philosophy that focuses on placing her early dances into historical context
D. A depiction of Graham's philosophy of dance and how that philosophy had come to be seen as outdated by the time of her death

GO ON TO THE NEXT PAGE.

22. The author would most likely describe Graham's dancing as:

F. decorative and pretty.
G. joyful and lighthearted.
H. stark and overly simplistic.
J. daring and rebellious.

23. Based on the passage, Graham in later life would most likely characterize her dance company's debut as:

A. a promising beginning.
B. an immature presentation.
C. an appeal for understanding.
D. a quest for modern expression.

24. According to the passage, which of the following features is NOT associated with classical ballet?

F. Whimsical story lines
G. Challenging themes
H. Prescribed positions
J. Restrictive techniques

25. As depicted in the passage, Graham's role in *Heretic* can best be described as one in which her character is:

A. unwilling to accept rigid social standards.
B. able to overcome difficulties easily.
C. ignorant of what others think of her.
D. unaware of differences that make her unusual.

26. The author claims that many people in the 1920s who were uncomfortable with the activities of the "new woman" found it more acceptable for women to:

F. vote knowledgeably in elections.
G. run a business.
H. dance to advocate social causes.
J. dance suggestively in a chorus line.

27. It can reasonably be inferred from the passage that part of the encouragement Graham received for her dancing came from:

A. the reaction of friends from her Denishawn days.
B. early and widespread support from critics.
C. recognition of her growth as a classical dancer.
D. the appreciation of an accepting audience.

28. Based on the passage, the period from 1926 to 1930 for Graham's dance company could best be described as a time of:

F. uninterrupted tranquility.
G. critical acclaim.
H. rich productivity.
J. popular acceptance.

29. As quoted in the passage, Graham suggests that *Heretic* is symbolic of:

A. her painful childhood experiences.
B. the reaction to her work as an adult.
C. her experience of being criticized for her religious beliefs.
D. the way she was often rejected while attending the Denishawn School of Dancing.

30. The critics referred to in the eighth paragraph (lines 62–65) were most nearly complaining that Graham's dancing was:

F. misleading and sentimental.
G. awkward and contorted.
H. meandering and second-rate.
J. agonizing and unoriginal.

Passage IV

Ornithologist Millicent Ficken was recording bird calls in Arizona's Chiricahua Mountains when she heard the screams of a Cooper's hawk on a nearby ponderosa pine. "After the hawk's last scream, a Steller's
5 jay sounded the alarm with its harsh *wah* call," recalls Ficken. Seconds later, a half-dozen jays were flocking about the hawk, darting in close to its back and head, and joining in a raucous chorus of *wahs*. Then one of the jays, despite being half the size of its target, struck
10 the hawk on its back and sent the raptor plummeting to the ground. The hawk stood there briefly and then flew off.

Zoologists call this massing together of birds to attack a common enemy "mobbing." In this case, the
15 jays were mobbing a hawk that specializes in eating birds their size. A widespread phenomenon among birds, mobbing may involve a mix of bird species or, as with the jays, just one species attacking a predator. Rarely, however, do the birds actually strike the object
20 of their wrath; the jay's attack was the only instance that Ficken, a professor emerita at the University of Wisconsin-Milwaukee, has witnessed in more than 20 years of research.

In many cases, mobbing is a noisy affair in which
25 each species uses its own special calls to bring out its allies. By surveying the mobbing calls of more than 50 species of birds, Ficken has provided additional insights into this behavior. "I discovered that there is no one stereotypic pattern to the calls as had been pre-
30 viously believed, but an array of different vocalizations among the various species of birds," she says.

Earlier research had suggested that mobbing calls enabled other birds to locate the bird sounding the alarm. Such calls would start abruptly and cover a wide
35 range of frequencies, so they could be readily picked up by other birds. "The black-capped chickadee's mobbing call is a classic example of this type," says Ficken. But she discovered that less than half the species she studied conformed to this classic pattern.

40 Among other species, she found different kinds of mobbing calls. Some flock associates—birds that often hang out together—have mobbing calls unique to their groups. "Brown creepers, golden-crowned kinglets and Mexican chickadees, for instance, are frequent flock
45 associates," says Ficken, "and their high-pitched, buzzy mobbing calls are strikingly similar." Bridled titmice and ruby-crowned kinglets give mobbing calls that are nearly identical. "The similarity in their calls may help to coordinate the group mobbing responses," she adds.

50 Her research has also revealed some similarities within groups of birds with a common ancestry such as corvids (crows and jays), nuthatches and vireos. But

underscoring the complexities of the avian world, she found that the mobbing calls within other related
55 groups of birds such as flycatchers and chickadees were very different. Why the variation? "There are many possible reasons, such as differences in ancestry and flock associations," says Ficken. "But we really don't know. It's a poorly understood area."

60 Despite the differences in calls, however, the main function of mobbing appears to be to get the predator to move out of the vicinity. Stanley Temple, a wildlife ecologist at the University of Wisconsin-Madison, sees evidence for this theory in his observations as a fal-
65 coner. On one occasion, one of his red-tailed hawks caught a crow and brought it to the ground. The screaming of the captured crow sounded the alarm for the crows in a huge nearby roost and "they descended like a black tornado on the hawk," Temple recalls, and
70 the captured crow got away.

Ficken's observations also bear out the "move along" hypothesis. The Steller's jays she watched in Arizona certainly sent the Cooper's hawk on its way in a hurry. With its initial mobbing call, the first jay also
75 put other jays on the alert, averting any surprise attacks by the hawk—another likely reason for mobbing.

One thing about mobbing is clear: It helps little birds even the odds against big predators. Ficken recently observed this in Arizona, where she saw five
80 hummingbirds mob and chase away a northern pygmy-owl more than three times their size. Says Ficken: "Even small prey species can defeat their larger enemies by mass action."

31. Which of the following statements is NOT supported by the passage?
    A. Brown creepers, nuthatches, and Steller's jays share a common ancestry.
    B. Ficken has been witnessing mobbing incidents for at least 20 years.
    C. Temple has made observations that support the "move along hypothesis."
    D. Ficken's research disproves an earlier belief that mobbing calls conformed to one stereotypic pattern.

32. It can reasonably be inferred from the passage that the average life span of members of a small-bird species is increased by the birds' ability to:
    F. travel with large predators.
    G. eat birds their own size.
    H. avoid contact with flock associates.
    J. participate in mass action.

33. What is the function of the first two paragraphs (lines 1–23) in relation to the passage as a whole?

A. To introduce the idea that Cooper's hawks specialize in eating Steller's jays and are the most common predators in mobbing incidents

B. To identify Ficken as the leading authority on mobbing and highlight her credentials and background

C. To provide a definition of mobbing and illustrate an unusual example of it

D. To present the opposing points of view held by ornithologists and zoologists on a widespread phenomenon among birds

34. According to the passage, the Steller's jay's initial mobbing call resulted in all of the following EXCEPT that it:

F. signaled other jays to flock around the predator.

G. put other jays on the alert.

H. motivated the Cooper's hawk's raucous chorus of screams.

J. prevented surprise attacks by the predator.

35. When Temple compares the flock of crows mobbing the red-tailed hawk to a "black tornado" (line 69), he illustrates a point made earlier in the passage that:

A. crows are the birds most commonly associated with violent mobbing attacks.

B. some birds have the ability to aggressively attack a predator.

C. mobbing typically involves a mix of aggressive bird species.

D. crows often physically strike the object of their wrath.

36. According to the passage, Ficken concludes that the "classic" mobbing call is used by:

F. most of the mobbing species she studied.

G. fewer than half of the species she studied.

H. birds she studied in Arizona but not other places.

J. birds that often hang out together.

37. Which of the following statements best expresses the main idea of the sixth paragraph (lines 50–59)?

A. Ficken finds it difficult to explain the variation in mobbing calls within certain related groups of birds and feels there is still a lot to be learned.

B. Flycatchers and chickadees have similar mobbing calls to those of crows and jays because they are connected by common ancestry.

C. Differences in ancestry and flock associates are the primary reasons for the variation in the mobbing calls of certain related groups of birds.

D. Similarities of mobbing calls within certain related groups of birds underscore the complexities of the avian world.

38. As it is used in line 5, the phrase "harsh *wah*" most nearly refers to the:

F. last scream of the Cooper's hawk.

G. combined screams of the Cooper's hawk and Steller's jay.

H. alarm call of the first Steller's jay.

J. Steller's jay's imitation of a human scream.

39. As it is used in line 24, the word *affair* most nearly means:

A. occasion.

B. observation.

C. catastrophe.

D. accident.

40. According to the passage, which of the following pairs of bird species has similar mobbing responses because of common ancestry?

F. Hawks and jays

G. Chickadees and crows

H. Hawks and kinglets

J. Crows and jays

END OF TEST 3

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

DO NOT RETURN TO A PREVIOUS TEST.

Test 3: Reading—Scoring Key

Key	Reporting Category*		
	KID	CS	IKI
1. C		—	
2. J		—	
3. C	—		
4. G		—	
5. D	—		
6. F	—		
7. D	—		
8. H		—	
9. B	—		
10. J	—		
11. B	—		
12. H	—		
13. A	—		
14. G	—		
15. C		—	
16. H		—	
17. D	—		
18. F			—
19. D			—
20. F			—

Key	Reporting Category*		
	KID	CS	IKI
21. C		—	
22. J		—	
23. B	—		
24. G	—		
25. A	—		
26. J			—
27. D	—		
28. H	—		
29. B	—		
30. G	—		
31. A	—		
32. J	—		
33. C		—	
34. H	—		
35. B		—	
36. G	—		
37. A	—		
38. H	—		
39. A	—		
40. J	—		

*Reporting Categories
KID = Key Ideas & Details
CS = Craft & Structure
IKI = Integration of Knowledge & Ideas

Number Correct (Raw Score) for:

Key Ideas & Details (KID) _____ (25)

Craft & Structure (CS) _____ (11)

Integration of Knowledge & Ideas (IKI) _____ (4)

Total Number Correct for Reading Test _____ (40)
(KID + CS + IKI)

Test 4: Science—Scoring Key

Key	Reporting Category*		
	IOD	SIN	EMI
1. C			—
2. F			—
3. B			—
4. H			—
5. B			—
6. G			—
7. B			—
8. F	—		
9. B	—		
10. H			—
11. D	—		
12. H		—	
13. B			—
14. H	—		
15. C		—	
16. J	—		
17. C	—		
18. G	—		
19. A	—		
20. G	—		

Key	Reporting Category*		
	IOD	SIN	EMI
21. D			—
22. H	—		
23. A		—	
24. F		—	
25. B		—	
26. H			—
27. B	—		
28. J		—	
29. A			—
30. H	—		
31. D	—		
32. F	—		
33. B	—		
34. H	—		
35. B	—		
36. F			—
37. C	—		
38. H	—		
39. D	—		
40. J	—		

*Reporting Categories
IOD = Interpretation of Data
SIN = Scientific Investigation
EMI = Evaluation of Models,
        Inferences & Experimental Results

Number Correct (Raw Score) for:

Interpretation of Data (IOD) _____ (18)

Scientific Investigation (SIN) _____ (10)

Evaluation of Models, Inferences &
Experimental Results (EMI) _____ (12)

Total Number Correct for Science Test _____ (40)
(IOD + SIN + EMI)

SCIENCE TEST

35 Minutes—40 Questions

NOTE: No Graphs, No Charts!

DIRECTIONS: There are several 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.

ESSAY = Using "Science" to do it.

Boom! you're doing a Comparison

Passage I

Mass extinctions on Earth may be caused by bombardments of Earth by comets from the *Oort cloud*, a spherical swarm of comets occupying the outer part of our solar system. Three scientists share their viewpoints about possible causes of the bombardments.

Scientist 1

The Sun is orbited by a dim, unseen object called a *brown dwarf*, an object that is less than 0.08 times the Sun's mass and therefore is not massive enough to become a star. Each complete orbit of the brown dwarf takes 26 million years. Once each orbit, the brown dwarf passes through the Oort cloud. The brown dwarf's gravitational force alters the orbits of many comets, causing 1 or more of them to enter the inner part of the solar system and to collide with Earth, producing a mass extinction.

Scientist 2

The Sun is part of an *open cluster*, a type of star cluster in which the stars are bound to each other by gravity. The Sun revolves around the center of mass of the cluster once every 26 million years. Once every orbit, the Sun passes through the densest part of the cluster. The gravitational force exerted by the stars in this part of the cluster causes many comets to leave the Oort cloud. One or more of these comets enter the inner part of our solar system and collide with Earth, causing a mass extinction.

Scientist 3

Our galaxy is disk shaped, and the Sun lies within the disk. The galaxy also contains *high-velocity stars*, stars following orbits that are highly inclined with respect to the disk. The bombardments that produce mass extinctions are caused by the gravitational effects of high-velocity stars. High-velocity stars cause bombardments whenever these stars pass near the Oort cloud. This hypothesis is preferable because, rather than occurring every 26 million years, mass extinctions occur at irregular intervals. Moreover, the Sun cannot be part of an open cluster, because the Sun is 5 billion years old. The stars in open clusters all form at approximately the same time and then drift apart after a few hundred million years.

Must Read This

And take Notes

1. Based on Scientist 3's viewpoint, which of the following quantities is approximately equal for the stars in an open cluster?
   A. Mass
   B. Diameter
   C. Age
   D. Temperature

2. Based on Scientist 3's viewpoint, high-velocity stars pass through or near our solar system:
   F. at irregular intervals.
   G. once each year.
   H. every 13 million years.
   J. every 26 million years.

3. Suppose that the last mass extinction occurred 13 million years ago. Based on Scientist 1's viewpoint, the next mass extinction would most likely occur how many million years from now?
   A. 5
   B. 13
   C. 26
   D. 32

4. Scientist 1 implies that the unseen object might be observable from Earth if the object:
   F. orbited the center of an open cluster instead of the center of our galaxy.
   G. orbited the center of our galaxy instead of the center of an open cluster.
   H. were a star instead of a brown dwarf.
   J. were a brown dwarf instead of a star.

GO ON TO THE NEXT PAGE.

Why? B/c All these questions will be comparing "Sci 1", "Sci 2", "Sci 3" — At least 1 of these are on every ACT EXAM

5. The viewpoints of Scientists 1 and 2 are inconsistent with that of Scientist 3 regarding which of the following factors?

   A. How regularly brown dwarfs form
   B. Whether comets cause mass extinctions at regular intervals of time
   C. Whether Earth has been bombarded by extraterrestrial objects at any time in the past
   D. Whether mass extinctions will occur in the future

6. Proving that the Sun is a member of an open cluster would directly *contradict* a statement made by:

   F. Scientist 1 only.
   G. Scientist 3 only.
   H. Scientists 1 and 3.
   J. Scientists 2 and 3.

7. The stars in an open cluster are bound together by gravity. Scientist 3 supports the conclusion that the gravitational force of an open cluster is:

   A. strong enough to keep the cluster together indefinitely.
   B. too weak to keep the cluster together indefinitely.
   C. present only among the stars more massive than the Sun.
   D. present only among the stars less massive than the Sun.

Passage II

A study was conducted to identify the properties of a type of sand being mined at a given site. Natural processes bring this sand to the mining site from 1 of 4 possible sources, all located within a few miles of the site: a river, inland dunes, underwater offshore dunes, or a beach to the north (see Figure 1). A second study examined sand from each of these possible sources to determine which of the sources supplies sand to the mining site.
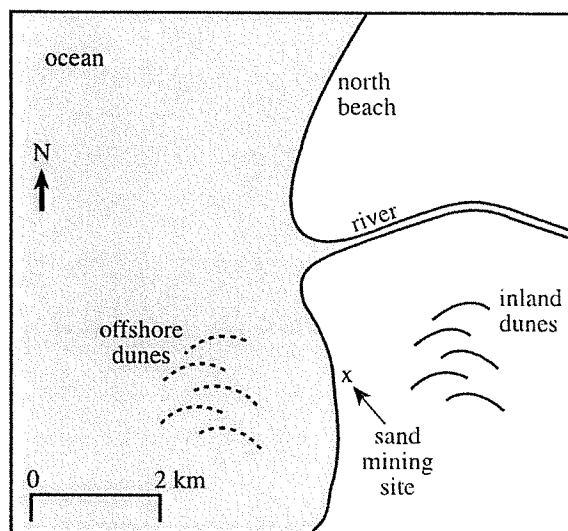

Figure 1

Study 1

Samples of the mined sand were collected at the mining site by taking a 2.5 cm diameter core 30 cm deep at 3 locations, 1 m apart. All organic matter, and all clay, silt, and gravel, were separated from the samples, leaving only sand-size particles (0.0625–2 mm in diameter). The coloration of each particle and the average diameter of the particles were determined. A thin layer of the sand was glued to a glass slide, ground down until it was only 25 micrometers thick, and then examined under magnification using transmitted polarized light to determine the composition of each particle. The results are in Table 1.

Study 2

The process of collecting and analyzing sand samples described in Study 1 was repeated at the 4 sites that were possible sources for the mined sand (see Table 2).

		Composition (% of all particles)				Coloration (% of all particles)			
Sample	Average diameter (mm)	quartz	K-feldspar	plagioclase	granite fragments	amber	white	colorless	dark
Mined sand	0.4	48	17	14	7	17	75	7	1

Table 1

Table 2									
Sample	Average diameter (mm)	Composition (% of all particles)				Coloration (% of all particles)			
		quartz	K-feldspar	plagioclase	granite fragments	amber	white	colorless	dark
River sand	0.2	44	15	12	8	4	75	18	3
Underwater offshore dune sand	0.4	49	16	14	7	17	72	9	2
Inland dune sand	0.4	52	14	14	7	11	76	11	1
North beach sand	0.3	50	10	11	5	13	58	20	9

Figure 1 and Tables 1 and 2 adapted from Rodney Combellick and Robert Osborne, "Sources and Petrology of Beach Sand from Southern Monterey Bay, California." ©1977 by The Society of Economic Paleontologists and Mineralogists.

8. How did the average particle diameter of river sand compare to those of the other sands in Study 2 ? River sand had an average particle diameter that was:

F. smaller than the average particle diameter of all of the other sands.
G. smaller than the average particle diameter of only some of the other sands.
H. the same as the average particle diameter of one of the other sands.
J. larger than the average particle diameter of all of the other sands.

9. If a minimum of 10% of the particles in a sand are amber-colored, the entire sand will appear reddish-brown. Which sand from the studies would NOT appear reddish-brown?

A. Mined sand
B. River sand
C. Underwater offshore dune sand
D. North beach sand

10. Which of the following statements best explains why the sum of the particle composition percents for any of the sands did not equal 100% ?

F. The number of particles composed of quartz was actually much lower than measured.
G. The number of particles that were granite fragments was actually much lower than measured.
H. Some particles were composed of materials other than quartz, K-feldspar, plagioclase, or granite fragments.
J. All of the particles were composed of either quartz, K-feldspar, plagioclase, or granite fragments.

11. In Study 2, based on the average particle diameter for north beach sand, a north beach sand sample most likely contained:

A. only particles that were 0.3 mm in diameter.
B. only particles that were larger than 0.3 mm in diameter.
C. only particles that were smaller than 0.3 mm in diameter.
D. some particles that were larger than 0.3 mm in diameter and some particles that were smaller than 0.3 mm in diameter.

12. The description in Study 1 of the methods used to prepare the sand sample for viewing under magnification indicates that intact sand particles are most likely too:

F. heavy to be fixed to a glass slide.
G. large to be fixed to a glass slide.
H. thick to allow light to pass through.
J. thin to allow light to pass through.

13. Based on the results of Studies 1 and 2, sand is most likely brought to the mining site from the:

A. river.
B. underwater offshore dunes.
C. inland dunes.
D. north beach.

14. If sand is being supplied to the mining site from the inland dunes, one or both of which 2 erosion processes are most likely capable of moving the sand directly from the inland dunes to the mining site?

F. Ocean waves and wind
G. Ocean waves and glaciers
H. Running water and wind
J. Running water and glaciers

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GO ON TO THE NEXT PAGE.

Passage III

A researcher performed 2 experiments to investigate seed germination in violet seeds.

Experiment 1

On Day 0, the experimenter placed a piece of sterile filter paper inside each of 30 sterile Petri dishes, moistened each filter paper with the same aqueous solution, and placed 25 seeds on each filter paper.

Next, 5 of these Petri dishes were placed in each of 6 growth chambers. No light was present in the growth chambers. Each chamber was maintained at 1 of 6 temperatures throughout the experiment. The percent of seeds that had germinated by Days 4, 8, 12, and 16 at each temperature appears in Figure 1.
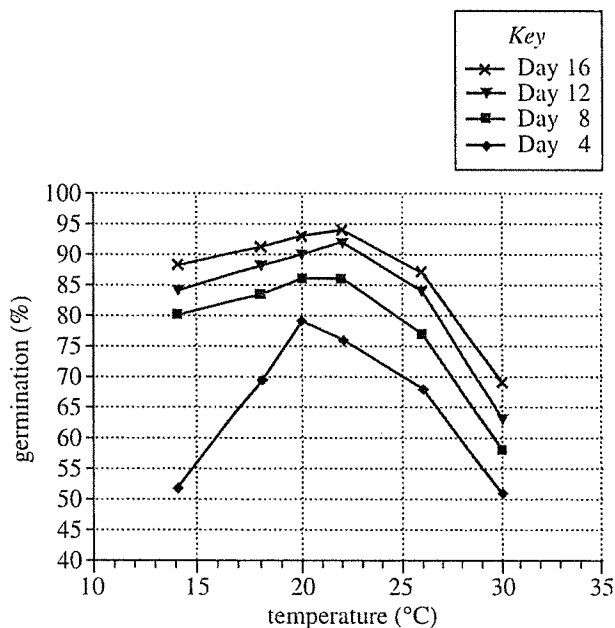
Experiment 2

On Day 0, the experimenter placed a piece of sterile filter paper inside each of 30 sterile Petri dishes, moistened each filter paper with 1 of 6 aqueous solutions, and placed 25 seeds on each filter paper. Each aqueous solution had a different pH, and each was used to moisten the filter paper in 5 of the Petri dishes.

All 30 Petri dishes were then placed in a growth chamber that was maintained at 20°C throughout the experiment. No light was present in the growth chamber. The percent of seeds that had germinated by Days 4, 8, 12, and 16 at each pH appears in Figure 2.

Key
—✕— Day 16
—▼— Day 12
—■— Day 8
—◆— Day 4

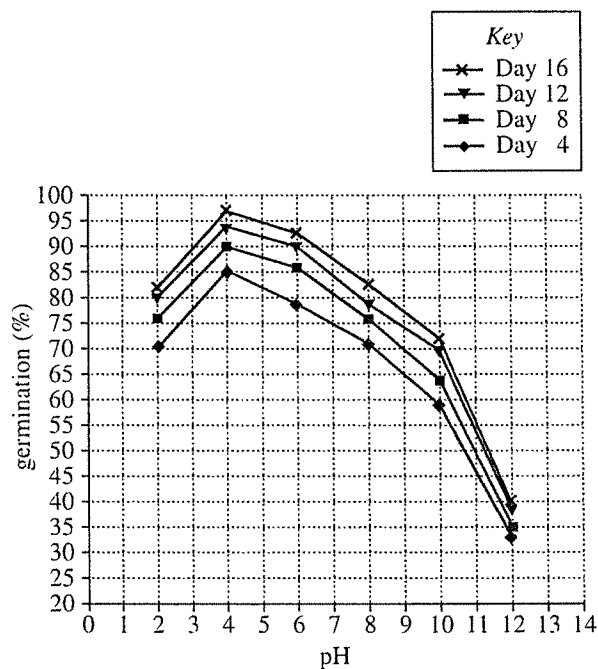Figure 1

Key
—✕— Day 16
—▼— Day 12
—■— Day 8
—◆— Day 4

Figure 2

Figures adapted from William C. Mitchell et al., "Analysis of Horned Violet, *Viola cornuta* L., Seed Germination." ©2000 by the New Jersey Academy of Science.

15. In which of the following ways did the experimental procedures used in Experiments 1 and 2 differ?

   A. More seeds were used in Experiment 1.
   B. Fewer seeds were used in Experiment 1.
   C. More temperatures were used in Experiment 1.
   D. Fewer temperatures were used in Experiment 1.

16. In Experiment 2, as pH increased from 2 to 12, percent germination:

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

17. Based on the results of Experiments 1 and 2, violet seeds exposed to which of the following sets of conditions would most likely have the highest percent germination after 8 days of exposure?

   A. A 16°C growth chamber and filter paper moistened with a solution with a pH of 4
   B. A 16°C growth chamber and filter paper moistened with a solution with a pH of 8
   C. A 21°C growth chamber and filter paper moistened with a solution with a pH of 4
   D. A 21°C growth chamber and filter paper moistened with a solution with a pH of 8

18. If the seeds that were maintained at 18°C in Experiment 1 had been examined on Day 10, the percent germination would most likely have been closest to which of the following?

   F. 80%
   G. 85%
   H. 90%
   J. 95%

19. Suppose one Petri dish in Experiment 1 had been maintained at 33°C. On Day 8, percent germination would most likely have been closest to which of the following values?

   A. 50%
   B. 60%
   C. 70%
   D. 80%

20. The pH of the aqueous solution used in Experiment 1 was equal to the pH of 1 of the 6 aqueous solutions used in Experiment 2. Based on this information and the results of Experiments 1 and 2, what was the pH of the aqueous solution used in Experiment 1 ?

   F. 4
   G. 6
   H. 10
   J. 12

21. A student concluded that on Day 16 of Experiment 2 the seeds exposed to the most acidic solution had the lowest percent germination. Do the results support this conclusion?

   A. Yes; on Day 16, the lowest percent germination was observed in the seeds exposed to pH 2.
   B. Yes; on Day 16, the lowest percent germination was observed in the seeds exposed to pH 12.
   C. No; on Day 16, the lowest percent germination was observed in the seeds exposed to pH 2.
   D. No; on Day 16, the lowest percent germination was observed in the seeds exposed to pH 12.

Passage IV

In the following experiments, a student studied some properties of *inductors* and *capacitors*, devices used to store electrical energy.

Experiment 1

The student constructed an electrical circuit (see Figure 1) containing a 6 V battery, a switch, a 10 ohm resistor, a 50 H (henry, a unit of inductance) inductor, and an *ammeter* (a device used to measure the amount and direction [+ or −] of an electrical current).
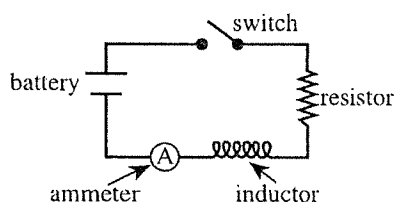

Figure 1

She closed the switch at time = 0.0 sec and immediately began recording the current over time. The results are shown in Table 1.

Table 1	
Time (sec)	Current (amp)
0.0	+0.00
1.0	+0.11
5.0	+0.38
10.0	+0.52
20.0	+0.59
30.0	+0.60

Experiment 2

She replaced the inductor in the electrical circuit with one having a different inductance. She closed the switch and 10.0 sec later recorded the electrical current. She repeated these steps using various inductors (see Table 2).

Table 2	
Inductance (H)	Current (amp)
10	+0.60
30	+0.58
50	+0.52
70	+0.46

Experiment 3

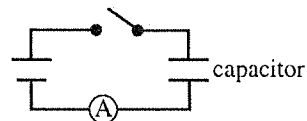The student charged a capacitor using the circuit shown in Figure 2.

Figure 2

Next, using the inductor from Experiment 1 and the charged capacitor, she assembled the circuit shown in Figure 3.
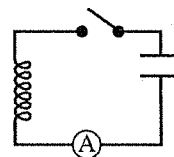

Figure 3

She closed the switch at time = 0.0 sec and recorded the current in the circuit over time (see Table 3).

Table 3	
Time (sec)	Current (amp)
0.0	0.00
1.0	−0.08
2.0	0.00
3.0	+0.08
4.0	0.00
5.0	−0.08

She determined from the data in Table 3 that the *period* of this circuit (twice the time between successive zeros of the current) was 4.0 sec.
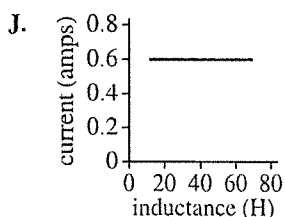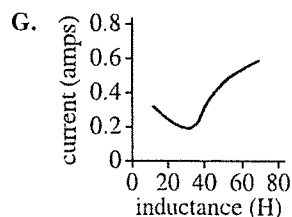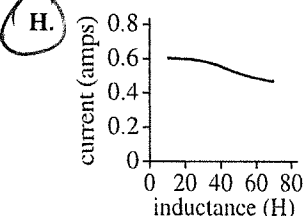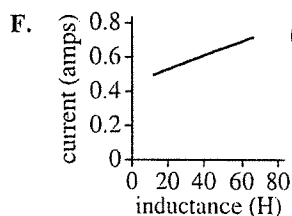
Experiment 4

Using the procedures from Experiment 3 and various capacitors, the student studied how the period of the circuit in Figure 3 varied with capacitance (see Table 4).

Table 4	
Capacitance (μF)*	Period (sec)
2,050	2.0
4,100	2.8
8,200	4.0
16,400	5.7
*μF (microfarad) is a unit of capacitance.	

22. The results of Experiment 2 are best represented by which of the following graphs?

F. current (amps): 0.8, 0.6, 0.4, 0.2, 0 vs inductance (H): 0 20 40 60 80

H. current (amps): 0.8, 0.6, 0.4, 0.2, 0 vs inductance (H): 0 20 40 60 80

G. current (amps): 0.8, 0.6, 0.4, 0.2, 0 vs inductance (H): 0 20 40 60 80

J. current (amps): 0.8, 0.6, 0.4, 0.2, 0 vs inductance (H): 0 20 40 60 80

23. The circuit shown in Figure 3 and used in Experiment 4 would most likely have had a period of 1.0 sec if the capacitor in the circuit had a capacitance of which of the following?

A. 512 µF
B. 3,015 µF
C. 6,100 µF
D. 20,800 µF

24. In Experiment 1, as soon as the switch was closed, which of the following energy conversions most likely occurred?

F. Chemical potential energy to electrical energy
G. Chemical potential energy to nuclear energy
H. Electrical energy to nuclear energy
J. Nuclear energy to gravitational potential energy

25. Which of the following objects acted as the main voltage source in a circuit during at least 1 of the 4 experiments?

I. Copper wire
II. Charged capacitor
III. Resistor

A. I only
B. II only
C. I and III only
D. I, II, and III

26. Based on the results of Experiment 4, the capacitance of the capacitor used in Experiment 3 was most likely which of the following?

F. 2,050 µF
G. 4,100 µF
H. 8,200 µF
J. 16,400 µF

27. In a circuit like the one shown in Figure 3, when the switch is closed, the current varies over time as shown in the following figure.
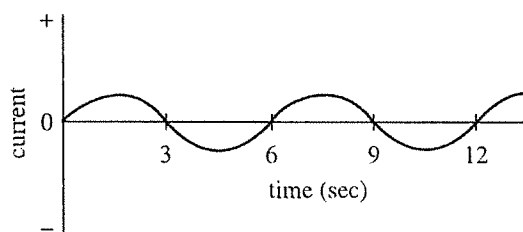
Based on Experiment 3, what is the period of this circuit?

A. 3 sec
B. 6 sec
C. 9 sec
D. 12 sec

28. The student is attempting to determine the inductance of a new inductor. Following the procedure in Experiment 1 with the new inductor, the student finds that after 20.0 sec the current is 0.46 amp. Based on the results of Experiments 1 and 2, the inductance of the new inductor is most likely:

F. less than 10 H.
G. between 10 H and 30 H.
H. between 31 H and 50 H.
J. greater than 50 H.

Passage V

Several trials were performed with helium gas in a cylinder. The cylinder was fitted with a piston that could be locked in place or allowed to freely move up and down (see Figure 1).
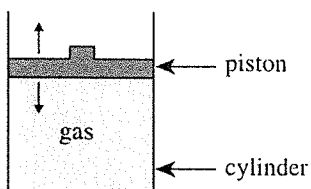

Figure 1

For each trial, the volume (V), temperature (T), pressure (P in atmospheres, atm), and amount (number of atoms) of the gas in the cylinder were known or measured. For each trial, 2 of these values were held constant (as shown in Tables 1–4).

Table 1		
$V = 0.4$ L; $T = 20°C$		
Trial	Amount ($\times 10^{22}$ atoms)	P (atm)
1	2.0	2.0
2	4.0	4.0
3	6.0	6.0
4	8.0	8.0

Table 2		
amount = 2.5×10^{22} atoms; $T = 20°C$		
Trial	P (atm)	V (L)
5	0.25	4.0
6	0.50	2.0
7	0.75	1.3
8	1.00	1.0
9	1.50	0.7

Table 3		
amount = 2.5×10^{22} atoms; $P = 1.0$ atm		
Trial	T (°C)	V (L)
10	0	0.93
11	20	1.00
12	40	1.07
13	60	1.14
14	80	1.21

Table 4		
amount = 2.7×10^{22} atoms; $V = 1.0$ L		
Trial	T (°C)	P (atm)
15	0	1.0
16	27	1.1
17	127	1.5
18	227	1.8
19	327	2.2

29. A student claimed that for a given amount of gas at a constant temperature, decreasing the volume of the gas would increase the rate of collisions (per unit area) by the atoms of the gas with the sides of its container. Do the data in Table 2 support this claim?

A. Yes; as the volume decreased, the pressure increased.
B. Yes; as the volume decreased, the pressure decreased.
C. No; as the volume decreased, the pressure increased.
D. No; as the volume decreased, the pressure decreased.

GO ON TO THE NEXT PAGE.

30. According to Table 1, as the number of atoms of the gas increased, the pressure of the gas:

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

**31.** Consider the data in the table below for 2 samples of the gas:

Sample	V (L)	T (°C)	P (atm)
1	3	50	4
2	3	50	8

Based on Table 1, how do the masses of Samples 1 and 2 compare? The mass of Sample 1 is:

A. greater, because Sample 1 is composed of fewer atoms.
B. greater, because Sample 1 is composed of more atoms.
C. smaller, because Sample 1 is composed of more atoms.
D. smaller, because Sample 1 is composed of fewer atoms.

32. Which of the following diagrams best compares how the cylinder appeared when the data were produced for Trials 8 and 15 ?
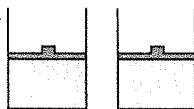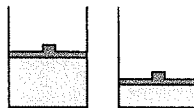
F.
Trial 8   Trial 15

H.
Trial 8   Trial 15

G.
Trial 8   Trial 15

J.
Trial 8   Trial 15

33. The piston was locked in place in each of the trials listed in both:

A. Tables 1 and 2.
B. Tables 1 and 4.
C. Tables 2 and 3.
D. Tables 3 and 4.

34. As the temperature increased in Trials 15–19, how were the volume of the gas and the average speed of the atoms of the gas affected?

	volume	average speed
F.	increased	increased
G.	increased	stayed constant
H.	stayed constant	increased
J.	stayed constant	stayed constant

Passage VI

Parcel lapse rate is the measured air temperature change per unit distance for a parcel of rising air. Figure 1 shows the temperature versus the altitude for a particular dry air parcel and a particular moist air parcel. If the atmosphere around a parcel decreases in temperature with altitude at a rate greater than that of the parcel itself, the parcel may, at some altitude, be warmer than the surrounding atmosphere. In this case, the parcel will continue to rise from that altitude, increasing the probability of strong storms. Figure 2 shows, for a given location, the temperature versus the altitude for 4 parcels of dry air, each of which began to rise at a different time on a particular day.

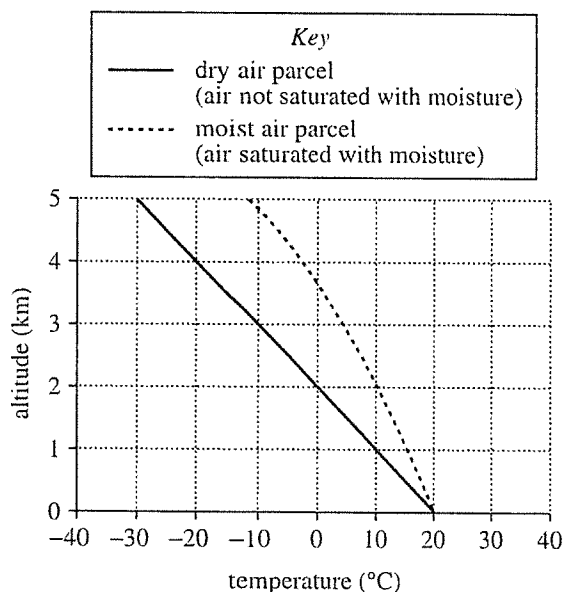Figure 2
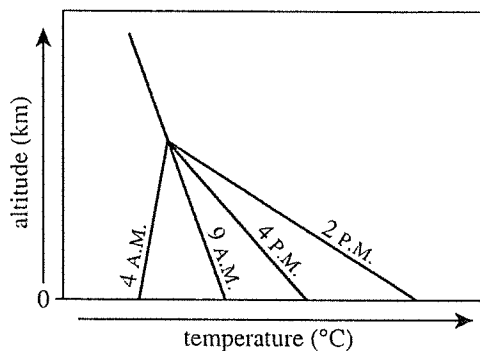
Figure 1

35. As shown in Figure 1, the dry air parcel at an altitude of 3 km was approximately how many degrees colder than the moist air parcel at that same altitude?

   A.   6°C
   B. 13°C
   C. 23°C
   D. 35°C

36. It was hypothesized that the moist air parcel lapse rate is constant as altitude increases from 0 km to 5 km. Is this hypothesis supported by Figure 1 ?

   F. No, because the plot of temperature versus altitude for the moist air parcel is curved from 0 km to 5 km.
   G. No, because the plot of temperature versus altitude for the moist air parcel is a straight line from 0 km to 5 km.
   H. Yes, because the plot of temperature versus altitude for the moist air parcel is curved from 0 km to 5 km.
   J. Yes, because the plot of temperature versus altitude for the moist air parcel is a straight line from 0 km to 5 km.

37. Based on the information provided, which of the following temperature conditions at a given altitude would cause a parcel of air to continue to rise from that altitude?

	temperature of air parcel	temperature of surrounding atmosphere
A.	10°C	10°C
B.	10°C	20°C
C.	20°C	10°C
D.	20°C	30°C

38. Consider the 4 dry air parcels represented in Figure 2. Immediately after the parcels left Earth's surface, the temperature of which parcel decreased the most per unit distance?

   F. The parcel that began to rise at 4 a.m.
   G. The parcel that began to rise at 9 a.m.
   H. The parcel that began to rise at 2 p.m.
   J. The parcel that began to rise at 4 p.m.

39. What is the parcel lapse rate, in °C/km, for the dry air parcel represented in Figure 1 ?

   A. 6°C/km
   B. −6°C/km
   C. 10°C/km
   D. −10°C/km

40. Relative humidity is defined by the equation below:

$$\text{relative humidity} = \frac{\text{actual amount of moisture in a unit volume of air}}{\text{maximum amount of moisture possible in a unit volume of air}} \times 100$$

Based on Figure 1, the relative humidity of a moist air parcel is closest to which of the following?

   F. 0%
   G. 20%
   H. 50%
   J. 100%

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

Test 3: Reading—Scoring Key

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

*Reporting Categories
KID = Key Ideas & Details
CS = Craft & Structure
IKI = Integration of Knowledge & Ideas

Number Correct (Raw Score) for:	
Key Ideas & Details (KID)	_____ (25)
Craft & Structure (CS)	_____ (11)
Integration of Knowledge & Ideas (IKI)	_____ (4)
Total Number Correct for Reading Test (KID + CS + IKI)	_____ (40)

Test 4: Science—Scoring Key

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

*Reporting Categories
IOD = Interpretation of Data
SIN = Scientific Investigation
EMI = Evaluation of Models, Inferences & Experimental Results

Number Correct (Raw Score) for:	
Interpretation of Data (IOD)	_____ (18)
Scientific Investigation (SIN)	_____ (10)
Evaluation of Models, Inferences & Experimental Results (EMI)	_____ (12)
Total Number Correct for Science Test (IOD + SIN + EMI)	_____ (40)