



Chapter 28
Practice Exam 2



ACT Diagnostic Test Form

Use a No. 2 pencil only. Be sure each mark is dark and completely fills the intended oval. Completely erase any errors or stray marks.

1. YOUR NAME: _____
(Print) Last First M.I.

SIGNATURE: _____ DATE: ____/____/____

HOME ADDRESS: _____
(Print) Number and Street

City State Zip

E-MAIL: _____

PHONE NO.: _____
(Print)

SCHOOL: _____

CLASS OF: _____

IMPORTANT: Please fill in these boxes exactly as shown on the back cover of your test book.

2. TEST FORM

3. TEST CODE			
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

4. PHONE NUMBER						
0	0	0	0	0	0	0
1	1	1	1	1	1	1
2	2	2	2	2	2	2
3	3	3	3	3	3	3
4	4	4	4	4	4	4
5	5	5	5	5	5	5
6	6	6	6	6	6	6
7	7	7	7	7	7	7
8	8	8	8	8	8	8
9	9	9	9	9	9	9

5. YOUR NAME					
First 4 letters of last name				FIRST INIT	MID INIT
A	A	A	A	A	A
B	B	B	B	B	B
C	C	C	C	C	C
D	D	D	D	D	D
E	E	E	E	E	E
F	F	F	F	F	F
G	G	G	G	G	G
H	H	H	H	H	H
I	I	I	I	I	I
J	J	J	J	J	J
K	K	K	K	K	K
L	L	L	L	L	L
M	M	M	M	M	M
N	N	N	N	N	N
O	O	O	O	O	O
P	P	P	P	P	P
Q	Q	Q	Q	Q	Q
R	R	R	R	R	R
S	S	S	S	S	S
T	T	T	T	T	T
U	U	U	U	U	U
V	V	V	V	V	V
W	W	W	W	W	W
X	X	X	X	X	X
Y	Y	Y	Y	Y	Y
Z	Z	Z	Z	Z	Z

6. DATE OF BIRTH			
MONTH	DAY		YEAR
<input type="radio"/> JAN			
<input type="radio"/> FEB			
<input type="radio"/> MAR	0	0	0
<input type="radio"/> APR	1	1	1
<input type="radio"/> MAY	2	2	2
<input type="radio"/> JUN	3	3	3
<input type="radio"/> JUL		4	4
<input type="radio"/> AUG		5	5
<input type="radio"/> SEP		6	6
<input type="radio"/> OCT		7	7
<input type="radio"/> NOV		8	8
<input type="radio"/> DEC		9	9

7. SEX
<input type="radio"/> MALE
<input type="radio"/> FEMALE

8. OTHER	
1	A B C D E
2	A B C D E
3	A B C D E

The Princeton Review Diagnostic ACT Form

Completely darken bubbles with a No. 2 pencil. If you make a mistake, be sure to erase mark completely. Erase all stray marks.

ENGLISH

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

MATHEMATICS

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

The Princeton Review Diagnostic ACT Form

Completely darken bubbles with a No. 2 pencil. If you make a mistake, be sure to erase mark completely. Erase all stray marks.

READING

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

SCIENCE REASONING

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

I hereby certify that I have truthfully identified myself on this form. I accept the consequences of falsifying my identity.

Your signature

Today's date



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 each underlined part. In most cases, you are to choose the one that correctly 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 correct, choose “NO CHANGE.” In some cases, you will find in the right-hand column a question about the underlined part of the passage. You are to choose the correct answer to the question.

You will also find questions about a section of the passage or 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 correct and blacken 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

Crocheting Makes a Good Hobby

Crocheting is the art of making fabric by twisting yarn or thread with a hook. Although many associate it by older people,

crocheting can be a fun hobby for people of all ages. Once you start crocheting, you won't be able to put down the hook; you'll have a hobby for life. 3

1. **A.** NO CHANGE
B. to
C. on
D. with
2. **F.** NO CHANGE
G. people of all ages, young and old.
H. young and old people of all ages.
J. people of all ages, both young and old people alike.
3. At this point, the author is considering adding the following true statement:

Irish nuns helped save lives with crocheting when they used it as a way to make a living during the Great Irish Potato Famine of 1846.

Should the writer add this sentence here?

 - A.** Yes, because it is essential to know when crocheting became internationally prominent and how it did so.
 - B.** Yes, because the reference to the Great Irish Potato Famine demonstrates that the author is conscious of historical events.
 - C.** No, because the reference to the Great Irish Potato Famine is not relevant to the main topic of this essay.
 - D.** No, because many people who left Ireland in 1846 brought crocheting with them to the United States and Australia.

GO ON TO THE NEXT PAGE.



Time-honored and easily taught⁴ to all, crocheting is an easy hobby to pick up. Instructional books are readily available, and

once you've learned a few basic stitches⁵. Picking up the more advanced ones is a snap. Once you learn how to crochet, you can

purchase store-bought books that detail crocheting patterns⁶ that tell you exactly how to make the projects that interest you. Even if you want to try several projects, the supplies required for

it's completion⁷ are minimal; all you need are a crochet hook, yarn, and a pair of scissors. You don't need to worry about making a big investment, either; fifteen dollars will buy you no

fewer than three starter kits!⁸

[1] As you grow more proficient, you can expand your supplies by purchasing hooks of different types⁹ to vary the size of your stitches. [2] Crochet hooks are available in all

sizes, ranging¹⁰, from very small to very large, with everything in between. [3] Some are so big that you need to use two strands of yarn. [4] Other hooks are very tiny, so small that you must use

thread. [5] These hooks are suitable for making smaller, more delicate things such as lace doilies, tablecloths, and bedspreads.

[6] These hooks make big stitches, so you can finish a project with them very quickly. [7] It is best to start with hooks that are medium in size; these are the easiest to manipulate and require only one strand of yarn. 11

4. F. NO CHANGE
G. teaches
H. taughted
J. teached
5. A. NO CHANGE
B. stitches; picking
C. stitches, picking
D. stitches since picking
6. F. NO CHANGE
G. buy books and other pamphlets at craft and book stores detailing certain specific patterns
H. buy pattern books
J. acquire store-bought pattern books
7. A. NO CHANGE
B. its
C. its'
D. their
8. F. NO CHANGE
G. fewer then
H. less than
J. less then
9. A. NO CHANGE
B. types;
C. types:
D. types,
10. F. NO CHANGE
G. sizes, ranging
H. sizes; ranging
J. sizes ranging,
11. For the sake of the logic and coherence of this paragraph, Sentence 6 should be placed:
A. where it is now.
B. after Sentence 1.
C. after Sentence 3.
D. after Sentence 7.

GO ON TO THE NEXT PAGE.

Because it seems like there are a million hooks to keep track of, ¹²crocheting makes a good hobby because it requires only ¹²time and patience, not attention or tremendous investment. You can crochet while watching television, listening to music, or visiting with other people. It is fun and relaxing and allows you to express your creative side in an easy way. Also, ¹³you have finished a project, you have a cherished keepsake. Whether you

have made an afghan to keep you warm on cold winter nights or a lace tablecloth to add a touch of elegance to your dining room, ¹⁴your creation is sure to be cherished for a long time to come.

12. Given that all the choices are true, which one provides the most effective transition from the preceding paragraph to this one?
- F. NO CHANGE
 G. Because it can take a long time to finish a project,
 H. With such a simple and inexpensive set of materials,
 J. No longer a field dominated primarily by older women,
13. A. NO CHANGE
 B. finally you
 C. despite the fact you
 D. once you
14. F. NO CHANGE
 G. at
 H. of
 J. within

Question 15 asks about the preceding passage as a whole.

15. Suppose the writer's goal had been to write an essay that demonstrates the commercial potential of crocheting. Would this essay successfully accomplish that goal?
- A. Yes, because it gives examples of end products of crocheting and shows the different kinds of materials needed to produce a wide range of products.
 B. Yes, because it discusses the supplies necessary to create crocheted products, and it shows the usefulness of many of them during the cold winter months.
 C. No, because it does not mention the market value of crocheted products or how one might go about selling them.
 D. No, because it describes other industries and hobbies that would be more commercially successful.

PASSAGE II

Seurat's Masterpiece

[1] How can I describe the wonder I felt the first time I saw my favorite painting, Georges Seurat's *A Sunday on La Grande Jatte*? [2] I had admired the work for years in art books, but I never thought I ¹⁶saw the actual painting, which was housed in Chicago, many miles from where I lived. [3] I finally got my

16. F. NO CHANGE
 G. would see
 H. had seen
 J. was seeing

GO ON TO THE NEXT PAGE.

chance to when I met someone else who loved the painting as
 much as I did. [4] We both had three days off at the same time,
 so we decided to make a road trip to Chicago so we could see

the painting in all it's grandeur. [5] We packed our bags,

jumped into the car, and headed on our way toward Chicago. [20]

[1] The first thing that struck me as we entered the room
 where the painting was displayed; was the size of the painting.
 [2] A common size for canvases is 24 by 36 inches. [3] It was
 enormous! [4] It covered a large part of an even larger wall. [5]
 The painting's size amazed me since it was painted with dots, a
 technique called pointillism. [6] To create a painting of such
 magnitude using this technique seemed an almost impossible
 task. [7] Seurat had done it, though, and had made it look easy! [23]

17. A. NO CHANGE
 B. at the moment
 C. just to
 D. DELETE the underlined portion.

18. F. NO CHANGE
 G. our
 H. its
 J. its'

19. A. NO CHANGE
 B. jumped into the car, and had headed
 C. jumped into the car, and head
 D. had jumped into the car, and headed

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

Her name was Lisa; she lived in my dorm, and a mutual friend had introduced us to each other, knowing how much both of us loved art.

For the sake of the logic of this paragraph, this sentence should be placed after Sentence:

- F. 2.
 G. 3.
 H. 4.
 J. 5.
21. A. NO CHANGE
 B. displayed:
 C. displayed,
 D. displayed

22. F. NO CHANGE
 G. task and difficult to complete.
 H. task, difficult to complete.
 J. task, overwhelming in its difficulty.

23. Which of the following sentences is LEAST relevant to the development of this paragraph and therefore could be deleted?
- A. Sentence 2
 B. Sentence 4
 C. Sentence 5
 D. Sentence 6

GO ON TO THE NEXT PAGE.

Even more impressive, however, was the beauty of the painting. Viewed from a distance, the colors looked muted, capturing the idyllic mood of a summer day in the park.

When I approached the painting, though, its colors exploded into myriad hues, illustrating the artist's skill in combining colors to create a mood. Even the parts of the painting that appeared white from a distance were vibrantly multicolored when viewed up

close. ²⁶ The effect was incredible;

he sat and stared at the painting in wonder for a good portion of ²⁷

the afternoon. ²⁸

My friend and I saw many other sights, on our trip to Chicago, but the best part by far was being able to see our favorite work of art. The image is forever imprinted in my mind

24. Given that all of the choices are accurate, which provides the most effective and logical transition from the preceding paragraph to this one?
- F. NO CHANGE
G. One thing that struck me was
H. Many art critics have written about
J. The debate rages on over
25. Which of the following alternatives to the underlined portion would NOT be acceptable?
- A. As I approached the painting, though,
B. However, as I approached the painting,
C. I approached the painting, though,
D. However, when I approached the painting,
26. If the writer were to delete the phrase "from a distance" from the preceding sentence, the paragraph would primarily lose:
- F. an essential point explaining the author's love of the painting.
G. the first part of the contrast in this sentence, which the author uses to describe viewing the painting.
H. a further indication of the length of the road trip taken by the author and her friend.
J. nothing, because the information provided by this phrase is stated more clearly elsewhere in the paragraph.
27. A. NO CHANGE
B. one
C. they
D. we
28. At this point, the writer is considering adding the following true statement:
- The Art Institute of Chicago contains many other famous paintings, among them Edvard Munch's *The Scream* and Grant Wood's *American Gothic*.
- Should the writer make this addition here?
- F. Yes, because it gives additional details essential to understanding the collection at the museum.
G. Yes, because it demonstrates a contrast between the author's favorite painting and those in this sentence.
H. No, because it provides information that is not relevant at this point in the paragraph and essay.
J. No, because it is contradicted by other information presented in this essay.
29. A. NO CHANGE
B. sights, which
C. sights;
D. sights

GO ON TO THE NEXT PAGE.

at the museum gift shop, even when I'm not looking at the ³⁰
souvenir print I bought.

30. The best placement for the underlined portion would be:
- F. where it is now.
 - G. after the word *image*.
 - H. after the word *looking*.
 - J. after the word *bought* (ending the sentence with a period).

PASSAGE III

The Language of Cats

Many people believe that language is the domain of human beings. However, cats have developed an intricate language not ³¹
for each other, but for the human beings who

have adopted them as pets. ³²

When communicating with each other, cats' "talk" is a ³³
complex system of nonverbal signals. In particular, their tails, ³³

rather than any kind of "speech," provide cats' chief means of ³⁴
expression. They also use physical contact to express their feelings. With other cats, cats will use their voices only to express pain. ³⁵

Next, incredibly, all of that changes when a human walks ³⁶
into the room. Cats use a wide range of vocal expressions when they communicate with a person, from affectionate meows to

31. A. NO CHANGE
B. developed, an intricate language
C. developed an intricate language,
D. developed; an intricate language
32. Which choice would most clearly and effectively express the ownership relationship between humans and cats?
- F. NO CHANGE
 - G. like to have cats around.
 - H. often have dogs as well.
 - J. are naturally inclined to like cats.
33. A. NO CHANGE
B. a complicated system of nonverbal signals is used by cats to "talk."
C. cats "talk" with a complex system of nonverbal signals.
D. "talking" is done by them with a system of complex nonverbal signals.
34. F. NO CHANGE
G. having provided
H. has provided
J. were provided by
35. If the preceding sentence were deleted, the essay would primarily lose:
- A. a redundant point made elsewhere in the essay.
 - B. another description of the ways in which cats communicate nonverbally.
 - C. an exception to the general trend described in this paragraph.
 - D. a brief summary of the information contained in the essay up to this point.
36. F. NO CHANGE
G. (Do NOT begin new paragraph) Incredibly,
H. (Begin new paragraph) Next incredibly,
J. (Begin new paragraph) Incredibly,

GO ON TO THE NEXT PAGE.

menacing hisses. Since cats verbal expressions are not used to

37

communicate with other cats, it is logical and reasonable to conclude that cats developed this “language” expressly to communicate with their human owners.

This fact is demonstrated more clear since observing households that have only one cat. An only cat is usually very vocal, since the only creature around with whom the cat can communicate is its owner. Cats with other feline companions, though, are much quieter. If they want to have a conversation, they need only go to their fellow cats and communicate in their natural way. 40

Since cats learned to meow for the sole purpose of communicating with human beings, owners should take the time to learn what their different meows mean. If an owner knows, to name just a few examples, which meow means the cat is hungry, which means the cat wants to be petted, and which means the cat wants to have a little “conversation,” the bond between cat and owner will grow deeper. 42 Certainly, after a time, owners will see that communicating with their pets, not just cats, is every bit as important to forging good relationships

as to communicate with other humans. Once, as an owner, you know that the cat is not just

43

37. A. NO CHANGE
B. cat’s verbal expressions
C. cats’ verbal expressions
D. cats verbal expressions,
38. F. NO CHANGE
G. logical and well-reasoned
H. logical to a startling degree
J. logical
39. A. NO CHANGE
B. clear when
C. clearly since
D. clearly when
40. At this point, the writer is considering adding the following true statement:
On the other hand, the natural way for most birds to communicate is vocally, by way of the “bird song.”
Should the writer add this sentence here?
F. Yes, because it shows that cats are truly unique in communicating nonverbally.
G. Yes, because it adds a relevant and enlightening detail about another animal.
H. No, because it basically repeats information given earlier in the essay.
J. No, because it does not contribute to the development of this paragraph and the essay as a whole.
41. A. NO CHANGE
B. knows, to,
C. knows to,
D. knows to
42. If the writer wanted to emphasize that cats communicate vocally with their owners to express a large number of different emotions in addition to those listed in the previous sentence, which of the following true statements should be added at this point?
F. Many animals communicate hunger similarly to cats.
G. Cats will tell their owners when they feel pain, sadness, irritation, or love.
H. Cats communicate these emotions differently to other cats.
J. Humans have the easiest time communicating with other mammals.
43. A. NO CHANGE
B. as being communicative
C. as communicating
D. through communicating

GO ON TO THE NEXT PAGE.



making senseless noises without any rhyme or reason but is making an attempt to communicate, you can make an effort to communicate back. After all, your cat isn't meowing just for the sake of making noise; however, cats are less communicative than many other animals.

44. F. NO CHANGE
 G. making senseless noises
 H. senselessly making noises with no thought involved
 J. making senseless noises, having no idea what they mean,
45. Which choice would best summarize the main point the essay makes about cats' communication with their human owners?
 A. NO CHANGE
 B. rather, there's a good chance your cat is trying to tell you something.
 C. instead, your cat is probably trying to communicate with other cats by meowing.
 D. on the other hand, it is better to have more than one cat so they can undergo a natural development.

PASSAGE IV

Visiting Mackinac Island

Visiting Mackinac (pronounced "Mackinaw") Island is like taking a step back to the past in time. Victorian

houses' and a fort dating back to the War of 1812 surround the historic downtown, where horses and buggies still pull passengers down the road.

The only way to get to Mackinac Island is by boat or private plane, and you may not bring your car. Automobiles are

outlawed on the little, isolated, Michigan, island, so visitors can

see the sights only by horse, carriage, or by riding a bicycle, or on foot. Luckily, the island is small enough that cars are not

necessary, Mackinac measures only a mile and a half in diameter.

46. F. NO CHANGE
 G. moving in a past-related direction
 H. going back to the past, not the future,
 J. stepping back
47. A. NO CHANGE
 B. house's
 C. houses
 D. houses,
48. F. NO CHANGE
 G. your sweet self over to
 H. yourself on down to
 J. over to
49. A. NO CHANGE
 B. isolated Michigan island
 C. isolated Michigan island,
 D. isolated, Michigan, island
50. F. NO CHANGE
 G. by bicycle,
 H. riding on a bicycle,
 J. bicycle,
51. A. NO CHANGE
 B. necessary, furthermore, Mackinac
 C. necessary. Mackinac
 D. necessary Mackinac

GO ON TO THE NEXT PAGE.

There are many things to see while visiting Mackinac Island. The majestic Grand Hotel is a popular tourist spot, as are the governor’s mansion and Arch Rock, a towering limestone arch formed naturally by water erosion. ⁵² Fort Mackinac, where they still set off cannons every hour, is also a popular place to visit. Visible from parts of the island are Mackinac Bridge—the longest suspension bridge ever built—and a picturesque old lighthouse.

Shopping is also a favorite pastime on Mackinac Island. The island’s biggest industry is tourism, ⁵³ For the island’s many

tourists, the most popular item of sale on Mackinac Island is

fudge. The downtown streets are lined with fudge shops, where tourists can watch fudge of all different flavors being made before lining up to buy some for themselves. These fudge shops

are so numerous and abundant that the local residents have even

developed a special nickname for these tourists: I call the tourists “fudgies.”

Apart from sightseeing and shopping, Mackinac Island is a great place to just sit back and relax. In the summer, a gentle lake breeze floats through the air, when it creates a beautiful, temperate climate. It is peaceful to sit in the city park and watch the ferries and private boats float into the harbor. The privacy of

52. If the writer were to delete the phrase “formed naturally by water erosion” (placing a period after the word *arch*), this sentence would primarily lose:
- F. a detail describing the unique formation of the Arch Rock.
 - G. factual information concerning the geological formations of the tourist attractions on Mackinac Island.
 - H. a contrast to the governor’s mansion, which was constructed by human hands.
 - J. nothing; this information is detailed elsewhere in this paragraph.
53. Given that all the following are true, which one, if added here at the end of this sentence, would provide the most effective transition to the topic discussed in the sentence that follows?
- A. so there are many souvenir stores, T-shirt shops, and candy and ice cream parlors.
 - B. so Mackinac Island has not been negatively affected by outsourcing.
 - C. which is a big change from the island’s eighteenth-century use in the fur trade.
 - D. but it’s not a tourist attraction like many others with theme parks and chain restaurants.
54. F. NO CHANGE
G. for selling
H. for sale
J. of selling
55. Which of the following alternatives to the underlined portion would NOT be acceptable?
- A. which
 - B. so
 - C. and
 - D. in which
56. F. NO CHANGE
G. abundantly numerous
H. numerous
J. of an abundance truly numerous
57. A. NO CHANGE
B. one calls
C. it calls
D. they call
58. F. NO CHANGE
G. creating
H. once it creates
J. as if it had created

GO ON TO THE NEXT PAGE.



the island's environs certainly don't give⁵⁹ it the hustle-bustle quality of a city, but the relaxing atmosphere makes Mackinac Island the perfect place to visit to get away from the hectic pace of everyday life.

59. A. NO CHANGE
 B. isn't giving
 C. hasn't given
 D. doesn't give

Question 60 asks about the preceding passage as a whole.

60. Suppose the writer had intended to write an essay on the difficulty the residents of Mackinac Island have had prohibiting automobile traffic from the historic island. Would this essay have successfully fulfilled that goal?
- F. Yes, because the automobile has become such an essential part of American tourist travel that the residents are clearly threatened.
 G. Yes, because this essay discusses the fact that automobiles are outlawed and goes on to detail many of the reasons this was possible.
 H. No, because the essay focuses instead on other aspects of Mackinac Island, mentioning automobiles in only one part of the passage.
 J. No, because this essay describes the ways the residents of Mackinac Island have sought to bring automobiles back to the island, not to outlaw them.

PASSAGE V

Fun with Karaoke

[1]

[1] Karaoke is one of the most popular forms of entertainment in the world. [2] What defies understanding, though, is why so many ordinary people insist on getting up on stage in public, humiliating themselves in front of both their friends; and peers. [3] Whether practiced at home, in a restaurant, or at a party, karaoke is a form of entertainment⁶¹

that provides⁶² people with a great time and a positive feeling. [4] It is understandable that people would enjoy singing in the

61. A. NO CHANGE
 B. friends and
 C. friends, and
 D. friends and,
62. Which of the following alternatives to the underlined portion would NOT be acceptable?
 F. entertainment that can provide
 G. entertainment, providing
 H. entertainment, one which provides
 J. entertainment that having provided

GO ON TO THE NEXT PAGE.

privacy of their homes. [5] There are many different ways to respond to this question. 63

[2]

Looking more closely, and you'll see a main reason for karaoke's success is its glitz and glamour. Karaoke provides people with a moment when they are more than just everyday folks—they are stars. Even though their performances may be heard only in dimly lit bars or busy restaurants, but karaoke singers are still performing as if in a true concert with such

concert-hall staples, as microphones, lights, and applause. Even though the singers' voices are not spectacular, the audience

has known that it's all for fun and responds anyway. And in the

end, everyone would like to be a rock star. Karaoke is as close as many people will get to fame and stardom, but this is not the only reason for its enduring popularity.

[3]

There is another, more obvious reason why karaoke is so popular and singing in public is such fun. The average person allows his or her singing to be heard only in the shower or in the car as the radio plays. Karaoke, by contrast, allows the average person the opportunity to share that ordinarily solitary

experience with other people. In lieu of how good or bad their voices are, people can experience the sheer joy of music with

63. For the sake of logic and coherence, Sentence 2 should be placed:

- A. where it is now.
- B. after Sentence 3.
- C. after Sentence 4.
- D. after Sentence 5.

64. F. NO CHANGE

- G. Having looked
- H. To look
- J. Look

65. A. NO CHANGE

- B. restaurants which
- C. restaurants,
- D. restaurants but

66. F. NO CHANGE

- G. staples:
- H. staples
- J. staples;

67. A. NO CHANGE

- B. is knowing
- C. knew
- D. knows

68. Given that all the choices are true, which one would most effectively conclude this paragraph while leading into the main focus of the next paragraph?

- F. NO CHANGE
- G. This is why AudioSynTrac and Numark Electronics were so successful in debuting the first sing-along tapes and equipment back in the 1970s.
- H. Japan's lasting influence on karaoke is obvious all the way down to its name—the Japanese word karaoke translates roughly to “empty orchestra.”
- J. Singing in front of people is more fun for many people than singing in the shower or in the car.

69. A. NO CHANGE

- B. furthermore,
- C. moreover,
- D. as a result,

70. F. NO CHANGE

- G. Regardless of
- H. However
- J. Because of

GO ON TO THE NEXT PAGE.

others, ⁷¹whose singing is mostly a private affair as well, through karaoke.

[4]

The effect karaoke has on people may also provide an explanation for its popularity: it helps bring people who are ordinarily shy out of their shells. ⁷²Karaoke helps them overcome stage fright, build their self-confidence, and conquer

their fears. The singers may feel nervous or silly if they first take ⁷³the stage, but when the audience breaks out into applause, the singers are sure to feel rewarded.

[5]

Whatever the reason, karaoke continues to grow in popularity. Last year, karaoke made no ⁷⁴less than \$7 billion in profit in Japan. Many dismiss it as a fad, but as long as karaoke is fun and leaves people feeling good, it will not disappear.

71. A. NO CHANGE
B. who
C. whom
D. who's
72. If the writer were to delete the clause "who are ordinarily shy" from the preceding sentence, the essay would primarily lose:
F. a detail that explains why karaoke is so popular in the international community.
G. a detail meant to indicate that karaoke is popular among those not normally inclined to sing in public.
H. information that emphasizes the possible psychological benefits of karaoke for the chronically shy.
J. an indication that karaoke may be used at some future time to help singers overcome stage fright.
73. A. NO CHANGE
B. when
C. unless
D. where
74. F. NO CHANGE
G. lesser than
H. fewer then
J. few than

Question 75 asks about the preceding passage as a whole.

75. Upon reviewing notes for this essay, the writer comes across some information and composes the following sentence incorporating that information:
- While different regions of the United States prefer different artists, the most popular karaoke requests are invariably for country artists, varying from the modern Carrie Underwood to the classic Johnny Cash.
- For the sake of the logic and coherence of this essay, this sentence should be:
- A. placed at the end of Paragraph 3.
B. placed at the end of Paragraph 4.
C. placed at the end of Paragraph 5.
D. NOT added to the essay at all.

END OF TEST 1

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



MATHEMATICS TEST

60 Minutes—60 Questions

DIRECTIONS: Solve each problem, choose the correct answer, and then darken the corresponding oval on your answer sheet.

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

You are permitted to use a calculator on this test. You may use your calculator for any problems you choose,

but some of the problems may best be done without using a calculator.

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

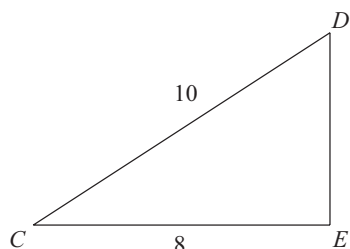
1. Illustrative figures are NOT necessarily drawn to scale.
2. Geometric figures lie in a plane.
3. The word *line* indicates a straight line.
4. The word *average* indicates arithmetic mean.

1. Point X is located at -15 on the real number line. If point Y is located at -11 , what is the midpoint of line segment XY ?

- A. -13
- B. -4
- C. -2
- D. 2
- E. 13

DO YOUR FIGURING HERE.

2. Given triangle CDE (shown below) with a right angle at point E , what is the length of leg DE ?



- F. $\sqrt{2}$
- G. 2
- H. 6
- J. $\sqrt{164}$
- K. 16

GO ON TO THE NEXT PAGE.



3. Lucy is studying her ant farm. She needs to approximate the number of ants in the population, and she realizes that the number of ants, N , is close to 50 more than double the volume of the ant farm, V . Which of the formulas below expresses that approximation?

- A. $N \approx \frac{1}{2}V + 50$
- B. $N \approx \frac{1}{2}(V + 50)$
- C. $N \approx 2V + 50$
- D. $N \approx 2(V + 50)$
- E. $N \approx V^2 + 50$

DO YOUR FIGURING HERE.

4. Lisa has 5 fiction books and 7 nonfiction books on a table by her front door. As she rushes out the door one day, she takes a book at random. What is the probability that the book she takes is fiction?

- F. $\frac{1}{5}$
- G. $\frac{5}{7}$
- H. $\frac{1}{12}$
- J. $\frac{5}{12}$
- K. $\frac{7}{12}$

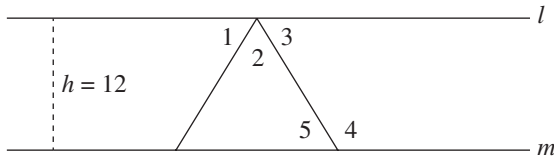
5. In the spring semester of her math class, Katie's test scores were 108, 81, 79, 99, 85, and 82. What was her average test score in the spring semester?

- A. 534
- B. 108
- C. 89
- D. 84
- E. 80

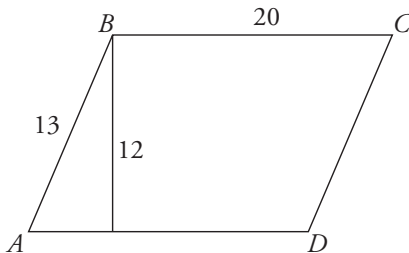
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6. Given parallel lines l and m , which of the following choices lists a pair of angles that must be congruent?



- F. $\angle 1$ and $\angle 2$
 G. $\angle 1$ and $\angle 3$
 H. $\angle 2$ and $\angle 3$
 J. $\angle 2$ and $\angle 5$
 K. $\angle 3$ and $\angle 5$
7. Gregor works as a political intern and receives a monthly paycheck. He spends 20% of his paycheck on rent and deposits the remainder into a savings account. If his deposit is \$3,200, how much does he receive as his monthly pay?
- A. \$ 4,000
 B. \$ 5,760
 C. \$ 7,200
 D. \$ 8,000
 E. \$17,000
8. Given parallelogram $ABCD$ below and parallelogram $EFGH$ (not shown) are similar, which of the following statements must be true about the two shapes?



- F. Their areas are equal.
 G. Their perimeters are equal.
 H. Side AB is congruent to side EF .
 J. Diagonal AC is congruent to diagonal EG .
 K. Their corresponding angles are congruent.
9. A size 8 dress that usually sells for \$60 is on sale for 30% off. Victoria has a store credit card that entitles her to an additional 10% off the reduced price of any item in the store. Excluding sales tax, what is the price Victoria pays for the dress?
- A. \$22.20
 B. \$24.75
 C. \$34.00
 D. \$36.00
 E. \$37.80

DO YOUR FIGURING HERE.

GO ON TO THE NEXT PAGE.



10. Erin and Amy are playing poker. At a certain point in the game, Erin has 3 more chips than Amy. On the next hand, Erin wins 4 chips from Amy. Now how many more chips does Erin have than Amy?
- F. -1
G. 4
H. 7
J. 11
K. 14

DO YOUR FIGURING HERE.

11. If $y = 4$, then $|1 - y| = ?$
- A. -5
B. -3
C. 3
D. 4
E. 5
12. $(3a + 2b)(a - b^2)$ is equivalent to:
- F. $4a + b^2$
G. $3a^2 - 2b^3$
H. $3a^2 + 2ab + 2b^3$
J. $3a^2 - 3ab^2 + a^2b^2$
K. $3a^2 - 3ab^2 + 2ab - 2b^3$

13. For all real values of y , $3 - 2(4 - y) = ?$
- A. $-2y - 9$
B. $-2y + 8$
C. $-2y - 1$
D. $2y - 5$
E. $2y + 11$

14. Which of the following is equivalent to $(y^3)^8$?
- F. y^{11}
G. y^{24}
H. $8y^3$
J. $8y^{11}$
K. $24y$

15. If the first day of the year is a Monday, what is the 260th day?
- A. Monday
B. Tuesday
C. Wednesday
D. Thursday
E. Friday

GO ON TO THE NEXT PAGE.



DO YOUR FIGURING HERE.

16. If a square has an area of 64 square units, what is the area of the largest circle that can be inscribed inside the square?

F. 4π
G. 8π
H. 16π
J. 64
K. 64π

17. What is the product of the solutions of the equation $x^2 - 5x - 14 = 0$?

A. -14
B. -2
C. 0
D. 5
E. 7

18. Factoring the polynomial $x^{12} - 9$ reveals a number of factors for the expression. Which of these is NOT one of the possible factors?

F. $x^6 + 3$
G. $x^{12} - 9$
H. $x^3 + \sqrt{3}$
J. $x^3 - \sqrt{3}$
K. $x - \sqrt{3}$

19. What is the value of $\frac{2x+4}{3x}$ when $x = \frac{1}{6}$?

A. $4\frac{1}{3}$
B. 2
C. $\frac{26}{3}$
D. 12
E. 24

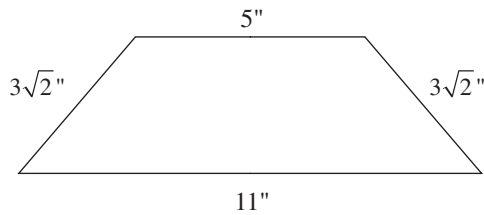
20. If you drive 60 miles at 90 miles an hour, how many minutes will the trip take you?

F. 15
G. 30
H. 40
J. 60
K. 90

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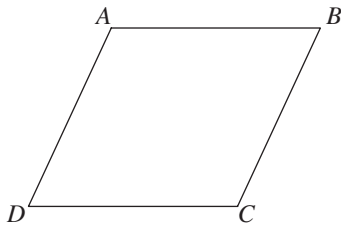
21. The area of a trapezoid is found by multiplying the height by the average of the bases: $A = \frac{1}{2}h(b_1 + b_2)$. Given the side measurements below, what is the area, in square inches, of the trapezoid?



DO YOUR FIGURING HERE.

- A. $15\sqrt{2}$
 B. 22
 C. 24
 D. $24\sqrt{2}$
 E. $30\sqrt{2}$
22. If $x = -\frac{2}{3}$ and $x = \frac{1}{4}$ are the roots of the quadratic equation $ax^2 + bx + c = 0$, then which of the following could represent the two factors of $ax^2 + bx + c$?
- F. $(3x + 2)$ and $(4x - 1)$
 G. $(3x + 1)$ and $(4x - 2)$
 H. $(3x - 1)$ and $(4x + 2)$
 J. $(3x - 2)$ and $(4x + 1)$
 K. $(3x - 2)$ and $(4x - 1)$

23. In the rhombus below, diagonal $AC = 6$ and diagonal $BD = 8$. What is the length of each of the four sides?



- A. $\sqrt{7}$
 B. $\sqrt{14}$
 C. 5
 D. 7
 E. 10

GO ON TO THE NEXT PAGE.



24. A rectangular rug has an area of 80 square feet, and its width is exactly 2 feet shorter than its length. What is the length, in feet, of the rug?

F. 8
G. 10
H. 16
J. 18
K. 36

DO YOUR FIGURING HERE.

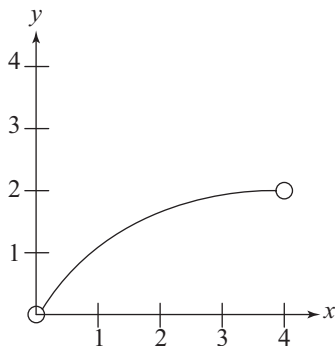
25. In the standard (x,y) coordinate plane, a line runs through points $(1,-5)$ and $(5,10)$. Which of the following represents the slope of that line?

A. $\frac{4}{15}$
B. $\frac{4}{5}$
C. 1
D. $\frac{5}{4}$
E. $\frac{15}{4}$

26. The equation of a circle in the standard (x,y) coordinate plane is given by the equation $(x + 5)^2 + (y - 5)^2 = 5$. What is the center of the circle?

F. $(-\sqrt{5}, \sqrt{5})$
G. $(-5, 5)$
H. $(\sqrt{5}, -\sqrt{5})$
J. $(5, -5)$
K. $(5, 5)$

27. The graph below shows the function $f(x)$ in the the standard (x,y) coordinate plane. Which of the following choices best describes the *domain* of this function?



A. $\{0, 1, 2, 3, 4\}$
B. $\{0, 1, 2\}$
C. $\{x: 0 < x < 2\}$
D. $\{x: 0 < x < 4\}$
E. All real values of x

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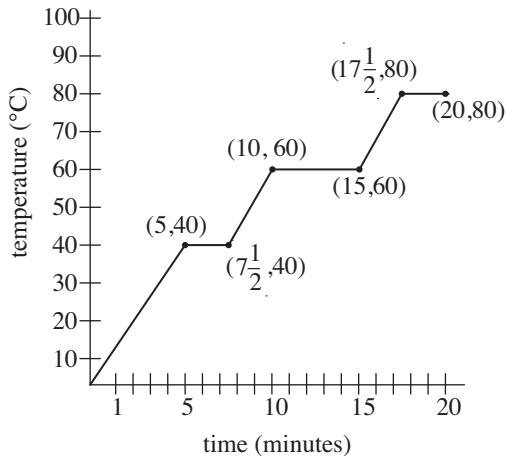


28. Amber decides to graph her office and the nearest coffee shop in the standard (x,y) plane. If her office is at point $(-1,-5)$ and the coffee shop is at point $(3,3)$, what are the coordinates of the point exactly halfway between those of her office and the shop? (You may assume Amber is able to walk a straight line between them.)

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

DO YOUR FIGURING HERE.

29. For a chemistry class, Sanjay is doing an experiment that involves periodically heating a container of liquid. The graph below shows the temperature of the liquid at different times during the experiment. What is the average rate of change of temperature (in degrees Celsius per minute) during the times in which the temperature is increasing?



- A. 4
 - B. 5
 - C. 8
 - D. 10
 - E. 20
30. If $\frac{a^x}{a^y} = a^5$, for $a \neq 0$, which of the following statements must be true?
- F. $x \neq 0$ and $y \neq 0$
 - G. $x + y = 5$
 - H. $x - y = 5$
 - J. $xy = 5$
 - K. $\frac{x}{y} = 5$

GO ON TO THE NEXT PAGE.



31. What is the slope of the line given by the equation $8 = 3y - 5x$?

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

DO YOUR FIGURING HERE.

32. When adding fractions, a useful first step is to find the least common denominator (LCD) of the fractions. What is the LCD for these fractions?

$$\frac{2}{3^2 \times 5}, \frac{13}{5^2 \times 7 \times 11}, \frac{2}{3 \times 11^3}$$

- F. $3 \times 5 \times 7 \times 11$
- G. $3^2 \times 5^2 \times 7 \times 11$
- H. $3^2 \times 5^2 \times 11^3$
- J. $3^2 \times 5^2 \times 7 \times 11^3$
- K. $3^3 \times 5^3 \times 7 \times 11^4$

33. $\frac{1}{4} \times \frac{2}{5} \times \frac{3}{6} \times \frac{4}{7} \times \frac{5}{8} \times \frac{6}{9} \times \frac{7}{10} = ?$

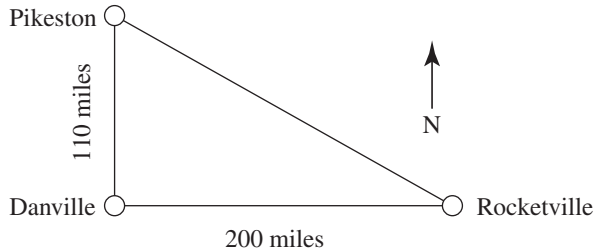
- A. $\frac{1}{720}$
- B. $\frac{1}{360}$
- C. $\frac{1}{120}$
- D. $\frac{27}{49}$
- E. 1

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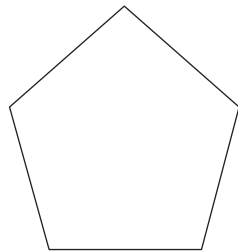


34. Dave is in Pikeston and needs to go to Danville, which is about 110 miles due south of Pikeston. From Danville, he'll head east to Rocketville, about 200 miles from Danville. As he sets out on his trip, a plane takes off from the Pikeston airport and flies directly to Rocketville. Approximately how far, in miles, does the plane fly?

DO YOUR FIGURING HERE.



- F. 310
 G. $\sqrt{310}$
 H. $\sqrt{27,900}$
 J. $\sqrt{30,000}$
 K. $\sqrt{52,100}$
35. The figure below is a pentagon (5-sided figure). Suppose a second pentagon were overlaid on this pentagon. At most, the two figures could have how many points of intersection?

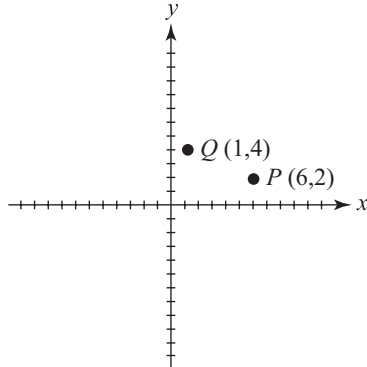


- A. 1
 B. 2
 C. 5
 D. 10
 E. Infinitely many
36. MicroCorp will hold its annual company picnic next week and will assign planning duties to 3 of its employees. One person selected will reserve a venue, another will arrange catering, and a third will plan activities. There are 10 employees eligible to fulfill these duties, and no employee can be assigned more than one duty. How many different ways are there for duties to be assigned to employees?
- F. 7^3
 G. 9^3
 H. 10^3
 J. $9 \times 8 \times 7$
 K. $10 \times 9 \times 8$

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37. In the (x,y) coordinate plane below, points $P(6,2)$ and $Q(1,4)$ are two vertices of $\triangle PQR$. If $\angle PQR$ is a right angle, then which of the following could be the coordinates of R ?



DO YOUR FIGURING HERE.

- A. $(4, -3)$
 B. $(3, 0)$
 C. $(2, 1)$
 D. $(2, 4)$
 E. $(3, 9)$

38. If $y = 0.25(100 - y)$, then what is the value of y ?

- F. 200
 G. 75
 H. 25
 J. 20
 K. 18

39. If $0^\circ \leq x \leq 180^\circ$ and $4\cos^2 x = 1$, then $x = ?$

- A. 0°
 B. 60°
 C. 90°
 D. 150°
 E. 180°

40. Danielle's living room is a rectangle with the dimensions 16 feet by 18 feet. If she partially covers the bare floor with a circular throw rug with a diameter of 12 feet, what is the approximate area of bare floor, in square feet, that remains exposed?

(Note: Assume the rug lies completely flat and does not touch any wall.)

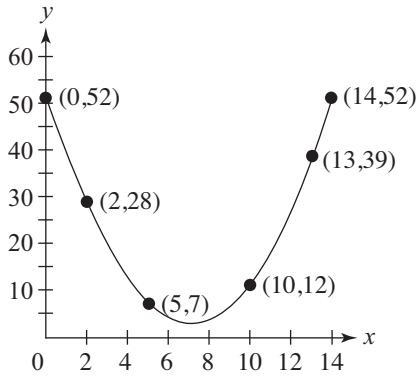
- F. 113
 G. 144
 H. 175
 J. 288
 K. Cannot be determined without knowing the exact position of the rug

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41. A portion of a parabola is shown below. Over which of the following intervals is the average rate of change the greatest?

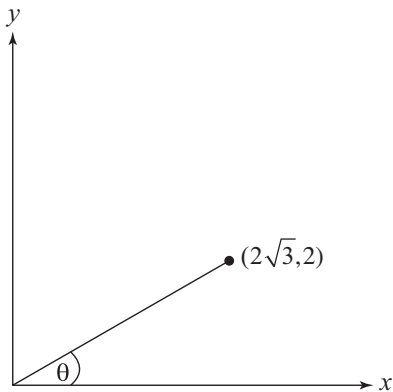
- A. $0 \leq x \leq 2$
- B. $2 \leq x \leq 5$
- C. $5 \leq x \leq 10$
- D. $10 \leq x \leq 13$
- E. $13 \leq x \leq 14$



DO YOUR FIGURING HERE.

42. In the figure given below, what is $\sin \theta$?

- F. $\frac{1}{2}$
- G. $\frac{\sqrt{3}}{3}$
- H. $\frac{\sqrt{3}}{2}$
- J. 1
- K. $\sqrt{3}$



GO ON TO THE NEXT PAGE.



DO YOUR FIGURING HERE.

43. The magnitude of an earthquake on the Richter Scale is determined by the equation $R = \log\left(\frac{A}{A_0}\right)$, in which A is the maximum amplitude measured at a sensor and A_0 is the threshold amplitude, dependent only on the sensor distance from the epicenter. What is the approximate magnitude, on the Richter Scale, of an earthquake with a measured amplitude 3,000 times the value of A_0 ?

- A. 2.5
- B. 3
- C. 3.5
- D. 4
- E. 4.5

44. Set $P = \{2, 3, 5.5, 6\}$ Set $Q = \{1, 2, 3, 4\}$

If m is randomly selected from Set P and n is randomly selected from Set Q , what is the probability that mn is an even integer?

- F. $\frac{3}{4}$
- G. $\frac{11}{16}$
- H. $\frac{9}{16}$
- J. $\frac{1}{4}$
- K. $\frac{3}{16}$

45. Which choice below is the complete solution set of $|2z - 3| \geq 7$?

- A. $z \geq 5$
- B. $z \leq -2$ or $z \geq 5$
- C. $-5 \leq z \leq 5$
- D. $z \leq -6$ or $z \geq 2$
- E. $z \leq -5$ or $z \geq 2$

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46. Which trigonometric function (where defined) is equivalent to

$$\frac{\sin^2 x}{\cos x \tan x} ?$$

F. $\frac{\cos x}{\sin^2 x}$

G. $\frac{1}{\cos x}$

H. $\sin x$

J. $\frac{1}{\sin x}$

K. $\frac{1}{\sin^2 x}$

DO YOUR FIGURING HERE.

47. When $a \neq b$, $\frac{ax - bx}{4a - 4b} < 0$. Which of the following describes the complete set of x values that make this inequality true?

A. $x = -4$ only

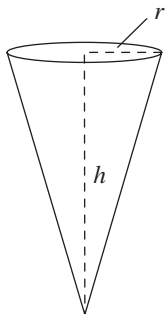
B. $x = 4$ only

C. $x = -\frac{1}{4}$ only

D. $x < 0$

E. $x > 0$

48. The volume of a cone, which is derived by treating it as a pyramid with infinitely many lateral faces, is given by the formula $V = \frac{1}{3}\pi r^2 h$, where r is the radius of the base, and h is the height. If the radius is halved and the height is doubled, what will be the ratio of the new volume to the old volume?



- F. 4:1
 G. 2:1
 H. 1:1
 J. 1:2
 K. 1:4

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DO YOUR FIGURING HERE.

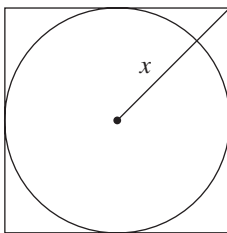
49. Al bikes a trail to the top of a hill and back down. He bikes up the hill in m minutes, and then returns twice as quickly downhill on the same trail. What is the total time, in hours, that Al spends biking up the hill and back down?

- A. $\frac{m}{60}$
 B. $\frac{m}{40}$
 C. $\frac{m}{30}$
 D. $\frac{3m}{2}$
 E. $2m$

50. A cylindrical cup with an interior radius of 5 centimeters has a cube of ice with side length 3 centimeters inside of it. The cup is then filled with lemonade until the lemonade reaches a height of 9 centimeters. Assuming the ice cube is fully submerged, which of the following expressions gives the volume, in cubic centimeters, of the lemonade poured into the cup?

- F. $9(10^2)\pi - 3^3$
 G. $9(5^2)\pi - 3^3$
 H. $3(9^2)\pi - 5^3$
 J. $9(3^2)\pi - 5^3$
 K. $2(5)(9)\pi - 3^3$

51. A circle is inscribed in a square, as shown below. If x is the distance from the center of the circle to a vertex of the square, then what is the length of the radius of the circle, in terms of x ?



- A. $2x$
 B. $x\sqrt{2}$
 C. x
 D. $\frac{x\sqrt{2}}{2}$
 E. Cannot be determined from the information given

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DO YOUR FIGURING HERE.

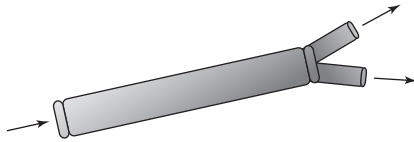
$$52. \begin{bmatrix} 4a & 3 & -1 \\ 2 & 1 & 5 \end{bmatrix} \begin{bmatrix} 2 & 7 \\ 4 & 3 \\ 1 & 5 \end{bmatrix} = \begin{bmatrix} 35 & 88 \\ 13 & 42 \end{bmatrix}$$

What value of a satisfies the matrix equation above?

- F. 12
- G. 7
- H. 5
- J. 4
- K. 3

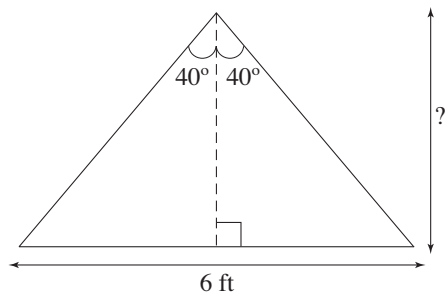
53. A pipe of radius $4\sqrt{2}$ feet sends water to two smaller pipes of equal size. If the cross-sectional area of each of the smaller pipes is exactly one-fourth that of the larger pipe, what is the radius of one of the smaller pipes?

- A. 2
- B. 2π
- C. $2\sqrt{2}$
- D. $4\sqrt{2}$
- E. $2\pi\sqrt{2}$



54. The cross-sectional view of a tent is shown below. If the tent is 6 feet wide at its base, then which of the following expressions could be used to calculate the height of the tent, in feet?

- F. $\frac{3}{\tan 80^\circ}$
- G. $3 \tan 40^\circ$
- H. $\frac{3}{\tan 40^\circ}$
- J. $6 \tan 40^\circ$
- K. $3 \tan 80^\circ$



GO ON TO THE NEXT PAGE.



55. Which of the following sets has the lowest standard deviation?

- A. $\{-10, -5, 0, 5, 10\}$
- B. $\{100, 200, 300, 400, 500\}$
- C. $\{2, 4, 6, 8, 10\}$
- D. $\{100, 100, 101, 102, 102\}$
- E. $\{1, 2, 3, 4, 5\}$

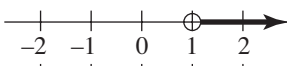
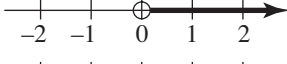
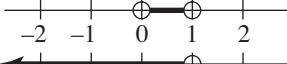

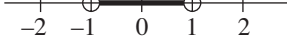
DO YOUR FIGURING HERE.

56. For all integer values of a and b such that $a > 0$ and $b < 0$, which of the following must also be an integer?

- F. 3^{a+b}
- G. 3^{a-b}
- H. 3^{ab}
- J. 3^{-a}
- K. $3^{\frac{a}{b}}$

57. If x and y are real numbers and $0 < x < y < \frac{y}{x}$, which of the

following gives the set of all values which $\frac{y}{x}$ could have?

- A. 
- B. 
- C. 
- D. 
- E. 

GO ON TO THE NEXT PAGE.



58. A circular running track is being built in a fenced-in athletic field 100 feet wide and 150 feet long. If a border of 10 feet is needed between the outside edge of the track and the fence, what is the radius of the largest track that can be built?

F. 40
G. 45
H. 65
J. 90
K. 110

DO YOUR FIGURING HERE.

59. If a sphere is cut by two different planes, dividing it into sections, how many sections is it possible to end up with?

A. 2 only
B. 2 or 4 only
C. 3 only
D. 3 or 4 only
E. 2, 3, or 4 only

60. For all real values of a and b , the equation $|a - b| = 5$ can be interpreted as “the positive difference of a and b is 5.” What is the positive difference between the 2 solutions for a ?

F. b
G. $b + 5$
H. $2b$
J. $\sqrt{b^2 - 25}$
K. 10

END OF TEST 2
STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.
DO NOT RETURN TO A PREVIOUS TEST.

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: Passage A is adapted from the essay “What Baseball Taught Us” by Richard Brown (©2007 by Richard Brown). Passage B is adapted from the essay “The Major Leagues” by Jack Bryant (©1998 by Jack Bryant).

Passage A by Richard Brown

April 15, 1947: I happen to be home sick from school, and my grandfather is delighted to have someone to share his anticipation with. He’s been pacing the house all morning, occasionally sitting down but quickly hopping back up, adjusting the TV antennas, cleaning his glasses, flicking an imaginary piece of lint off the television screen. Amidst my mother’s protestations, I am brought out of my stuffy, dark bedroom where I have been confined to fight my fever and propped up on the sofa with four quilts over me, at least three more than I really need. Fever or no, my grandfather wants me to witness history.

Jackie Robinson is making his major league debut for the Brooklyn Dodgers, the first African-American player in the Major League Baseball. I’m not sure what’s more stifling, the quilts, or my grandfather’s tense excitement that has us all on edge. I’m proud that Robinson is playing—there’s been a long build-up to this day, and he has taken people’s prejudice and abuse like a gentleman, never losing his cool. I know he’ll do the same today. I wonder, through my fever and quilts, just what my grandfather thinks will happen.

We were not Dodgers fans before Jackie Robinson. Our team was the Memphis Red Sox, in the Negro League. But now we are watching the small, jerky figures take the field hundreds of miles away in Brooklyn. At first base, number 42, is a black man. My grandfather has finally settled down, staring at the television in disbelief. My mother has tears in her eyes. The Braves are at bat, and Robinson gets the first man out, on a ground ball thrown from third. The crowd cheers. In the bottom of the first inning, he grounds out. I let out a loud groan. My grandfather turns to look at me, his eyes ablaze. He quietly tells my mother to take me back to bed.

Later, I try to apologize to my grandfather, and I blame my outburst on the fever. It’s partly true—I needed to break the tension, which I probably felt more keenly because of my illness, but he doesn’t buy it. *He needs our support, son. Take a cue from the way he’s stood up to his critics, and stand up for him. What matters is how he plays the whole game, not an occasional out.* I realize then that I had been nervous, too. I had expected the impossible—I had wanted him to bat a thousand.

Passage B by Jack Bryant

Opening Day, 1947—some friends and I cut school and instead made our way to Ebbets Field to see Jackie Robinson make his major league debut. We hadn’t expected to get in; everyone thought the game would be sold out, with crowds overflowing into the streets near the stadium. We just wanted to be part of that crowd. We had been saving up money, just in case, and it paid off. The game was not sold out, and we got in. I hadn’t been to a major league game before, and inside the stadium I felt I was in some utopian society that existed without segregation and racism. The crowd, which was more than half black, cheered as Jackie made the first out of the game at first base. Though he didn’t get a hit in the game, he scored a run after drawing a walk, and got eleven put-outs at first base.

My friends and I were flying high as we left the stadium. If a black man was now playing for the Brooklyn Dodgers, we felt there was nothing we couldn’t do. Later that same season, Larry Doby signed with the Cleveland Indians to become the first African American player in the American league. Change, we thought, was rapidly coming. To a certain extent that was true, but racism and injustice also persisted. Other teams treated Jackie badly, calling him names, threatening to strike if he played, and handling him roughly. When the Dodgers were on the road, he often was not allowed to stay at the hotels where the rest of the team stayed. These injustices weren’t new, but somehow I had thought they would go away when he took the field, that when Branch Rickey had offered him a contract, he was extending an olive branch to all African Americans on behalf of white Americans.

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Twenty-one years later, I remembered that day as I grieved the death of Dr. Martin Luther King, Jr., a victim of the struggle for racial equality that was ongoing. I had been so young, and so hopeful, and so hopelessly naïve. At times it felt like nothing had been accomplished in those 21 years. But that isn't entirely true. In baseball, getting a hit three out of every ten at bats is considered a good record. While I wish the struggle for equality were more like golf, in which the professionals hit the ball every time, we have come a long way since that day in 1947. But the season is 162 games long, and we are only part way through it.

Questions 1–3 ask about Passage A.

- The last paragraph of Passage A (lines 31–38) marks a shift in the passage from:
 - the time when baseball was segregated to after African Americans started playing in the major leagues.
 - the narrator seeing things through a fever-induced delirium to his understanding of how he had misinterpreted events.
 - a description of the experience of a historical moment to a lesson learned from that moment.
 - the narrator's grandfather's happy anticipation of an event to his anger at how the event unfolded.
- In Passage A, the narrator's descriptions of Jackie Robinson suggest that he sees him as ultimately:
 - a gentleman and a hero.
 - capable of doing the impossible.
 - a disappointing player.
 - overly excited and tense.
- The narrator of Passage A most nearly suggests that his grandfather is annoyed with him for groaning because:
 - his grandfather believes the narrator shouldn't have criticized Robinson.
 - his grandfather was disappointed that Robinson grounded out but didn't want to say so.
 - the noise disturbed his grandfather's concentration on the game.
 - the narrator was too sick to be out of bed and watching baseball.

Questions 4–7 ask about Passage B.

- The narrator's statement "inside the stadium I felt I was in some utopian society that existed without segregation and racism" (lines 46–48) is most nearly meant to:
 - describe the way people interact with each other inside a baseball stadium.
 - express the narrator's feelings of the momentousness of the occasion.
 - illustrate the way that Jackie Robinson changed society by playing in the major leagues.
 - foreshadow the way the narrator would feel 21 years later.
- Passage B indicates that compared to the narrator's expectation about how Jackie Robinson's appearance in Major League Baseball would affect segregation, its actual effect was:
 - different; the narrator had thought the crowd at the game would be bigger than it was.
 - different; the narrator had thought segregation would quickly disappear.
 - similar; the narrator had thought Robinson was a good choice for the Dodgers.
 - similar; the narrator had thought racism and injustice would last for a long time.
- Based on the passage, the information about Dr. Martin Luther King, Jr. provided in lines 67–69 is most likely included to:
 - show that not all of the narrator's role models were baseball players.
 - provide historical context for the importance of Jackie Robinson's role in baseball.
 - illustrate how little progress the narrator felt had been made in the struggle for racial equality.
 - convey the idea that Jackie Robinson's influence was felt far beyond the world of sports.
- The narrator of Passage B makes a comparison between:
 - the struggle for racial equality and the baseball season.
 - professional golf and major league baseball.
 - tense excitement and bed covers.
 - striking out in baseball and experiencing injustice.

GO ON TO THE NEXT PAGE.

Questions 8–10 ask about both passages.

8. Which of the following statements provides the most accurate comparison of the tone of each passage?
- F. Passage A is hopeful and cheery, while Passage B is dreary and pessimistic.
 - G. Passage A is objectively factual, while Passage B is descriptive and detailed.
 - H. Both passages maintain a sense of disappointment throughout.
 - J. Both passages begin with a sense of optimism and end with a sense that expectations had been too high.
9. Compared to the narrator of Passage A, the narrator of Passage B provides more information about:
- A. the play-by-play analysis of Jackie Robinson's first major league game.
 - B. the long-term effects of Jackie Robinson's appearance in the major leagues.
 - C. Jackie Robinson's baseball career before signing with the Dodgers.
 - D. the role of Negro League baseball in the early 20th century.
10. It can reasonably be inferred that after seeing Jackie Robinson play, compared to the narrator of Passage B, the narrator of Passage A felt:
- F. less optimistic about how race relations would change.
 - G. less interested in continuing to follow the Dodgers.
 - H. more disappointed that he hadn't played better.
 - J. more excited about the future for African-American baseball players.

GO ON TO THE NEXT PAGE.

Passage II

SOCIAL SCIENCE: This passage is adapted from T. H. Watkins' *The Great Depression* (©1993, Little, Brown and Co.; Blackside Inc.).

One of the most durable and well regarded of all the New Deal's programs came from President Roosevelt himself, who had his own share of inventiveness. If the president cared about the fate of people, he also cared about the fate of trees, having practiced the art of silviculture on his Hyde Park estate with such enthusiasm that on various official forms he was fond of listing his occupation as "tree farmer." It was in early March, 1933, that he proceeded to bring the two concerns together—enlisting young unemployed men in a kind of volunteer "army" to be put to work in the national forests, national parks, and on other federal public lands. When he went to Congress for authorization of the program, he called the new agency the Civilian Corps Reforestation Youth Rehabilitation Movement, but before sinking under the weight of an acronym like CCRYRM, it was soon changed to the Civilian Conservation Corps (known forever after as the CCC). Congress chose not to handle the details itself. It simply authorized the president to create the program and structure it as he saw fit by executive order; it was to last two years. Responsibility was divided up among the Labor Department, which was to screen and select the enrollees, the War Department, which would house and feed them in their nonworking hours, and the Departments of Agriculture and Interior, which would design and supervise projects in regional and national forests, national parks, and other public lands. The men would be paid \$30 a month, anywhere from \$23 to \$25 of it to be sent to their families.

The CCC officially began on April 5, 1933, calling for an enrollment of 250,000 to be housed in 1,468 camps around the country. The cost for the first year was estimated at \$500 million. The men had to be US citizens between the ages of seventeen and twenty-seven (later, twenty-four), out of school, out of work, capable of physical labor, over 60 inches but under 78 inches in height, more than 107 pounds in weight, and had to possess no fewer than "three serviceable natural masticating teeth above and below." They would serve terms of no more than nine months so that as many as possible could be accommodated over the course of time.

Among the earliest enrollees were some veterans who had returned to Washington, setting up camp and demanding payment of their bonuses for service during the war. While making it clear that he opposed the payments on economic grounds, FDR provided tents, showers, mess halls, and latrines, and, waiving the age restriction for them, invited the members of this new Bonus Army to join his new agency. What was more, Eleanor Roosevelt dropped by one rainy day for a visit, slogging through ankle-deep mud to meet and talk with the men. "Hoover sent the army," said one veteran of the previous summer's BEF disaster, "Roosevelt sent his wife." When it became clear that no bonus would be forthcoming, about twenty-five hundred of the men took Roosevelt up on his offer and joined the CCC.

In the summer of 1934, Roosevelt expanded the size of the CCC to 350,000 and would raise it to 500,000 in 1935. Congress continued to reauthorize it faithfully over the next seven years, and by the time it was closed out in 1942, the CCC had put more than three million young "soil soldiers" to work. In the national forests alone they built 3,470 fire towers, installed 65,100 miles of telephone lines, scraped and graded thousands of fire breaks, roads, and trails, and built 97,000 miles of truck trails and roads, spent 4.1 million man-hours fighting fires, and cut down and hauled out millions of diseased trees and planted more than 1.3 billion young trees in the first major reforestation campaign in the country's history. For the National Park Service, they built roads, campgrounds, bridges, and recreation and administration facilities; for the Biological Survey (a predecessor of today's Fish and Wildlife Service), they conducted wildlife surveys and improved wildlife refuge lands; and for the Army Corps of Engineers, they built flood control projects in West Virginia, Vermont, and New York State.

In return, the CCC, at its best, took at least some young men out of the urban tangle of hopelessness where so many resided, introduced them to the intricacies and healing joy of the outdoors, and clothed and fed them better than many had been for years. Moreover, the program taught more than a hundred thousand to read and write, passed out twenty-five thousand eighth-grade diplomas and five thousand high-school diplomas, gave structure and discipline to lives that had experienced little of either, strengthened bodies and minds, and for many provided a dose of self-esteem they had never known.

11. The main idea of the passage is that:

- A. the CCC forced unemployed young men to work in the national forests, national parks, and on other federal public lands for no payment or bonus.
- B. it was only after President Roosevelt created the CCC that veterans had suitable employment during the Great Depression.
- C. research into the history of the New Deal shows that the idea for the CCC came from Congress.
- D. among the programs of the New Deal, the CCC employed young men to build public works projects on public lands in return for modest wages, food, clothing, and some education.

GO ON TO THE NEXT PAGE.

12. The main idea of the third paragraph (lines 37–49) is that:
- F. President Hoover had dispatched the army to meet with disgruntled veterans, but President Roosevelt sent his wife, Eleanor, to meet with the Bonus Army.
 - G. when they realized President Roosevelt would not pay the bonus, many veterans abandoned the Bonus Army and accepted his invitation to join the CCC.
 - H. President Roosevelt supplied shelter and food to the veterans before paying the bonus the veterans demanded.
 - J. many of the veterans were above the age requirement of the CCC.
13. As it is used in line 7 to describe President Roosevelt, the term *tree farmer* most nearly means that Roosevelt:
- A. had supported his family by growing trees before he entered politics.
 - B. believed in an agrarian economy over urban industrialization.
 - C. continued his successful business selling trees while in office.
 - D. had a great interest in trees and knew a good deal about them.
14. According to the passage, which of the following was a project the CCC performed for the National Park Service?
- F. Building fire towers
 - G. Building campground facilities
 - H. Installing telephone lines
 - J. Conducting wildlife surveys
15. According to the passage, which of the following statements is true about the CCC?
- A. The agency provided enrollees with academic instruction.
 - B. The agency provided enrollees with urban job training.
 - C. The agency accepted only men with six teeth.
 - D. The agency offered courses in nutrition and self-esteem.
16. Information in the fourth paragraph (lines 50–67) makes it clear that the CCC:
- F. was voluntary and therefore did not pay members anything.
 - G. ran for more years and employed more men than was originally intended.
 - H. employed 4.1 million men.
 - J. battled fires in West Virginia, Vermont, and New York.
17. The passage most strongly suggests that before the 1930s, the national forests:
- A. received no federal support or aid for projects to clear diseased trees.
 - B. included land reserved for wildlife refuges.
 - C. had never undergone a major reforestation campaign.
 - D. experienced more floods than forest fires.
18. According to the passage, when did the CCC change its name?
- F. After President Roosevelt received authorization from Congress
 - G. After Congress protested that CCRYM was too difficult to say
 - H. In the same year the size expanded to 500,000 men
 - J. After the Bonus Army disbanded
19. The passage states that the same year the CCC was authorized enrollees had to be:
- A. over 78 inches in height.
 - B. in school.
 - C. between the ages of seventeen and twenty-seven.
 - D. between the ages of seventeen and twenty-four.
20. According to the passage, CCC programs in national parks and forests were:
- F. conducted far from where the members were fed and housed.
 - G. under the control of the Departments of Agriculture and the Interior.
 - H. supervised by the Labor Department.
 - J. minimum-wage jobs.

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Passage III

HUMANITIES: This passage is adapted from John Gattuso, ed., *Native America* (©1993, Houghton Mifflin Co.).

Northwest natives are carvers by tradition, but it was the natives of the far north, in what is now British Columbia and Alaska, who first carved totem poles. The history of these fascinating works is surprisingly brief, for it wasn't until the mid-18th century, when European explorers first encountered these remote tribes, that the unique sculptures began to appear. Although the natives were already expert carvers of canoes, tools, longhouses, and furniture, they lacked the iron tools necessary to fell a massive tree in one piece and carve its entire length.

With the iron axes they got in trade for their baskets, boxes, and pelts, the coastal tribes of the far north could take advantage of the trees that grew so tall and straight in their wet climate. Initially, the poles were made to stand against the front of a house, with figures facing out and a door cut through the base, so all would enter the house through the pole. In this case, the totem pole functioned as a family crest, recounting genealogies, stories, or legends that in some way identified the owner. Towards the end of the 19th century, the poles stood free on the beach or in the village outside the carvers' homes. Some villages were virtual forests of dozens, sometimes hundreds, of poles.

The family that carved the pole gave a potlatch with feasting, games, and much gift-giving. The guests, in return, raised the pole. These gatherings were costly and required a great deal of preparation and participation. The custom frustrated whites trying to "civilize" the Indians, especially missionaries who solved the problem by knocking the poles down. Employers, too, complained that their Indian workers were unreliable when a pole was being carved or a potlatch planned. Eventually, both the Canadian and United States governments banned potlatches, and pole carving nearly died out. The ban was lifted in the 1950s.

The Tlingit, on the southeastern coast of Alaska, and the Haidas and Tsimshian of western Canada are known for their pole carving. On a tour in 1899, a group of Seattle businessmen visited the Tlingit village of Tongas and, finding no one there, took one of the poles. They erected it in Seattle where, at a towering 50 ft., it became one of the city's most distinctive monuments. In 1938, Tlingit carvers copied the pole after the original was destroyed by fire, and it remains in Pioneer Square today.

Poles serve the important purpose of recording the lore of a clan, much as a book would. The top figure on the pole identifies the owner's clan, and succeeding characters (read from top to bottom) tell their stories. Raven, the trickster, might tell the story of how he fooled the Creator into giving him the sun, or Frog might tell how he wooed a human woman. With slight variations between villages, everyone knew these stories, and potlatch guests dramatized them at the pole-raising with masks, drumming, and songs. And so the legends were preserved from one generation to the next.

There is a story behind almost every image on the pole. For example, if an animal had the power to transform itself into other beings, the carver would portray it in all its forms. If Raven were sometimes bird, sometimes human, he would be carved with both wings and limbs, or have a human face with a raven's beak. Other images are used to describe the spirits' special abilities. Eyes are frequently used to suggest acuteness or skill. So, for example, if an eye appears in an animal's ear, it might indicate that that animal has a sharp sense of hearing. And human figures in unexpected places, like an ear or nose, might mean that the animal has great powers.

Learning to read totem poles is like learning to read a language. They speak of history, mythology, social structure, and spirituality. They serve many purposes and continue to be carved by the descendants of the original carvers.

Today, Haida, Tlingit, Tsimshian, Kwakiutl and other native craftsmen carve, predominantly for the tourist trade, small "souvenir" totem poles in wood and black slate (or argillite). They also carve extraordinarily beautiful masks, effigies, boxes, house posts, and fixtures....

21. Which of the following statements best expresses the main idea of the passage?
 - A. Many Native American tribes created totem poles with meaningful symbols, but these poles were less important than the canoes carved before the mid-18th century.
 - B. Although the Tlingit village was deserted, the Seattle businessmen who took the totem pole were not right to take it without permission.
 - C. The history of totem pole carving dates back to only the mid-18th-century, but these poles have played an important role in Native American culture since that time.
 - D. The ban issued by the Canadian and United States governments against potlatches was lifted in the 1950s, but interest in totem-pole carving had diminished by that time.

22. Which of the following questions is NOT answered in the passage?
 - F. In terms of geographical region, which were the first groups to carve totem poles?
 - G. What is the tallest totem pole in North America?
 - H. What is the predominant use of the small totem poles carved today?
 - J. What prevented Native American tribes from carving totem poles before the 18th century?

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23. The passage suggests that one of the main purposes of totem poles is the way in which they:
- A. demonstrate the artistic skill of the carvers.
 - B. function as landmarks in major North American cities.
 - C. document the history and mythology of various clans.
 - D. complement the festivities of the potlatch.
24. The main function of the sixth paragraph (lines 49–59) is to:
- F. identify the origins of the stories behind every image on a totem pole.
 - G. describe and explain some of the images that might appear on a totem pole.
 - H. contrast the images on the totem poles of the Northwest natives with those of British Columbia and Alaska.
 - J. explain the role of the Raven in Native American mythology.
25. All of the following are used in the passage as illustrations of the role totem poles play in Native American culture EXCEPT the:
- A. function of the top figure on the pole.
 - B. descriptions of the Raven and Frog as characters on the pole.
 - C. reference to the popularity of totem poles in the tourist industries of many tribes.
 - D. placement of the Tlingit totem pole in Seattle’s Pioneer Square.
26. The second paragraph (lines 10–20) establishes all of the following about the totem poles carved by the coastal tribes of the far north EXCEPT that they were:
- F. initially used as the entryways of houses.
 - G. fashioned from tall, straight trees.
 - H. used to identify the owners of the poles.
 - J. produced only by clans with family crests.
27. One of the main points of the fifth paragraph (lines 39–48) is that the various characters on a totem pole are meant to represent:
- A. the owner of the totem pole.
 - B. the lore of the owner’s clan.
 - C. Raven, the trickster, fooling the Creator.
 - D. Frog wooing a human woman.
28. According to the passage, which of the following places is home to the Tlingit?
- F. Seattle
 - G. Western Canada
 - H. Pioneer Square
 - J. Alaska
29. The author most likely includes the information in lines 60–63 to suggest that:
- A. totem poles are notable for reasons beyond physical beauty.
 - B. totem poles have replaced books for Native American tribes.
 - C. Native American tribes have no spoken or written language.
 - D. the descendants of the original carvers of totem poles carve copies of older poles.
30. Which of the following words best describes the attitude of the employers referred to in the third paragraph (lines 21–30) in reaction to potlatches?
- F. Patient
 - G. Accepting
 - H. Irritated
 - J. Civilized

GO ON TO THE NEXT PAGE.

Passage IV

NATURAL SCIENCE: This passage is adapted from the article “The Pioneer Mission to Venus” by Janet G. Luhmann, James B. Pollack, and Lawrence Colin (©1994, Scientific American).

Venus is sometimes referred to as the Earth’s “twin” because it resembles the Earth in size and in distance from the sun. Over its 14 years of operation, the National Aeronautics and Space Administration’s *Pioneer Venus* mission revealed that the relation
5 between the two worlds is more analogous to Dr. Jekyll and Mr. Hyde. The surface of Venus bakes under a dense carbon dioxide atmosphere, the overlying clouds consist of noxious sulfuric acid, and the planet’s lack of a magnetic field exposes the upper atmosphere to the continuous hail of charged particles from the
10 sun. Our opportunity to explore the hostile Venusian environment came to an abrupt close in October 1992, when the *Pioneer Venus Orbiter* burned up like a meteor in the thick Venusian atmosphere. The craft’s demise marked the end of an era for the U.S. space program; in the present climate of fiscal austerity, there is no
15 telling when humans will next get a good look at Earth’s nearest planetary neighbor.

The information gleaned by *Pioneer Venus* complements the well-publicized radar images recently sent back by the *Magellan* spacecraft. *Magellan* concentrated on studies of Venus’s surface
20 geology and interior structure. *Pioneer Venus*, in comparison, gathered data on the composition and dynamics of the planet’s atmosphere and interplanetary surroundings. These findings illustrate how seemingly small differences in physical conditions have sent Venus and the Earth hurtling down very different evolutionary paths. Such knowledge will help scientists intelligently
25 evaluate how human activity may be changing the environment on the Earth.

Well before the arrival of *Pioneer Venus*, astronomers had learned that Venus does not live up to its image as Earth’s near-
30 twin. Whereas Earth maintains conditions ideal for liquid water and life, Venus’s surface temperature of 450 degrees Celsius is hotter than the melting point of lead. Atmospheric pressure at the ground is some 93 times that at sea level on Earth.

Even aside from the heat and the pressure, the air on Venus
35 would be utterly unbreathable to humans. The Earth’s atmosphere is about 78 percent nitrogen and 21 percent oxygen. Venus’s much thicker atmosphere, in contrast, is composed almost entirely of carbon dioxide. Nitrogen, the next most abundant gas, makes up only about 3.5 percent of the gas molecules. Both planets
40 possess about the same amount of gaseous nitrogen, but Venus’s atmosphere contains some 30,000 times as much carbon dioxide as does Earth’s. In fact, Earth does hold a quantity of carbon dioxide comparable to that in the Venusian atmosphere. On Earth, however, the carbon dioxide is locked away in carbonate
45 rocks, not in gaseous form in the air. The crucial distinction is responsible for many of the drastic environmental differences that exist between the two planets.

The large *Pioneer Venus* atmospheric probe carried a mass spectrometer and gas chromatograph, devices that measured the
50 exact composition of the atmosphere of Venus. One of the most stunning aspects of the Venusian atmosphere is that it is extremely dry. It possesses only a hundred thousandth as much water as Earth has in its oceans. If all of Venus’s water could somehow be condensed onto the surface, it would make a global puddle
55 only a couple of centimeters deep.

Unlike Earth, Venus harbors little if any molecular oxygen in its lower atmosphere. The abundant oxygen in Earth’s atmosphere is a by-product of photosynthesis by plants; if not for the activity of living things, Earth’s atmosphere also would be
60 oxygen poor. The atmosphere of Venus is far richer than Earth’s in sulfur-containing gases, primarily sulfur dioxide. On Earth, rain efficiently removes similar sulfur gases from the atmosphere.

Pioneer Venus revealed other ways in which Venus is more primordial than Earth. Venus’s atmosphere contains higher concentrations of inert, or noble, gases—especially neon and isotopes of argon—that have been present since the time the planets were
65 born. This difference suggests that Venus has held on to a far greater fraction of its earliest atmosphere. Much of Earth’s primitive atmosphere may have been stripped away and lost into space when our world was struck by a Mars-size body. Many planetary
70 scientists now think the moon formed out of the cloud of debris that resulted from such a gigantic impact.

31. With regard to the possibility of returning to the planet Venus, information presented in the passage makes it clear that the authors are:
- A. cheerful and optimistic.
 - B. sarcastic and contentious.
 - C. doubtful and pragmatic.
 - D. uncertain and withdrawn.
32. Which of the following statements most accurately summarizes how the passage characterizes the state of scientific knowledge about Venus before the *Pioneer* mission?
- F. The scientific community was hesitant to return to Venus after an earlier mission had ended in disaster.
 - G. Scientists saw Earth and Venus as near polar opposites in atmospheric conditions.
 - H. The common belief that Earth and Venus were “twins” had been eroding under the weight of scientific evidence.
 - J. Scientists knew little about the planet Venus because they were more interested in other planets.

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33. Based on the passage, Earth may have retained less of its early atmosphere than Venus did due to:
- A. the impact that occurred when Earth was struck by Mars.
 - B. a cloud of debris that stripped the atmosphere away.
 - C. rain that removes sulfur gases from the atmosphere.
 - D. a collision between Earth and another massive object.
34. The main point of the second paragraph (lines 17–27) is to:
- F. account for the failure of the *Magellan* mission and to show the superiority of the *Pioneer* mission.
 - G. suggest that information from both the *Magellan* and *Pioneer* missions can bring the scientific community to a deeper understanding of Venus.
 - H. show that the *Magellan* had sent back information regarding physical characteristics while the *Pioneer* had not.
 - J. hypothesize that the findings of the *Pioneer* mission will help scientists to approach problems more intelligently.
35. The passage indicates that if humans were to attempt to live on the planet Venus, survival would not be possible because:
- A. of the mistaken belief that Venus and Earth are “twin” planets.
 - B. carbon dioxide is locked away in bicarbonate rocks, not in gaseous form.
 - C. the atmospheric pressure, heat, and air are not suitable for human life.
 - D. all of the water on Venus is condensed onto the surface.
36. According to the passage, some evidence gained before the *Pioneer Venus* mission suggesting that Earth and Venus are not near-twins stated that:
- F. Venus produces no lead on or underneath its surface.
 - G. Earth was found to be much farther from the sun than was previously thought.
 - H. the atmosphere of Venus contains 78 percent nitrogen and 21 percent oxygen.
 - J. the surface temperature of Venus is 450 degrees Celsius and thus unlivable for humans.
37. As it is used in line 56, the word *harbors* most nearly means:
- A. shelters.
 - B. hides.
 - C. holds.
 - D. cherishes.
38. According to the passage, “primordial” most nearly refers to planets that:
- F. are oxygen-poor due to a lack of activity by living things.
 - G. are not hospitable to humans because they have thick atmospheres and high surface temperatures.
 - H. have preserved many of the characteristics present when the planets were formed.
 - J. have been struck by large bodies which have altered the planets’ atmospheres.
39. It can reasonably be inferred that the “activity of living things” described in line 59 directly refers to organisms on Earth that:
- A. produce oxygen by their own natural processes and influence the contents of Earth’s atmosphere.
 - B. remove sulfur gases from the atmosphere during heavy rainfall.
 - C. lock away carbon dioxide in carbonate rocks and maintain a reserve of the gas.
 - D. could easily live in oppressive atmospheres similar to the atmosphere of Venus.
40. According to the passage, the *Pioneer Venus* mission to Venus involved investigating details relating to the planet’s:
- F. surface geology and interior structure.
 - G. atmosphere as it has been changed by the influence of photosynthesis.
 - H. similarities to the planet Earth.
 - J. atmospheric contents.

END OF TEST 3

**STOP! DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.
DO NOT RETURN TO A PREVIOUS TEST.**



SCIENCE TEST

35 Minutes–40 Questions

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

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

Passage I

Metallic *alloys*, solid mixtures of metal, are useful for coin production when they contain a high percentage of zinc. When electric current is applied to zinc in the presence of precious metal solutions of *silver nitrate*, *copper sulfate*, or *potassium gold cyanide*, the precious metals *plate* (form a coating) on the zinc surface.

- Silver nitrate, formed when silver dissolves in *nitric acid*, reacts with zinc to form solid silver and *zinc nitrate*.
- Copper sulfate, formed when copper dissolves in *sulfuric acid*, reacts with zinc to form solid copper and *zinc sulfate*.
- Potassium gold cyanide contains reactive gold ions.

A chemist performed experiments on precious metal plating.

Experiment 1

The chemist obtained 4 coin-like samples of a high percentage zinc alloy. All samples were circular, had a radius of 1 cm, and had the same thickness. The mass of each coin was recorded. Each coin was wired via a battery to a strip of either pure silver or copper metal. Coins wired to silver were placed in dilute nitric acid and coins wired to copper were placed in dilute sulfuric acid. An electric current of either 1,000 milliamperes (mA) or 2,000 mA was applied for 30 minutes to each sample. The coins were removed and the increase in mass from precious metal plating was recorded in milligrams. Results of the experiment are shown in Table 1.

Coin sample	Precious metal solution		Increased mass from plating (mg)
	Identity	Electric current (mA)	
I	silver nitrate	1,000	2.0
II	silver nitrate	2,000	4.0
III	copper sulfate	1,000	1.2
IV	copper sulfate	2,000	2.4

Experiment 2

The chemist completely dissolved equal amounts of pure silver in 4 beakers of nitric acid. He then placed equivalent coin-like samples of zinc into the beakers for different lengths of time measured in minutes (min). The coin surfaces developed a silver metal coating without any electric current applied. The concentrations of silver coating on the coin and zinc nitrate in the surrounding solution were determined in parts per billion (ppb) and recorded in Table 2.

Coin sample	Time (min)	Silver coating concentration (ppb)	Zinc nitrate concentration (ppb)
V	5	75	30
VI	15	125	55
VII	30	200	75
VIII	60	500	85

1. A comparison of the results for coin samples II and IV supports the hypothesis that zinc is plated more extensively when exposed to:
 - A. silver nitrate and a current of 1,000 mA than silver nitrate and a current of 2,000 mA.
 - B. copper sulfate and a current of 1,000 mA than copper sulfate and a current of 2,000 mA.
 - C. silver nitrate than when exposed to copper sulfate.
 - D. copper sulfate than when exposed to silver nitrate.

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2. If the chemist were to repeat Experiment 1, but compress each coin sample to a radius of 0.5 cm to decrease the surface area exposed to the surrounding solution, how would the mass of precious metal plated most likely be affected?
- F. The mass of precious metal plated would decrease for all coin samples.
 - G. The mass of precious metal plated would decrease for coin samples I and III and increase for coin samples II and IV.
 - H. The mass of precious metal plated would remain constant for all coin samples.
 - J. The mass of precious metal plated would increase for all coin samples.
3. According to the information in the passage, a zinc alloy coin sample exposed to which of the following conditions would result in the greatest concentration of zinc nitrate?
- A. 6 minutes in a solution with a high initial concentration of silver nitrate
 - B. 6 minutes in a solution with a low initial concentration of silver nitrate
 - C. 10 minutes in a solution with a high initial concentration of silver nitrate
 - D. 10 minutes in a solution with a low initial concentration of silver nitrate
4. In Experiment 1, if the chemist had applied 1,580 mA to a 1 cm radius zinc alloy coin sample in a copper sulfate solution, approximately how much copper would have plated after 30 minutes?
- F. 0.6 mg
 - G. 1.1 mg
 - H. 1.9 mg
 - J. 4.6 mg
5. In Experiment 1, which of the following variables was the same for all 4 zinc alloy coin sample trials?
- A. Change in mass from plating
 - B. Electric current applied
 - C. Type of precious metal solution used
 - D. Initial radius of the sample
6. According to the passage, if a chemist wants to study the effect of plating zinc alloys with silver, the chemist should monitor the concentration of which of the following substances in the surrounding solution?
- F. Potassium gold cyanide
 - G. Zinc nitrate
 - H. Copper sulfate
 - J. Sulfuric acid
7. One of the ways in which Experiment 2 differed from Experiment 1 is that in Experiment 2:
- A. Zinc was used to plate the coins, whereas in Experiment 1 only silver was used.
 - B. The mass of the coins increased only, whereas in Experiment 1 the mass of the coins increased and then decreased.
 - C. Only silver was used to plate the coins, whereas in Experiment 1 copper was also used.
 - D. The mass of the coins increased and then decreased, whereas in Experiment 1 the mass of the coins increased only.

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Passage II

Organic compounds are molecules that frequently contain carbon (C), hydrogen (H), and oxygen (O) joined together by covalent bonds (symbolized by straight lines in chemical notation). As the number of bonds to oxygen atoms increases in a carbon chain, the overall molecule is increasingly oxidized. For example, aldehydes are more oxidized than alcohols, which are more oxidized than alkanes, as shown in Table 1. The melting points of these compounds are listed in Table 2, and their *viscosities* (resistance to flow) are listed in Table 3.

Carbons in the chain	Name prefix	Structure		
		alkane (suffix -ane)	alcohol (suffix -anol)	aldehyde (suffix -analdehyde)
4	but-	$\text{H}_3\text{C}-\underset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\text{CH}_3$	$\text{H}_3\text{C}-\overset{\text{H}_2}{\text{C}}-\underset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\text{OH}$	$\text{H}_3\text{C}-\overset{\text{H}_2}{\text{C}}-\underset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}=\text{O}$
5	pent-	$\text{H}_3\text{C}-\overset{\text{H}_2}{\text{C}}-\underset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\text{CH}_3$	$\text{H}_3\text{C}-\overset{\text{H}_2}{\text{C}}-\underset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\text{OH}$	$\text{H}_3\text{C}-\overset{\text{H}_2}{\text{C}}-\underset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}=\text{O}$
6	hex-	$\text{H}_3\text{C}-\overset{\text{H}_2}{\text{C}}-\underset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\underset{\text{H}_2}{\text{C}}-\text{CH}_3$	$\text{H}_3\text{C}-\overset{\text{H}_2}{\text{C}}-\underset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\text{OH}$	$\text{H}_3\text{C}-\overset{\text{H}_2}{\text{C}}-\underset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}=\text{O}$
7	hept-	$\text{H}_3\text{C}-\overset{\text{H}_2}{\text{C}}-\underset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\underset{\text{H}_2}{\text{C}}-\text{CH}_3$	$\text{H}_3\text{C}-\overset{\text{H}_2}{\text{C}}-\underset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\text{OH}$	$\text{H}_3\text{C}-\overset{\text{H}_2}{\text{C}}-\underset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}=\text{O}$
8	oct-	$\text{H}_3\text{C}-\overset{\text{H}_2}{\text{C}}-\underset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\underset{\text{H}_2}{\text{C}}-\text{CH}_3$	$\text{H}_3\text{C}-\overset{\text{H}_2}{\text{C}}-\underset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\text{OH}$	$\text{H}_3\text{C}-\overset{\text{H}_2}{\text{C}}-\underset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}-\overset{\text{H}_2}{\text{C}}=\text{O}$

Carbons in the chain	Melting point (K)		
	alkane	alcohol	aldehyde
4	135	183	174
5	143	194	213
6	178	221	217
7	182	239	231
8	216	257	285

Carbons in the chain	Viscosity (cP)		
	alkane	alcohol	aldehyde
4	0.01	3.0	0.4
5	0.24	5.1	0.5
6	0.29	5.4	0.8
7	0.39	5.8	1.0
8	0.54	8.4	1.2

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8. Based on Table 1, which of the following is the chemical formula for pentanol?
- F. C_4H_{10}
G. $C_4H_{12}O$
H. C_5H_{12}
J. $C_5H_{12}O$
9. Which organic compounds in Table 2 are solids at 215 K ?
- A. All alkanes, alcohols, and aldehydes with 5 carbons or fewer
B. Alcohols and aldehydes with 6 or more carbons and octane
C. The 4- and 5-carbon alcohols and aldehydes, and all alkanes with 7 or fewer carbons
D. The 5-carbon pentane and pentanol compounds and the 4-carbon butane, butanol, and butanaldehyde
10. According to Tables 1 and 3, which organic compound has the highest viscosity?
- F. Octanol
G. Octanaldehyde
H. Hexanol
J. Butane
11. According to Table 3, how do the different types of 5-carbon molecules differ with respect to their viscosity?
- A. The alkane has a higher viscosity than the aldehyde, and the aldehyde has a higher viscosity than the alcohol.
B. The alkane has a higher viscosity than the alcohol, and the alcohol has a higher viscosity than the aldehyde.
C. The alcohol has a higher viscosity than the alkane, and the alkane has a higher viscosity than the aldehyde.
D. The alcohol has a higher viscosity than the aldehyde, and the aldehyde has a higher viscosity than the alkane.
12. For each type of organic compound, what is the relationship between the length of the carbon chain to the melting point and viscosity? As the number of carbons in the chain increases, the melting point:
- F. decreases, and the viscosity decreases.
G. increases, and the viscosity increases.
H. increases, but the viscosity decreases.
J. decreases, but the viscosity increases.
13. According to Table 2, the difference in melting point between an alkane and an alcohol with the same number of carbons is approximately how much?
- A. 25 K
B. 35 K
C. 50 K
D. 65 K

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**Passage III**

A mass suspended by a lightweight thread and swinging back and forth approximates the motion of a *simple gravity pendulum*, a system in which gravity is the only force acting on the mass, causing an acceleration of 9.8 m/sec^2 . The time to complete one cycle of swinging back and forth is the *period* and is inversely related to gravitational acceleration.

Using the same type and length of thread, 2 cubes were suspended, lifted to the same starting angle, and let go. The amount of time required for each pendulum to complete one swinging cycle (1 period) was recorded with a timer capable of reading to the nearest 0.01 sec. The measured times were used to calculate acceleration.

Experiment 1

A cube of lead (11.3 grams) and a cube of tin (7.4 grams) were suspended from a 0.5 m length of thread. Both cubes had the same length. (Note: A cube's volume is proportional to its length cubed; its surface area is proportional to its length squared.) The cubes were set in motion from a fixed starting angle, and the period for each was recorded.

Trial	Measured period (sec)	
	lead cube	tin cube
1	1.48	1.51
2	1.45	1.47
3	1.46	1.42
4	1.49	1.45
5	1.39	1.53

The average periods were 1.46 sec and 1.48 sec for the lead and tin cubes, respectively. The average accelerations were 9.3 m/sec^2 for lead and 9.1 m/sec^2 for tin.

Experiment 2

The same procedures used in Experiment 1 were repeated using a thread length of 1.0 m and the same fixed starting angle. Results were recorded in Table 2.

Trial	Measured period (sec)	
	lead cube	tin cube
6	2.10	2.12
7	2.04	2.06
8	2.05	2.07
9	2.12	2.11
10	2.00	2.10

The average periods were 2.06 sec and 2.09 sec for the lead and tin cubes, respectively. The average accelerations were 9.3 m/sec^2 for lead and 9.0 m/sec^2 for tin.

Experiment 3

Given the results of the first 2 experiments, the accuracy of the timer was tested. The procedures of Experiment 1 were repeated using only the lead cube. The trials were recorded on digital video at 100 frames per second. The video was then reviewed to obtain precise measurements of the period for each trial and results are shown in Table 3.

Trial	Measured period (sec)
11	1.47
12	1.42
13	1.49
14	1.50
15	1.46

The average period recorded in Table 3 was 1.47 sec.

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14. To demonstrate that a pendulum's acceleration is reduced by drag force from air resistance, which additional experiment can be performed in addition to those in the passage?
- F. The cubes are suspended by 0.5 m and 1.0 m springs and set in motion by extending the spring 9.8 cm and letting go in a vacuum chamber with no air pressure.
 - G. The cubes are suspended by 0.5 m and 1.0 m threads and set in motion from the same starting angle in a vacuum chamber with no air pressure.
 - H. The cubes are suspended by 0.5 m and 1.0 m springs and set in motion by extending the spring 9.8 cm and letting go in a vacuum chamber at 1 atmosphere of pressure.
 - J. The cubes are suspended by 0.5 m and 1.0 m threads and set in motion from the same starting angle in a vacuum chamber at 1 atmosphere of pressure.
15. In Experiment 1, could a timer that reads to the nearest half second be used to obtain similar results, and why?
- A. No, because the period of both pendulums was approximately 1.5 seconds.
 - B. No, because the pendulums would not have completed a full swinging cycle in 1.5 seconds.
 - C. Yes, because the period of both pendulums was approximately 1.5 seconds.
 - D. Yes, because the pendulums would have completed more than one swinging cycle in 1.5 seconds.
16. The results of the experiments indicate that forces other than gravity are acting on the pendulums because the calculated values of acceleration were:
- F. the same for pendulums of different lengths.
 - G. the same for cubes of different mass.
 - H. lower than the expected 9.8 m/sec^2 from gravity alone.
 - J. greater than the expected 9.8 m/sec^2 from gravity alone.
17. Based on the passage, if a tin cube is suspended from a 2.0 m thread and set in motion multiple times from the same starting angle, the average measured period will most likely be:
- A. less than 1.48 sec.
 - B. approximately 1.48 sec.
 - C. approximately 2.09 sec.
 - D. greater than 2.09 sec.
18. In Experiment 2, if an additional trial were conducted using the lead cube, the cube's measured period would most likely be nearest to:
- F. 1.90 sec.
 - G. 2.05 sec.
 - H. 2.15 sec.
 - J. 2.20 sec.
19. Experiments 1 and 2 were conducted using lead and tin cubes most likely to determine whether a pendulum's period was altered by the cube's:
- A. length.
 - B. mass.
 - C. starting angle.
 - D. surface area.
20. Based on the results of Experiments 1 and 2, which cube most likely had a larger drag coefficient?
- F. The lead cube, because the average period of the lead cube was shorter than the average period of the tin cube in both experiments.
 - G. The lead cube, because the mass of the lead cube was smaller.
 - H. The tin cube, because the average period of the tin cube was longer than the average period of the lead cube in both experiments.
 - J. The tin cube, because the mass of the tin cube was greater.

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**Passage IV**

Accepted classification systems of life do not include *viruses*. Although viruses possess certain features of cellular organisms, including genetic material that codes for making new viral particles, they cannot *replicate* (make copies of) themselves without first infecting a living cell. Biologists agree that viruses originated from genetic material called *nucleic acid*, but it is difficult to prove any single theory regarding how this occurred. Three scientists present their hypotheses of viral origin.

Scientist 1

Viruses evolved alongside other organisms over billions of years. Simple molecules of *ribonucleic acid* (RNA), a *nucleotide* that forms the genetic code for proteins, joined to form more complex sequences. These RNA sequences developed enzyme-like abilities including the ability to self-replicate and insert themselves into other nucleotide sequences. While some RNA sequences became incorporated into membrane-bound cells, others were packaged inside proteins as the first viral particles that could replicate after infecting cellular organisms (see Figure 1).

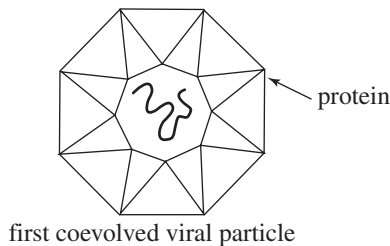
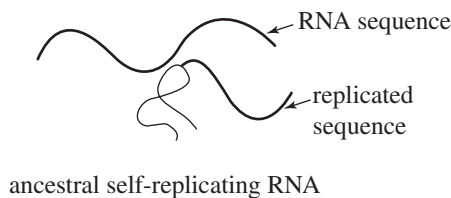


Figure 1

Scientist 2

Nucleotide sequences within *prokaryotic* (non-nucleated) and *eukaryotic* (nucleated) cellular organisms incorporated into a protein coating and escaped from the cells as viral particles. Initially, DNA or RNA nucleotide sequences gained the code required for other cells to replicate them. Next, these sequences associated with proteins to form an outer *capsid*. Finally, the *virion* (viral particle) became capable of passing through the cell membrane and infecting other cells where it could be replicated. After the initial escape, viruses evolved independently from their initial host and ultimately could infect either prokaryotic or eukaryotic cells.

Scientist 3

Viruses evolved from cellular organisms. Some cellular organisms, particularly certain bacteria, are *obligate intracellular parasites* because they must infect a host cell in order to reproduce. Regressive evolution suggests that some bacterial parasites gradually lost the structures required for survival outside of a cell. The result was a virus particle containing only nucleotides, a capsid (protein coating), and at times an outer membrane or envelope. This would account readily for viruses that contain complex *deoxyribonucleic acid* (DNA) similar to that found in bacteria and other cellular organisms (see Figure 2).

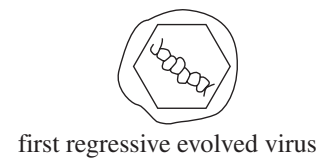
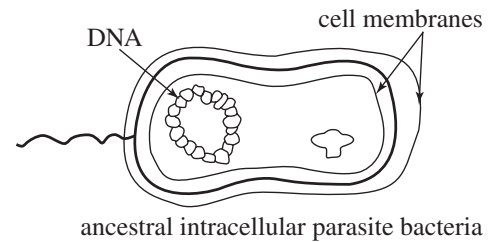


Figure 2

21. The development of which of the following is addressed in the passage by Scientist 1 but not by Scientist 3 ?
- Self-replication
 - Capsid
 - Deoxyribonucleic acid
 - Cell membrane transit
22. All three scientist would agree with the conclusion that the first viruses:
- evolved from bacteria.
 - could self-replicate outside a cell.
 - were enclosed within a membrane.
 - contained nucleic acid.
23. Scientist 1 does NOT provide an explanation for the earliest virus particles possessing:
- protein.
 - enzyme-like activity.
 - nucleotides.
 - DNA.

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24. If Scientist 2 is correct, which of the following conclusions can be made about modern T4 DNA viruses, which infect *Escherichia coli* bacteria, and modern PP7 RNA viruses, which infect *Pseudomonas aeruginosa* bacteria?
- F. T4 and PP7 are more closely related to each other than to bacteria genetically.
 - G. T4 and PP7 are only distantly related genetically through a cellular organism.
 - H. T4 and PP7 both evolved from prokaryotic organisms.
 - J. T4 and PP7 both evolved from eukaryotic organisms.
25. The discovery of which of the following living organisms would provide the most support for Scientist 3's theory?
- A. Extracellular parasites with DNA resembling a known virus
 - B. Extracellular parasites with unique RNA nucleotide sequences
 - C. Intracellular parasites with DNA resembling a known virus
 - D. Intracellular parasites with unique RNA nucleotide sequences
26. All three scientists would agree with which of the following conclusions about the origin of viruses?
- F. Viral capsids contain a protein structure similar to the cell walls of modern bacteria.
 - G. The first viruses did not originate before the first cellular organisms.
 - H. RNA viruses are more advanced than DNA viruses.
 - J. The first virus contained DNA and was surrounded by an envelope similar to a cell membrane.
27. Which of the following questions is raised by Scientist 1, but is NOT answered in the passage?
- A. Why were some RNA sequences packaged into protein structures and others incorporated into cell structures?
 - B. Why did obligate intracellular parasites lose their ability to survive outside of cells?
 - C. How could two different types of cellular organisms account for the origin of viruses?
 - D. How did virions develop the ability to pass through the cell membrane out of the cell?

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**Passage V**

Wind causes *topsoil deflation*, a type of erosion that is affected by plant and organic cover as well as water content of the soil. Scientists performed 2 experiments using equal-sized fields containing the same volume of soil. The soil samples were primarily a mixture of sand and silt, but differed in the percentage of clay they contained. Soil X was composed of 5% clay and Soil Y was composed of 40% clay. Large fans were used to simulate wind. Topsoil deflation was measured in kilograms per hectare (kg/ha) following 10 hours of wind.

Experiment 1

A mixture of compost and straw was used to represent plant and organic cover. The percentage of soil covered with the mixture was considered to approximate an equivalent percentage of natural vegetative cover. One field remained uncovered, and the other fields were covered with different percentages of compost and straw. The topsoil deflation from each field was recorded in Table 1.

Soil	Topsoil deflation (kg/ha) by percentage of organic cover			
	0%	25%	50%	75%
X	105,000	68,000	46,000	20,000
Y	65,000	42,000	28,500	12,000

Experiment 2

Rainfall was simulated using a sprinkler system. Sprinklers were turned on for either 4 hours or 8 hours for fields of each kind of soil. Two additional fields composed of each type of soil were left unwatered. Afterward, soil samples were taken from all of the fields to determine their water content percentage, which was recorded in Table 2. Wind was applied as in Experiment 1 and topsoil deflation for all fields was recorded in Table 3.

Soil	Water content of soil following various sprinkler times		
	0 hours	4 hours	8 hours
X	10%	13%	16%
Y	10%	14%	22%

Soil	Topsoil deflation (kg/ha) following various sprinkler times		
	0 hours	4 hours	8 hours
X	89,250	66,000	14,000
Y	53,400	40,100	10,300

28. A third soil, Soil Z, contains 45% clay. One field with Soil Z is covered with a mixture of compost and straw and subjected to 10 hours of simulated wind in the same procedure used in Experiment 1. At the conclusion of the trial, the topsoil deflation in the field was determined to be 26,000 kg/ha. The percentage of organic cover used on the field was most likely closest to:
- F. 0%.
G. 25%.
H. 50%.
J. 75%.

29. According to the results of Experiments 1 and 2, topsoil deflation will be minimized by:
- A. decreased organic cover, increased amount of rainfall, and the use of either Soil X or Y as topsoil.
B. decreased organic cover, decreased amount of rainfall, and the use of Soil Y as topsoil.
C. increased organic cover, increased amount of rainfall, and the use of Soil Y as topsoil.
D. increased organic cover, increased amount of rainfall, and the use of Soil X as topsoil.
30. If Experiment 1 were repeated using a soil containing 10% clay with 0% organic cover, which of the following would be the most likely topsoil deflation amount?
- F. 60,200 kg/ha
G. 70,700 kg/ha
H. 99,800 kg/ha
J. 110,200 kg/ha

31. To further investigate the effect of water content on erosion from topsoil deflation, the scientists should repeat Experiment:
- A. 1, using a different type of topsoil.
B. 1, using plastic covers over the fields.
C. 2, using no sprinklers.
D. 2, using fields exposed to various amounts of rainfall.

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32. Which of the following assumptions was made in the design of Experiment 1 ?
- F. The quantity of topsoil deflation is independent of the percentage of clay present in the soil.
 - G. The presence of straw on the soil does not accurately simulate vegetation and organic cover.
 - H. Air movement from fans provides an accurate simulation of the wind responsible for topsoil deflation.
 - J. Compost is more effective than water content in the prevention of topsoil erosion.
33. In Experiment 2, the water content in the two soil types was similar after 4 hours of sprinkling, yet the topsoil deflation was significantly different. Which of the following statements provides the best explanation for these findings?
- A. Topsoil erosion is independent of the water content found in the soil.
 - B. Fields are susceptible to topsoil deflation only when water completely evaporates from the topsoil.
 - C. Soil with a lower percentage of clay is more prone to erosion from topsoil deflation than one with a higher percentage of clay.
 - D. Water is trapped in the topsoil by wind and this increases the rate of topsoil deflation.
34. If Experiment 2 were repeated with soil containing 10% clay, which of the following values would be expected for water content and topsoil deflation in a field following 8 hours of water sprinkling?
- F. Water content of 21%; topsoil deflation of 9,700 kg/ha
 - G. Water content of 17%; topsoil deflation of 13,400 kg/ha
 - H. Water content of 15%; topsoil deflation of 10,900 kg/ha
 - J. Water content of 14%; topsoil deflation of 101,000 kg/ha

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Passage VI

The oceans of Earth are exposed to various climates and consequently have different physical properties. Deep oceans can be divided into zones based on temperature gradient and penetration of sunlight. Figure 1 shows the zones of a typical deep-water ocean, the depth of the zone boundaries in meters (m), and the overall pressure at those depths in kilopascals (kPa). Figure 2 shows the water temperature in degrees Celsius (°C) in warmer tropical oceans and cooler temperate oceans at varying depths. Sound waves are used to measure water temperature at depth, and readings from two different ocean regions are recorded in Table 1.

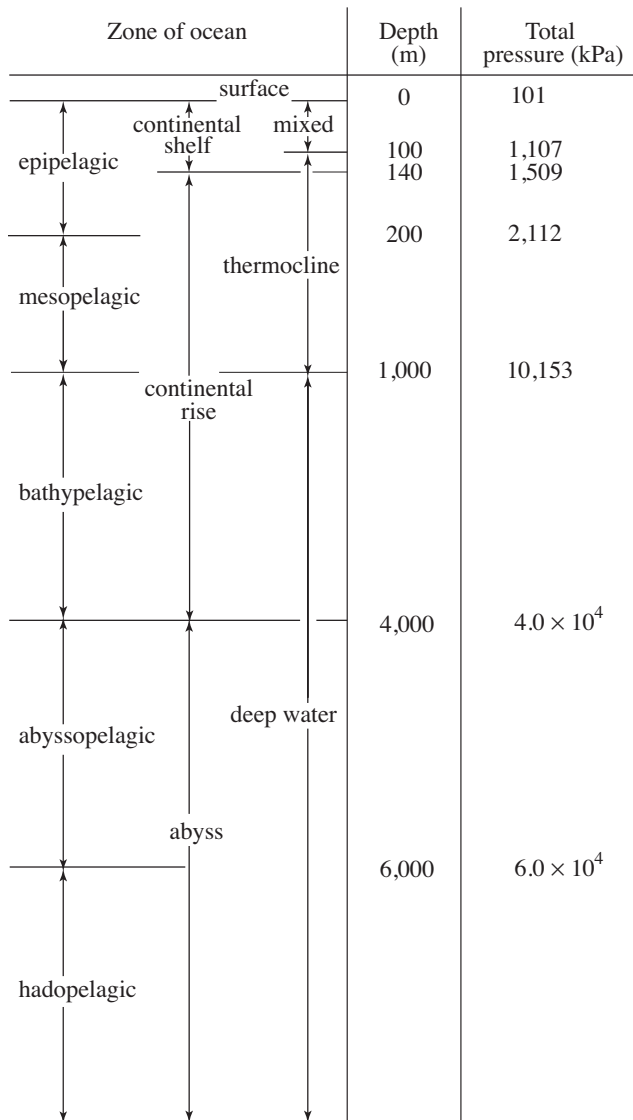


Figure 1

(Note: Figure is NOT drawn to scale)

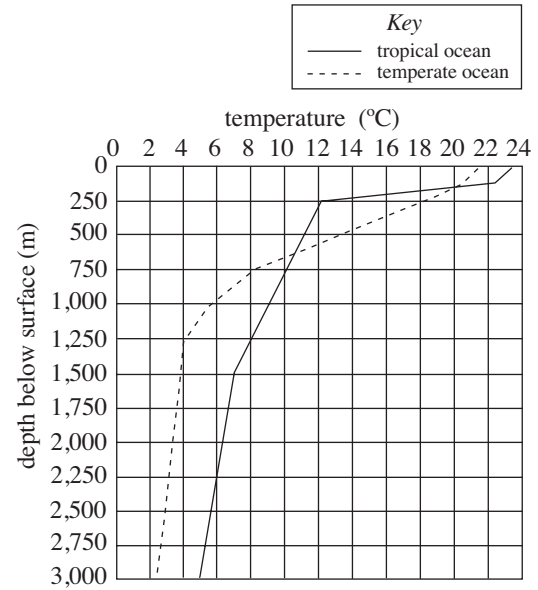


Figure 2

Total pressure (kPa)	Depth (m)	Ocean temperature (°C)	
		Region 1	Region 2
101	0.0	24	21
200	9.8	22	20
300	19.8	14	11
400	29.7	11	9
500	39.7	10	8
600	49.6	9	6
700	59.6	7	5
800	69.5	5	5
900	79.5	4	6

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35. According to Figure 1, the regions of several ocean zones overlap. Which of the following pairs of ocean zones share part of a common depth range?
- A. Bathypelagic and thermocline
 - B. Bathypelagic and epipelagic
 - C. Epipelagic and thermocline
 - D. Epipelagic and mesopelagic
36. According to Figure 1, an oceanographic reading taken at a total pressure of 1,700 kPa is most likely from which of the following zones?
- F. Abyss
 - G. Continental shelf
 - H. Mixed
 - J. Thermocline
37. According to Figure 2, a sonographic measurement of temperature would be unable to distinguish the difference between tropical and temperate oceans at which of the following depths?
- A. 250 m
 - B. 500 m
 - C. 625 m
 - D. 750 m
38. According to Table 1, the relationship between depth and ocean temperature is best described by which of the following statements?
- F. The water temperature increased with increasing depth in Region 1 only.
 - G. The water temperature decreased with increasing depth in Region 1 only.
 - H. The water temperature increased with increasing depth in Region 2 only.
 - J. The water temperature decreased with increasing depth in Region 2 only.
39. According to Figure 1 and Table 1, if water temperature measurements were taken at depths greater than 79.5 m, the total pressure at those depths would most likely:
- A. increase to 101 kPa.
 - B. increase to more than 900 kPa.
 - C. stay at 900 kPa.
 - D. decrease to less than 101 kPa.
40. According to Figures 1 and 2, the range of depths at which the temperate ocean is warmer than the tropical ocean occurs within which of the following ocean zones?
- F. Mixed
 - G. Thermocline
 - H. Bathypelagic
 - J. Deep water

END OF TEST 4

STOP! DO NOT RETURN TO A PREVIOUS TEST.

DIRECTIONS

This is a test of your writing skills. You will have forty (40) minutes to write an essay. Before you begin planning and writing your essay, read the writing prompt carefully to understand exactly what you are being asked to do. Your essay will be evaluated on the evidence it provides of your ability to express judgments by taking a position on the issue in the writing prompt; to maintain a focus on the topic throughout your essay; to develop a position by using logical reasoning and by supporting your ideas; to organize ideas in a logical way; and to use language clearly and effectively according to the conventions of standard written English.

You may use the unlined pages in this test booklet to plan your essay. These pages will not be scored. ***You must write your essay on the lined pages in the answer folder.*** Your writing on those lined pages will be scored. You may not need all the lined pages, but to ensure you have enough room to finish, do NOT skip lines. You may write corrections or additions neatly between the lines of your essay, but do NOT write in the margins of the lined pages. ***Illegible essays cannot be scored, so you must write (or print) clearly.***

If you finish before time is called, you may review your work. Lay your pencil down immediately when time is called.

DO NOT OPEN THIS BOOK UNTIL YOU ARE TOLD TO DO SO.

ACT Assessment Writing Test Prompt

Population Growth

Since the Industrial Revolution, the growth rate of Earth’s human population has increased dramatically. It took mankind until the 1800s to reach one billion, but only 120 years after that to reach two billion, and less than 40 years after that to reach three billion. We continue to increase our numbers, currently measuring in at 7.3 billion in 2015. Some express a great deal of concern about this trend, arguing that the increasing population uses more resources than the planet can provide and encourages harmful practices such as deforestation and industrial pollution. Others say that while our population is at higher numbers than ever before and the subsequent problems are very real, the issues are caused less by the actual number of people and more by the unequal distribution of resources.

Read and carefully consider these perspectives. Each suggests a particular way of thinking about human population growth.

Perspective One

Overpopulation is one of the most serious environmental issues humans face. Our increasing numbers are causing myriad problems from loss of fresh water to extinction of species to lowered life expectancy in developing countries.

Perspective Two

The number of people on Earth is not a problem. We only have 7 billion, while scientists predict our planet can support up to 10 billion. The real problem is the unequal distribution of resources. A more equitable use of water, land, food, and fuel would eliminate many of the problems we currently face.

Perspective Three

Though our population numbers are higher than they’ve ever been, this is not a cause for alarm. Our growth rate is already beginning to slow. As we approach critical mass, that decrease in rate will continue until we’re at “replacement” levels of reproduction, allowing the human race to continue without drastically increasing the overall numbers.

Essay Task

Write a unified, coherent essay in which you evaluate multiple perspectives on the issues connected with population growth. In your essay, be sure to:

- analyze and evaluate the perspectives given
- state and develop your own perspective on the issue
- explain the relationship between your perspective and those given

Your perspective may be in full agreement with any of the others, in partial agreement, or wholly different. Whatever the case, support your ideas with logical reasoning and detailed, persuasive examples.