**Fall 2016**

# PSAT/NMSQT®

Preliminary SAT/National Merit Scholarship Qualifying Test

# Practice Test #2

**Make time to take the practice test.**
It is one of the best ways to get ready for the PSAT/NMSQT.

After you have taken the practice test, score it right away at **collegeboard.org/psatscoring**.

Preliminary SAT/National Merit Scholarship Qualifying Test
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5LPT01

# Take the Practice Test

Take the practice test on the following pages to become familiar with the kinds of questions (reading, writing and language, and math) on the PSAT/NMSQT. The test you take in the fall will contain the same four parts as this practice test: (1) reading questions, (2) writing and language questions, (3) math questions you cannot use a calculator on, and (4) math questions you can use a calculator on.

Set aside about 2 hours and 45 minutes to take the entire test, and use the practice answer sheet on pages 3–6. Have your calculator available only for the Math Test – Calculator. After the test, check your answers to see how you scored.

## Get Credit for All You Know

- ☐ Use a No. 2 pencil.
- ☐ Follow instructions for marking your answers, particularly for the Math student-produced response questions.
- ☐ Mark only one answer to each question.
- ☐ Make dark marks and fill circles completely.
- ☐ Erase completely if you change a response.

## Test-Taking Strategies

Try these out when you take the practice test:

- ☐ **Focus on easy questions first.** For each correct answer you receive one point, no matter how hard or easy the question is. Beware of careless errors on questions you know how to answer.
- ☐ **You don't have to get every question right.** You can do well even though you answer some questions incorrectly.
- ☐ **Work steadily.** Don't waste time on a question that is hard for you. If you cannot answer it, mark it in your test book and go on. Go back to it later if there is time. Use a watch to help with pacing.
- ☐ **It's okay to guess**, especially if you can eliminate some of the answers. You won't lose any points if you guess incorrectly.
- ☐ **Mark your answers in the correct row of circles on the answer sheet.** Be especially careful if you skip questions.
- ☐ **For math questions 14–17 and 28–31, first write your answer in the boxes above the circles**, and then grid your answer accurately and as completely as the grid will accommodate. In the actual test, *you **must** grid the correct answer in the circles to receive credit.* If the incorrect circles are marked, the answer will be scored as incorrect, even if the right answer is given in the boxes. A common mistake is marking two circles in the same column, so be sure to double-check your grids.

### STANDARD TIMING

| | | | |
|---|---|---|---|
| Reading Test: | **60 minutes** | Math Test – No Calculator: | **25 minutes** |
| Writing and Language Test: | **35 minutes** | Math Test – Calculator: | **45 minutes** |

### SCORING

| | |
|---|---|
| Each correct answer: | One point |
| Wrong/blank answers: | No points lost |

### GUESSING

There is no penalty for wrong answers, so it makes sense to give the best answer you can to every question, even if it is just your best guess.

### MARKING ANSWERS

Make sure each mark is dark and completely fills the circle. If you erase, do so completely. You may use the test book for scratch work, but for the actual test you will not receive credit for anything you write there.

### CHECKING ANSWERS

When you take the test, you may check your work on a particular section if you finish it before time is called, but *you may not turn to any other section.*

For information on how to score your practice test, go to: **collegeboard.org/psatscoring**

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## PSAT/NMSQT PRACTICE ANSWER SHEET

COMPLETE MARK ● EXAMPLES OF INCOMPLETE MARKS

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### TEST NUMBER

**ENTER TEST NUMBER**

For instance, for Practice Test #1, fill in the circle for 0 in the **first column** and for 1 in the **second column.**

| | | |
|---|---|---|
| | ○ | ○ |
| 0 | ○ | ○ |
| 1 | ○ | ○ |
| 2 | ○ | ○ |
| 3 | ○ | ○ |
| 4 | ○ | ○ |
| 5 | ○ | ○ |
| 6 | ○ | ○ |
| 7 | ○ | ○ |
| 8 | ○ | ○ |
| 9 | ○ | ○ |

### SECTION 1

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A ○ | B ○ | C ○ | D ○ | 13 | A ○ | B ○ | C ○ | D ○ | 25 | A ○ | B ○ | C ○ | D ○ | 37 | A ○ | B ○ | C ○ | D ○ |
| 2 | A ○ | B ○ | C ○ | D ○ | 14 | A ○ | B ○ | C ○ | D ○ | 26 | A ○ | B ○ | C ○ | D ○ | 38 | A ○ | B ○ | C ○ | D ○ |
| 3 | A ○ | B ○ | C ○ | D ○ | 15 | A ○ | B ○ | C ○ | D ○ | 27 | A ○ | B ○ | C ○ | D ○ | 39 | A ○ | B ○ | C ○ | D ○ |
| 4 | A ○ | B ○ | C ○ | D ○ | 16 | A ○ | B ○ | C ○ | D ○ | 28 | A ○ | B ○ | C ○ | D ○ | 40 | A ○ | B ○ | C ○ | D ○ |
| 5 | A ○ | B ○ | C ○ | D ○ | 17 | A ○ | B ○ | C ○ | D ○ | 29 | A ○ | B ○ | C ○ | D ○ | 41 | A ○ | B ○ | C ○ | D ○ |
| 6 | A ○ | B ○ | C ○ | D ○ | 18 | A ○ | B ○ | C ○ | D ○ | 30 | A ○ | B ○ | C ○ | D ○ | 42 | A ○ | B ○ | C ○ | D ○ |
| 7 | A ○ | B ○ | C ○ | D ○ | 19 | A ○ | B ○ | C ○ | D ○ | 31 | A ○ | B ○ | C ○ | D ○ | 43 | A ○ | B ○ | C ○ | D ○ |
| 8 | A ○ | B ○ | C ○ | D ○ | 20 | A ○ | B ○ | C ○ | D ○ | 32 | A ○ | B ○ | C ○ | D ○ | 44 | A ○ | B ○ | C ○ | D ○ |
| 9 | A ○ | B ○ | C ○ | D ○ | 21 | A ○ | B ○ | C ○ | D ○ | 33 | A ○ | B ○ | C ○ | D ○ | 45 | A ○ | B ○ | C ○ | D ○ |
| 10 | A ○ | B ○ | C ○ | D ○ | 22 | A ○ | B ○ | C ○ | D ○ | 34 | A ○ | B ○ | C ○ | D ○ | 46 | A ○ | B ○ | C ○ | D ○ |
| 11 | A ○ | B ○ | C ○ | D ○ | 23 | A ○ | B ○ | C ○ | D ○ | 35 | A ○ | B ○ | C ○ | D ○ | 47 | A ○ | B ○ | C ○ | D ○ |
| 12 | A ○ | B ○ | C ○ | D ○ | 24 | A ○ | B ○ | C ○ | D ○ | 36 | A ○ | B ○ | C ○ | D ○ | | | | | |

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## PSAT/NMSQT PRACTICE ANSWER SHEET

COMPLETE MARK ● EXAMPLES OF INCOMPLETE MARKS

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### SECTION 2

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | | A | B | C | D | | A | B | C | D | | A | B | C | D |
| 1 | ○ | ○ | ○ | ○ | 10 | ○ | ○ | ○ | ○ | 19 | ○ | ○ | ○ | ○ | 28 | ○ | ○ | ○ | ○ | 37 | ○ | ○ | ○ | ○ |
| 2 | ○ | ○ | ○ | ○ | 11 | ○ | ○ | ○ | ○ | 20 | ○ | ○ | ○ | ○ | 29 | ○ | ○ | ○ | ○ | 38 | ○ | ○ | ○ | ○ |
| 3 | ○ | ○ | ○ | ○ | 12 | ○ | ○ | ○ | ○ | 21 | ○ | ○ | ○ | ○ | 30 | ○ | ○ | ○ | ○ | 39 | ○ | ○ | ○ | ○ |
| 4 | ○ | ○ | ○ | ○ | 13 | ○ | ○ | ○ | ○ | 22 | ○ | ○ | ○ | ○ | 31 | ○ | ○ | ○ | ○ | 40 | ○ | ○ | ○ | ○ |
| 5 | ○ | ○ | ○ | ○ | 14 | ○ | ○ | ○ | ○ | 23 | ○ | ○ | ○ | ○ | 32 | ○ | ○ | ○ | ○ | 41 | ○ | ○ | ○ | ○ |
| 6 | ○ | ○ | ○ | ○ | 15 | ○ | ○ | ○ | ○ | 24 | ○ | ○ | ○ | ○ | 33 | ○ | ○ | ○ | ○ | 42 | ○ | ○ | ○ | ○ |
| 7 | ○ | ○ | ○ | ○ | 16 | ○ | ○ | ○ | ○ | 25 | ○ | ○ | ○ | ○ | 34 | ○ | ○ | ○ | ○ | 43 | ○ | ○ | ○ | ○ |
| 8 | ○ | ○ | ○ | ○ | 17 | ○ | ○ | ○ | ○ | 26 | ○ | ○ | ○ | ○ | 35 | ○ | ○ | ○ | ○ | 44 | ○ | ○ | ○ | ○ |
| 9 | ○ | ○ | ○ | ○ | 18 | ○ | ○ | ○ | ○ | 27 | ○ | ○ | ○ | ○ | 36 | ○ | ○ | ○ | ○ | | | | | |

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### SECTION 3

| | A | B | C | D |
|---|---|---|---|---|
| 1 | ○ | ○ | ○ | ○ |
| 2 | ○ | ○ | ○ | ○ |
| 3 | ○ | ○ | ○ | ○ |
| 4 | ○ | ○ | ○ | ○ |
| 5 | ○ | ○ | ○ | ○ |
| 6 | ○ | ○ | ○ | ○ |
| 7 | ○ | ○ | ○ | ○ |
| 8 | ○ | ○ | ○ | ○ |
| 9 | ○ | ○ | ○ | ○ |
| 10 | ○ | ○ | ○ | ○ |
| 11 | ○ | ○ | ○ | ○ |
| 12 | ○ | ○ | ○ | ○ |
| 13 | ○ | ○ | ○ | ○ |

Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

| 14 | 15 | 16 | 17 |
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| 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 |

NO CALCULATOR ALLOWED

Did you know that you can print out these test sheets from the web? Learn more at sat.org/scoring.

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## PSAT/NMSQT PRACTICE ANSWER SHEET

COMPLETE MARK ● EXAMPLES OF INCOMPLETE MARKS

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### SECTION 4

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | A B C D | 7 | A B C D | 13 | A B C D | 19 | A B C D | 25 | A B C D |
| 2 | A B C D | 8 | A B C D | 14 | A B C D | 20 | A B C D | 26 | A B C D |
| 3 | A B C D | 9 | A B C D | 15 | A B C D | 21 | A B C D | 27 | A B C D |
| 4 | A B C D | 10 | A B C D | 16 | A B C D | 22 | A B C D | | |
| 5 | A B C D | 11 | A B C D | 17 | A B C D | 23 | A B C D | | |
| 6 | A B C D | 12 | A B C D | 18 | A B C D | 24 | A B C D | | |

Only answers that are gridded will be scored. You will not receive credit for anything written in the boxes.

| 28 | 29 | 30 | 31 |
|---|---|---|---|
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| 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 |

CALCULATOR ALLOWED

If you're using our mobile app keep in mind that bad lighting and even shadows cast over the answer sheet can affect your score. Be sure to scan this in a well-lit area for best results.

# Reading Test

## 60 MINUTES, 47 QUESTIONS

**Turn to Section 1 of your answer sheet to answer the questions in this section.**

**DIRECTIONS**

Each passage or pair of passages below is followed by a number of questions. After reading each passage or pair, choose the best answer to each question based on what is stated or implied in the passage or passages and in any accompanying graphics (such as a table or graph).

**Questions 1-9 are based on the following passage.**

This passage is adapted from Mark Slouka, *Brewster: A Novel*. ©2013 by Mark Slouka.

This was a time trial, he said—a one-mile time trial, four laps—not a race. It was meant to give an idea of where we stood, no more.

Line
5 We'd gathered around the middle of the long side of the track, just ten or twelve of us, including three others who seemed new like me, jogging back and forth in the wind, loosening up. The rest had walked over to the other side of the field.

Falvo took me aside. "Warmed up? How're the
10 shoes?"

"Fine." In the distance I could see kids walking toward the parking lot. The sun stabbed out from under the clouds, glancing off the windshields.

He raised his voice over the wind. "All right, I
15 want you all to stay contained, stay smooth. I don't want to see anybody draining the well today—that means you, Mr. McCann." A tall, tough-looking kid with red hair and a tight face smiled like a gunslinger.

He turned to me. "I don't want you doing
20 anything stupid, Mosher. Some of these boys have been at it for a while. Don't think about them, think about yourself."

I shrugged.

"Pace yourself. Let them do what they do. They'll
25 be about thirty yards ahead after the first lap. Don't worry about them. Go out slow, feel your way, then bring it home as best you can. OK?"

"Sure," I said.

"Remember, it's a time trial. Not a race."

_____

30 There was no starting gun. We lined up in the gusty wind, Falvo standing in the soggy infield in his dress shoes holding his clipboard like a small high table against his chest with his left hand and his stopwatch in his right and then he barked, "Runners
35 . . . marks? Go!"

They didn't run, they flowed—the kid in the headband, the red-headed kid, and two or three others in particular—with a quiet, aggressive, sustained power that looked like nothing but felt
40 like murder and I was with them and then halfway through the third turn they were moving away smooth as water and I could hear them talking among themselves, and I was slowing, burning, leaning back like there was a rope around my neck.
45 "Too fast, Mosher, too fast," I heard Falvo yelling, and his ax-sharp face came out of nowhere looking almost frantic and then it was gone and there was just the sound of my breathing and the crunch of my sneakers slapping the dirt. The group, still in a tight
50 cluster, wasn't all that far ahead of me.

By the end of the second lap I heard someone far away yelling "Stop, Mosher, that's enough," and then at some point someone else calling "Coming through—inside," and they passed me like a single
55 mass, all business now, and I remember staggering after them, gasping, drowning, my chest, my legs, my throat filling with lead and looking up through a fog of pain just in time to see the kid with the headband, halfway down the backstretch, accelerating into a
60 sustained, powerful sprint.

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CONTINUE

I don't know why. I can't explain it. By the end of the third lap I was barely moving, clawing at the air, oblivious to everything except the dirt unfolding endlessly in front of me. "Let him go," I heard somebody say. They'd all finished by then, recovered, and now stood watching as I staggered past them like something shot. "C'mon . . . " I heard someone start to call out uneasily, and then, "What's his name?" A small crowd, I found out later, sensing something going on, had gathered by the fence to the parking lot. The last of the newcomers had passed me long ago.

I remember seeing him appear in front of me like I was coming up from underwater and trying to swerve but I was barely standing and I walked right into him and he caught me as I fell, his one good arm around my back, saying over and over, "All right, easy now, easy, you're done, keep walking, walk it off," like he was gentling a horse. I threw up on the infield grass.

"What we have here," he was saying, "is a failure to communicate. Stay within yourself, I said. Don't drain the well, I said."

"What did I get?" I couldn't seem to hold my head up, or open my eyes—the pain kept coming in waves.

"What?"

"Time. What time did I get?"

He laughed—that bitter Falvo laugh—ha!—like he'd just been vindicated. "He wants to know what he got," he said, like there was somebody with us. "You want to know what you got? I'll tell you what you got: proof you could beat yourself senseless—something I very much doubt you needed."

**1**

Based on the passage, which character would most likely agree with the idea that, when trying something new, it is best not to push one's limits?

A) Falvo

B) McCann

C) Mosher

D) The person who said "Let him go"

**2**

Which choice provides the best evidence for the answer to the previous question?

A) Lines 14-17 ("All right . . . McCann")

B) Lines 19-22 ("He turned . . . yourself")

C) Lines 55-60 ("I remember . . . sprint")

D) Lines 76-79 ("he caught . . . horse")

**3**

In the context of Falvo's instructions to the runners, the main purpose of lines 24-27 ("Pace . . . OK") is to

A) provide useful general information to the group.

B) emphasize and elaborate on advice given earlier.

C) introduce a philosophy applicable to sports and life.

D) reveal Falvo's underlying motivation.

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CONTINUE

4

In the context of the passage, "I shrugged" (line 23) and "'Sure,' I said" (line 28) mainly serve to show the narrator's

A) shyness.

B) dismissiveness.

C) dishonesty.

D) hostility.

5

Based on the passage, how did the experienced runners respond to Falvo's advice?

A) They enthusiastically embraced it.

B) They acted like they hadn't heard it.

C) They generally accepted it.

D) They only pretended to take it seriously.

6

What does the narrator say about his motivation for performing as he did in the time trial?

A) That he was determined to keep up with the other runners

B) That he wanted to prove something to himself

C) That he wished to improve on his previous time

D) That he was unable to provide a reason for his behavior

7

Which choice provides the best evidence for the answer to the previous question?

A) Lines 36-39 ("They didn't . . . power")

B) Line 61 ("I don't . . . explain it")

C) Lines 73-76 ("I remember . . . into him")

D) Lines 91-94 ("I'll . . . needed")

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CONTINUE

8

Based on the passage, when Falvo says, "Don't drain the well" (line 83), he most probably means

A) don't use up all of your energy.

B) don't get sick.

C) don't try to outdo one another.

D) don't quit before you're finished.

9

As used in line 89, "vindicated" most nearly means

A) avenged.

B) set free.

C) defended against.

D) proven right.

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CONTINUE

**Questions 10-18 are based on the following passage and supplementary material.**

This passage is adapted from Moisés Naím, *The End of Power: From Boardrooms to Battlefields and Churches to States, Why Being in Charge Isn't What It Used to Be*. ©2013 by Moisés Naím.

The number of democracies in the world today is unprecedented. And remarkably, even the remaining autocratic countries are less authoritarian than
Line before, with electoral systems gaining strength and
5 people empowered by new forms of contestation that repressive rulers are poorly geared to suppress. Local crises and setbacks are real, but the global trend is strong: power continues to flow away from autocrats and become more fleeting and dispersed.

10 The data confirm this transformation: 1977 was the high-water mark of authoritarian rule, with 90 authoritarian countries. A respected source, Freedom House, assessed whether countries are electoral democracies, based on whether they hold
15 elections that are regular, timely, open, and fair, even if certain other civic and political freedoms may be lacking. In 2011 it counted 117 of 193 surveyed countries as electoral democracies. Compare that with 1989, when only 69 of 167 countries made the
20 grade. Put another way, the proportion of democracies in the world increased by just over half in only two decades.

What caused this global transformation? Obviously local factors were at work, but scholar
25 Samuel Huntington noted some big forces as well. Poor economic management by many authoritarian governments eroded their popular standing. A rising middle class demanded better public services, greater participation, and eventually more political freedom.
30 Western governments and activists encouraged dissent and held out rewards for reform, such as membership in NATO or the EU or access to funds from international financial institutions. A newly activist Catholic Church under Pope John Paul II
35 empowered opposition in Poland, El Salvador, and the Philippines. Above all, success begat success, a process accelerated by the new reach and speed of mass media. As news of democratic triumphs spread from country to country, greater access to media by
40 increasingly literate populations encouraged emulation. In today's digital culture, the force of that factor has exploded.

There have been exceptions, of course—not just countries where democracy has yet to spread but
45 others where it has experienced reversals. Larry Diamond, a leading scholar in this field, calls the stalling in recent years in countries like Russia, Venezuela, or Bangladesh a "democratic recession." Yet against this is mounting evidence that public
50 attitudes have shifted. In Latin America, for example, despite persistent poverty and inequality, and constant corruption scandals, opinion polls show greater confidence in civilian government than in the military.

55 Even autocracies are less autocratic today. According to one study of the world's democratic electoral systems, Brunei may be the only country where "electoral politics has failed to put down any meaningful roots at all." With far fewer repressive
60 regimes in the world, one might have expected the holdouts to be places where freedom and political competition are increasingly suppressed. But in fact the opposite is true. How? Elections are central to democracy but they are not the only indicator of
65 political openness. Freedom of the press, civil liberties, checks and balances that limit the power of any single institution (including that of the head of state), and other measures convey a sense of a government's grip on society. And the data show that
70 on average, even as the number of authoritarian regimes has gone down, the democracy scores of countries that remain politically closed have gone up. The sharpest improvement occurred in the early 1990s, suggesting that the same forces that pushed so
75 many countries into the democratic column at that time had profound liberalizing effects in the remaining nondemocratic countries as well.

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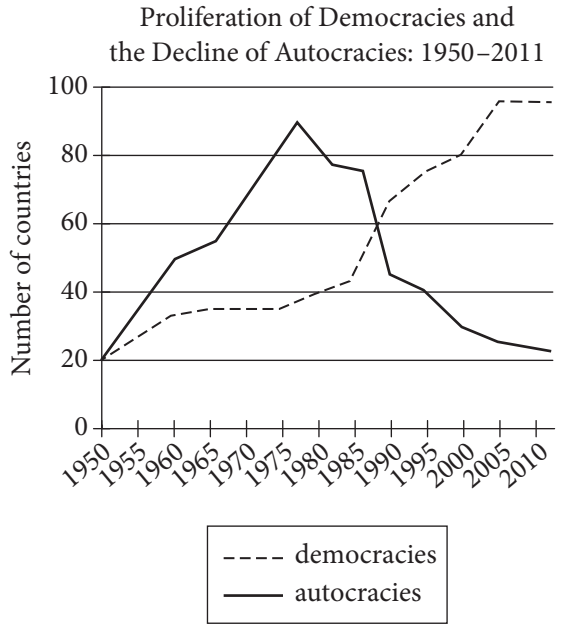
CONTINUE




Adapted from Monty G. Marshall, Keith Jaggers, and Ted Robert Gurr. "Political Regime Characteristics and Transitions, 1800–2010," Polity IV Project.

**10**

Over the course of the passage, the main focus shifts from

A) a discussion of the increase in democracies and political openness to an analysis of the causes of the increase.

B) a claim that electoral democracies have become less politically open to a discussion of the effects of the decreased openness.

C) an explanation of one set of data about a trend toward political openness to an explanation of a conflicting set of data.

D) a positive portrayal of democracy to a strong denunciation of autocracy.

**11**

As used in line 20, "put" most nearly means

A) imposed.

B) placed.

C) incited.

D) stated.

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CONTINUE

12

As used in line 31, "held out" most nearly means

A) resisted.

B) awaited.

C) avoided.

D) offered.

13

Which choice best supports the claim that increased political openness is a widespread, global trend?

A) Line 23 ("What . . . transformation")

B) Lines 26-27 ("Poor . . . standing")

C) Lines 41-42 ("In today's . . . exploded")

D) Lines 56-59 ("According . . . all")

14

The passage characterizes the state of political openness in autocratic regimes as unexpected in that

A) instead of becoming more oppressive, autocracies are becoming more democratic.

B) data indicate that the regimes are becoming less democratic, while opinion polls indicate that the public believes regimes are becoming more democratic.

C) despite the recent, well-publicized trend toward democratization, there have been many local setbacks.

D) in a reversal of the trend over the last decade, political openness in autocracies is on the decline.

15

Which choice provides the best evidence for the answer to the previous question?

A) Lines 18-22 ("Compare . . . decades")

B) Lines 46-50 ("Larry . . . shifted")

C) Lines 59-63 ("With far . . . true")

D) Lines 73-77 ("The sharpest . . . well")

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CONTINUE

16

Which of the following is cited in the passage as an indicator of political openness?

A) A strong head of state

B) Freedom of the press

C) Confidence in the military

D) Presence of a digital culture

17

According to the graph, the number of autocracies in 1975 was less than the number of

A) democracies in 1950.

B) democracies in 1995.

C) autocracies in 2011.

D) democracies in 2011.

18

According to the graph, the number of democracies was roughly equal to the number of autocracies in which of the following ranges?

A) 1975–1980

B) 1985–1990

C) 1995–2000

D) 2005–2010

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CONTINUE

**Questions 19-28 are based on the following passage and supplementary material.**

This passage is adapted from Bettina Boxall, "Yellowstone Wolves Boost Berry Diet for Grizzlies, Study Says." ©2013 by Los Angeles Times.

In another example of how the return of a top predator can have far-reaching ecological effects, researchers have found that the reintroduction of the gray wolf to Yellowstone National Park has boosted an important food source for the threatened grizzly bear. A study published in the Journal of Animal Ecology is essentially a tale of who eats what.

When wolves were reintroduced to the park in 1995 after a 70-year absence, they preyed on elk herds that browsed trees and shrubs.The elk population, which had exploded without the wolves, dropped. The over-browsed plants began to rebound, including berry-producing shrubs that provide nutritious summer meals for grizzlies when they are fattening up for hibernation.

"The grizzly bear uses some of the same plants that the prey of the wolf uses," said William Ripple, an Oregon State University professor of forest ecosystems and lead author of the study. "The reintroduction of one top predator is potentially affecting another top predator through this food web."

Ripple and his fellow researchers at OSU and Washington State University compared the frequency of fruit found in grizzly bear scat (animal fecal droppings) to elk numbers before and after wolf introduction. Over a 19-year period, they found that the average proportion of fruit in grizzly scat rose significantly after wolves returned to Yellowstone and the elk population fell. The scientists examined and rejected other possible explanations for the smaller, pre-wolf proportion of fruit in grizzly diets—such as climate influences or the operation of open-pit garbage dumps that served as bear mess halls before the last one was closed in 1970.

Previous research by Ripple and colleagues has demonstrated other ways in which the gray wolf's return has had a cascading effect in the Greater Yellowstone Ecosystem, the wildest in the lower 48 states. Ripple's work was the first to show that aspens declined after wolves were eliminated from the park in the 1920s. When wolves returned and drove down the elk numbers, scientists saw a resurgence of aspen, cottonwood, and willows in some parts of the park that has led to an increase in beavers.

"We're in the early stages of this ecosystem recovery. This is what we call passive restoration," Ripple said. "We put the wolf back in and then we let nature take its course." In the case of the grizzly, the paper's authors said increasing berry production could help make up for the loss of another bear food threatened by climate change, whitebark pine nuts. The Yellowstone region's whitebark pines have been dying en masse, the victim of beetle kills promoted by milder winters. Wildlife biologists worry the diminishing nut crop could hurt grizzly survival.

Ripple cautioned that it will take time for berry-producing shrubs to regrow."It may not be a panacea or a big silver bullet as a food item for the grizzlies."

The wolf-bear connection in Yellowstone offers a broader lesson, Ripple said. "We should be looking much farther and much more holistically at large mammal or predator management," he suggested. "There could be far reaching effects that we have not considered in the past. And they can be very important."

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CONTINUE

Annual Counts of Northern Yellowstone Elk and Wolves and the Ratio of Wolves per 1,000 Elk, 1986–2004

| Year | Winter elk count | Wolf numbers | Wolf/elk ratio |
|---|---|---|---|
| 1986 | 16,286 | 0 | 0 |
| 1987 | 17,007 | 0 | 0 |
| 1988 | 18,913 | 0 | 0 |
| 1989 | *10,265 | 0 | 0 |
| 1990 | 14,829 | 0 | 0 |
| 1991 | *9,465 | 0 | 0 |
| 1992 | 12,859 | 0 | 0 |
| 1993 | 17,585 | 0 | 0 |
| 1994 | 19,045 | 0 | 0 |
| 1995 | 16,791 | 0 | 0 |
| 1996 | —** | 21 | —** |
| 1997 | —** | 24 | —** |
| 1998 | 11,736 | 32 | 2.73 |
| 1999 | 11,742 | 48 | 4.09 |
| 2000 | 14,539 | 44 | 3.03 |
| 2001 | 13,400 | 72 | 5.37 |
| 2002 | 11,969 | 77 | 6.43 |
| 2003 | 9,215 | 84 | 9.12 |
| 2004 | 8,335 | 106 | 12.72 |

*Poor counting conditions; count is likely a substantial underestimate.
**Elk count not available in 1996 and 1997.

Adapted from Patrick J. White and R. A. Garrott, "Northern Yellowstone Elk after Wolf Restoration." ©2005 by John Wiley & Sons, Inc.

**19**

The main purpose of the passage is to

A) discuss an ecological phenomenon.
B) analyze a scientific experiment.
C) resolve an environmental debate.
D) draw attention to a historic discovery.

**20**

According to the passage, what was a direct result of the drop in the elk population at Yellowstone National Park?

A) An investigation of the grizzly bear population
B) A decrease in the number of aspen trees
C) An increase in fruit-bearing plants
D) A surge in the wolf population

**21**

Which choice provides the best evidence for the answer to the previous question?

A) Lines 6-7 ("A study . . . what")
B) Lines 12-15 ("The over-browsed . . . hibernation")
C) Lines 42-46 ("When . . . beavers")
D) Lines 49-50 ("We put . . . course")

**22**

According to the passage, one potential challenge to the survival of the grizzly bear population in Yellowstone National Park is a shortage of

A) elk.
B) beetles.
C) cottonwood trees.
D) whitebark pine trees.

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CONTINUE

**23**

Which choice provides the best evidence for the answer to the previous question?

A) Lines 27-30 ("Over . . . fell")

B) Lines 50-53 ("In the . . . nuts")

C) Lines 59-60 ("Ripple . . . regrow")

D) Lines 60-62 ("It may . . . grizzlies")

**24**

As used in line 10, "browsed" most nearly means

A) inspected.

B) skimmed.

C) destroyed.

D) grazed.

**25**

Which choice most closely captures the meaning of the figurative "big silver bullet" referred to in line 61?

A) Unexpected outcome

B) Tempting choice

C) Definitive solution

D) Dangerous event

**26**

The main purpose of the final paragraph of the passage is to

A) advise the reader of some potential limitations of Ripple's conclusions about the nutritional needs of the grizzly bear.

B) extend the implications of the relationship between wolves and grizzlies in a particular environment to other animals and contexts.

C) describe a certain experiment that Ripple will be undertaking in the future to corroborate his findings.

D) suggest the potential ramifications of reintroducing another species into an already fragile ecosystem.

**27**

According to the table, the wolf/elk ratio experienced a decrease between which of the following years?

A) 1998 and 1999

B) 1999 and 2000

C) 2000 and 2001

D) 2003 and 2004

**28**

Which claim from the passage is most directly supported by the data given in the table?

A) Elk numbers in Yellowstone National Park showed an overall decline as a result of the introduction of wolves.

B) Elk numbers in Yellowstone National Park declined every year following the introduction of wolves.

C) Elk numbers in Yellowstone National Park in any given year decreased as the ratio of wolves to elk that year increased.

D) Elk numbers in Yellowstone National Park stabilized after an initial decline as wolf population numbers stabilized.

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CONTINUE

**Questions 29-38 are based on the following passages.**

Passage 1 is adapted from Henry David Thoreau, "Resistance to Civil Government." Originally published in 1849. Passage 2 is adapted from Martin Luther King, Jr., "Letter from Birmingham Jail." ©1986 by the Estate of Martin Luther King, Jr. Thoreau wrote at a time when slavery was legal in the United States. In 1963, King was arrested while protesting racial segregation in Birmingham, Alabama; he wrote this letter while in jail.

**Passage 1**

Must the citizen ever for a moment, or in the least degree, resign his conscience to the legislator? Why has every man a conscience, then? I think that we should be men first, and subjects afterward. It is not desirable to cultivate a respect for the law, so much as for the right. The only obligation which I have a right to assume is to do at any time what I think right. It is truly enough said that a corporation has no conscience; but a corporation of conscientious men is a corporation *with* a conscience. Law never made men a whit more just; and, by means of their respect for it, even the well-disposed are daily made the agents of injustice. . . .

The mass of men serve the state . . . not as men mainly, but as machines, with their bodies. They are the standing army, and the militia, jailers, constables, . . . etc. In most cases there is no free exercise whatever of the judgment or of the moral sense; but they put themselves on a level with wood and earth and stones; and wooden men can perhaps be manufactured that will serve the purpose as well. Such command no more respect than men of straw or a lump of dirt. They have the same sort of worth only as horses and dogs. Yet such as these even are commonly esteemed good citizens. Others, as most legislators, politicians, lawyers, ministers, and office-holders, serve the state chiefly with their heads; and, as they rarely make any moral distinctions, they are as likely to serve the devil, without *intending* it, as God. A very few, as heroes, patriots, martyrs, reformers in the great sense, and *men*, serve the state with their consciences also, and so necessarily resist it for the most part; and they are commonly treated as enemies by it. . . .

How does it become a man to behave toward this American government to-day? I answer, that he cannot without disgrace be associated with it. I cannot for an instant recognize that political organization as *my* government which is the *slave's* government also.

**Passage 2**

You express a great deal of anxiety over our willingness to break laws. This is certainly a legitimate concern. Since we so diligently urge people to obey the Supreme Court's decision of 1954 outlawing segregation in the public schools, at first glance it may seem rather paradoxical for us consciously to break laws. One may well ask: "How can you advocate breaking some laws and obeying others?" The answer lies in the fact that there are two types of laws: just and unjust. I would be the first to advocate obeying just laws. One has not only a legal but a moral responsibility to obey just laws. Conversely, one has a moral responsibility to disobey unjust laws. I would agree with St. Augustine that "an unjust law is no law at all."

Now, what is the difference between the two? How does one determine whether a law is just or unjust? A just law is a man-made code that squares with the moral law or the law of God. An unjust law is a code that is out of harmony with the moral law. To put it in the terms of St. Thomas Aquinas: An unjust law is a human law that is not rooted in eternal law and natural law. Any law that uplifts human personality is just. Any law that degrades human personality is unjust. All segregation statutes are unjust because segregation distorts the soul and damages the personality. It gives the segregator a false sense of superiority and the segregated a false sense of inferiority. . . . Thus it is that I can urge men to obey the 1954 decision of the Supreme Court, for it is morally right; and I can urge them to disobey segregation ordinances, for they are morally wrong. . . .

In no sense do I advocate evading or defying the law, as would the rabid segregationist [by refusing to comply with the Supreme Court ruling]. That would lead to anarchy. One who breaks an unjust law must do so openly, lovingly, and with a willingness to accept the penalty. I submit that an individual who breaks a law that conscience tells him is unjust, and who willingly accepts the penalty of imprisonment in order to arouse the conscience of the community over its injustice, is in reality expressing the highest respect for law.

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CONTINUE

29

As used in line 22, "command" most nearly means

A) order.
B) dominate.
C) overlook.
D) deserve.

30

Thoreau makes which point about people who follow their consciences?

A) They often band together with other entities to form corporations.
B) They tend to have mutually antagonistic relationships with their governments.
C) They generally believe that the exercise of the moral sense is what makes them human.
D) They hold their legislators to a different moral standard than that to which they hold themselves.

31

Which choice provides the best evidence for the answer to the previous question?

A) Lines 1-2 ("Must . . . legislator")
B) Lines 7-10 ("It is . . . conscience")
C) Lines 17-21 ("In most . . . well")
D) Lines 30-34 ("A very . . . by it")

32

According to King, an unjust statute should not be

A) regarded as having moral authority.
B) broken in a manner intended to attract attention.
C) viewed as detrimental to the human spirit.
D) used to enforce obedience to moral law.

33

Which choice provides the best evidence for the answer to the previous question?

A) Lines 49-50 ("The answer . . . unjust")
B) Lines 51-52 ("One . . . laws")
C) Lines 53-55 ("one . . . all")
D) Lines 64-65 ("Any . . . unjust")

34

As used in line 57, "determine" most nearly means

A) establish.
B) regulate.
C) direct.
D) limit.

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CONTINUE

35

The primary purpose of each passage is to

A) make an argument about the relationship between the individual and the law.

B) advance a view on how laws could be made more just.

C) question a claim that the morality of actions depends on their consequences.

D) discuss a change in the nature of the state and its power over the individual.

36

Both authors would most likely agree with which statement about people who obey their government's statutes?

A) They fail to follow the guidance of their consciences.

B) They are incapable of exercising moral judgment.

C) They may not be acting in accordance with justice.

D) They value personal morality over the public good.

37

In the passages, a significant difference in how the two authors discuss morality is that Thoreau indicates that

A) very few people follow their consciences, while King indicates that most people consistently adhere to moral laws.

B) people should do what they judge to be right, while King indicates that people should follow a universal moral code.

C) the morality of an action derives from its legal status, while King indicates that morality and human law are distinct.

D) even morally good laws should be disobeyed, while King indicates that people should follow just laws.

38

Assuming that he agrees with the assertions in the final paragraph of Passage 1, King would most likely recommend which course of action to Thoreau?

A) Thoreau should obey laws upholding slavery while they are in force but should work to repeal them.

B) Thoreau should view laws upholding slavery as immoral but should not break them since doing so would lead to anarchy.

C) Thoreau should break laws upholding slavery and in doing so should neither hide his actions nor try to avoid punishment.

D) Thoreau should openly criticize laws upholding slavery but should follow them since committing a crime would degrade his personality.

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CONTINUE

**Questions 39-47 are based on the following passage.**

This passage is adapted from Ed Yong, "Gut Bacteria Allows Insect Pest to Foil Farmers." ©2013 by National Geographic Society.

Here is a lesson that we're going to be taught again and again in the coming years: Most animals are not just animals. They're also collections of microbes. If you really want to understand animals, you'll also have to understand the world of microbes inside them. In other words, zoology is ecology.

Consider the western corn rootworm—a beetle that's a serious pest of corn in the United States. The adults have strong preferences for laying eggs in corn fields, so that their underground larvae hatch into a feast of corn roots. This life cycle depends on a continuous year-on-year supply of corn. Farmers can use this dependency against the rootworm, by planting soybean and corn in alternate years. These rotations mean that rootworms lay eggs into corn fields but their larvae hatch among soybean, and die.

But the rootworms have adapted to this strategy by reducing their strong instincts for laying eggs in corn. These rotation-resistant females might lay among soybean fields, so their larvae hatch into a crop of corn.

There are almost certainly genetic differences that separate the rotation-resistant rootworms from their normal peers, but what are they? Researchers at the University of Illinois have been studying the problem since 2000 and, despite generating a vast mountain of data, have failed to find the genes in question.

"The western corn rootworm has been an enigma for a long time," says Manfredo Seufferheld. "This insect has the ability to adapt to practically all control methods deployed against it, including crop rotation. After many years of research about the mechanisms of rotation resistance, results were mostly inconclusive."

So, Seufferheld looked elsewhere. Rather than focusing on the rootworm's own genes, he studied the genes of the bacteria in its gut . . . and found some answers. The rotation-resistant varieties have very different gut bacteria from the normal ones. And when the team killed these microbes with antibiotics, they severely reduced the beetle's ability to cope with rotation.

"The bad guy in the story—the western corn rootworm—was actually part of a multi-species conspiracy," says Joe Spencer, who was part of the study.

The team, including graduate student Chia-Ching Chu, found that a third of the rootworms' gut bacteria comprise species that are unique to either the resistant or normal varieties. These two factions also differ in the relative numbers of the bacteria that they share.

These different microbes give the resistant beetles an edge when eating soybeans. The rootworms digest the protein in their meals using enzymes called cysteine proteases, and soybeans defend themselves with substances that can block these enzymes. But Chu found that the more the beetles' bacteria differed from the normal set, the higher the levels of cysteine proteases in their guts. By avoiding indigestion, these beetles were better at surviving among soybeans, and more likely to lay their eggs there.

The team proved that the bacteria were responsible by killing them with antibiotics. Sure enough, this drastically lowered the cysteine protease activity in the guts of the rotation-resistant beetles and wrecked their ability to thrive among soybeans.

**39**

Over the course of the passage, the main focus shifts from a

A) statement about the challenge posed by a particular insect to an indication of why that challenge was easy to overcome.

B) summary of a once-unexplained natural phenomenon to a biography of the scientists who researched that phenomenon.

C) description of a problem affecting agriculture to an explanation of how scientists identified the cause of that problem.

D) discussion about a scientific field to an anecdote showing how research is done in that field.

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CONTINUE

40

The statement "zoology is ecology" (line 6) mainly serves to

A) propose that two areas of scientific knowledge be merged.

B) point out that knowledge obtained in one field of research will lead to expertise in another.

C) assert a point about biological science that is supported by the example in the passage.

D) suggest that one field of scientific research has completely supplanted another.

41

According to the passage, one similarity between rotation-resistant rootworms and normal rootworms is that they both

A) reduce crop productivity by extracting nutrients from the soil.

B) produce larvae that feed on the plant roots of crops.

C) adapt to crop rotation by maintaining high levels of enzymes in their guts.

D) contain the same quantity and composition of bacteria in their guts.

42

Which choice most clearly provides information indicating how some rootworms have overcome farmers' efforts to eradicate them?

A) Lines 15-17 ("These . . . die")

B) Lines 18-20 ("But . . . corn")

C) Lines 25-28 ("Researchers . . . question")

D) Lines 41-43 ("And . . . rotation")

43

The central claim in the fourth paragraph (lines 23-35) is that

A) extensive study of the rootworm's genes was insufficient to determine why some rootworms are rotation resistant.

B) the rootworm's ability to adapt to pest control methods is unique among insects.

C) the genetic profile of rootworms is significantly more complex than researchers initially believed.

D) our current understanding of genetics is inadequate to allow researchers to understand why some rootworms are rotation resistant.

44

As used in line 24, "separate" most nearly means

A) distinguish.

B) discharge.

C) extract.

D) scatter.

45

According to the passage, the gut bacteria of rotation-resistant rootworms

A) help the rootworms survive in soybean crops.

B) are responsible for lowering the amount of cysteine protease in the rootworms' guts.

C) make the rootworms less vulnerable to being killed by antibiotics.

D) are transferred to the larvae that hatch from the rootworms' eggs.

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CONTINUE

46

Which choice provides the best evidence for the answer to the previous question?

A) Lines 29-30 ("The western . . . Seufferheld")

B) Lines 39-40 ("The rotation-resistant . . . ones")

C) Lines 44-47 ("The bad . . . study")

D) Lines 54-55 ("These . . . soybeans")

47

The main idea of the last paragraph is that

A) cysteine proteases are harmful to rootworms when present in large quantities in the body.

B) eggs laid by rotation-resistant rootworms will hatch into crops of soybeans.

C) bacteria unique to rotation-resistant rootworms allow them to digest soybeans.

D) rotation-resistant rootworms do not digest soybeans using cysteine proteases.

# STOP

**If you finish before time is called, you may check your work on this section only. Do not turn to any other section.**

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# Writing and Language Test

## 35 MINUTES, 44 QUESTIONS

**Turn to Section 2 of your answer sheet to answer the questions in this section.**

**DIRECTIONS**

Each passage below is accompanied by a number of questions. For some questions, you will consider how the passage might be revised to improve the expression of ideas. For other questions, you will consider how the passage might be edited to correct errors in sentence structure, usage, or punctuation. A passage or a question may be accompanied by one or more graphics (such as a table or graph) that you will consider as you make revising and editing decisions.

Some questions will direct you to an underlined portion of a passage. Other questions will direct you to a location in a passage or ask you to think about the passage as a whole.

After reading each passage, choose the answer to each question that most effectively improves the quality of writing in the passage or that makes the passage conform to the conventions of standard written English. Many questions include a "NO CHANGE" option. Choose that option if you think the best choice is to leave the relevant portion of the passage as it is.

**Questions 1-11 are based on the following passage.**

### For the Love of Coffee

Ever since 1 introducing coffee to Italy several centuries ago, it has been a ubiquitous part of Italian culture. 2 However, coffee is so central to Italian culture that one cannot visit any city or town in Italy without seeing several coffeehouses (called *caffetterie* in

1

A) NO CHANGE
B) they introduced coffee
C) their introduction of coffee
D) coffee was introduced

2

A) NO CHANGE
B) In fact,
C) Even so,
D) Despite this history,

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CONTINUE

Italian). Such coffeehouses have existed since 1640, when the first was established in Venice, and 3 it has since become a part of Italy's national identity. It is not uncommon in Italy for people to make two to three trips a day to their favorite *caffetteria*, and often people are so selective about their coffee that they will frequent only one establishment. But it is not simply the coffee that creates such enthusiasm for coffeehouses among those 4 which love them; the social aspect of the *caffetteria* may play nearly as great a role as the coffee itself.

3

A) NO CHANGE
B) it will
C) they have
D) they had

4

A) NO CHANGE
B) who loves
C) who love
D) whom love

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CONTINUE

Each *caffetteria* functions as a social hub in its neighborhood, and the way in which most patrons consume their coffee **5** contribute to this fact. Few *caffetteria* patrons sit at tables, since most coffeehouses in Italy charge a premium for table service, **6** although sometimes it's worth the cost to be able to sit and rest. Nor can patrons take their drinks elsewhere: to-go cups

**5**

A) NO CHANGE
B) contributes
C) contributing
D) which contributes

**6**

Which choice gives an example that most clearly supports the statement made earlier in the sentence?

A) NO CHANGE
B) a fee that can amount to three to four times as much as the price per drink.
C) which can come as a surprise to tourists who are not forewarned.
D) which simply means being waited on at your table.

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CONTINUE

are not available at typical coffeehouses. 7 Instead, most regular patrons of a *caffetteria* drink their coffee standing. They do this, often shoulder-to-shoulder, at a counter or bar. Normally, those drinking their coffee at a bar will also chat with each other and the person making coffee behind the bar. This practice, which combines social interaction with coffee drinking, is the most popular way to enjoy a cup of coffee in Italy.

7

Which choice most effectively combines the underlined sentences?

A) Instead, most regular patrons of a *caffetteria* drink their coffee standing, often shoulder-to-shoulder, at a counter or bar.

B) Instead, most regular patrons of a *caffetteria* drink their coffee, often standing shoulder-to-shoulder, which they do at a counter or bar.

C) Instead, most regular patrons of a *caffetteria* drink their coffee; they do it often standing shoulder-to-shoulder at a counter or bar.

D) Most regular patrons of a *caffetteria* drink their coffee shoulder-to-shoulder at a counter or bar, standing there instead.

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CONTINUE

8 Indeed, many Italian coffee enthusiasts agree that there is only one 9 correct way to make coffee: this involves filtering water through freshly ground coffee beans at specific temperatures and pressures, which produces the concentrated form of coffee known as espresso. This type of coffee is drunk in Italy in several

**8**

Which choice best introduces the paragraph?

A) Coffee consumption does not necessarily have to take place in a *caffetteria*; espresso-based drinks can also be made in the home.

B) In Italy, the fervor for the coffee-drinking experience extends beyond the drinking of coffee to the making of it and the timing of its consumption.

C) There are as many different ways to make coffee in Italy as there are coffee drinkers, and there is little agreement about which way is best.

D) Not all Italians share in this enthusiasm for coffee, of course.

**9**

A) NO CHANGE

B) correct and proper

C) properly correct

D) appropriate and correct

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CONTINUE

forms, either unadulterated or with varying amounts of milk, and each form has a different name. An espresso mixed with frothed and steamed milk **10** is a cappuccino: for example, while an espresso with just a dollop of steamed milk on top is a caffè macchiato. There are also respected traditions about when these different coffee drinks should be consumed: while cappuccino is a popular morning drink, espresso, either plain or diluted with water, is usually the drink of choice for coffee drinkers in Italy in the afternoon and evening. **11**

**10**

A) NO CHANGE
B) is a cappuccino, for example:
C) is, a cappuccino for example—
D) is a cappuccino, for example,

**11**

At this point, the writer is considering adding the following sentence.

> These espresso-based coffee drinks have become increasingly popular in the United States over the past several decades.

Should the writer make this addition here?

A) Yes, because it adds force to the writer's argument about the popularity of coffeehouses in Italy.
B) Yes, because it elaborates on the statement in the previous sentence about different types of drinks.
C) No, because it suggests that coffee drinking is not as popular in Italy as the writer claims it is.
D) No, because it digresses from the main topic of how coffee is regarded in Italy.

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CONTINUE

**Questions 12-22 are based on the following passage and supplementary material.**

**A Study in Arctic Migration**

Each year, many species of shorebirds migrate from locations in the Southern Hemisphere to their breeding grounds in the **12** Arctic. A journey of thousands of kilometers that requires frequent stops to fuel up. The risk of death is significant, and the Arctic is an inhospitable region for most of the **13** year, yet the shorebirds never failing to make their annual pilgrimage.

Come spring, the Arctic becomes a suitable habitat, providing many benefits: an abundant supply of food, permanent daylight, ample nesting space, fewer pathogens, and fewer predators to invade the nests of these ground-dwelling birds. These benefits are found in all regions of the **14** Arctic regardless of latitude yet some shorebirds continue on to the high Arctic. If these birds are simply looking for open space and enough food to eat, then why not end their long journey in the low Arctic? Continuing on to the north requires more fuel and carries an even greater risk of **15** mortality if the birds continue on. The most likely reason certain shorebirds head to the high Arctic is to escape their predators.

**12**

A) NO CHANGE
B) Arctic, a
C) Arctic; a
D) Arctic; which is a

**13**

A) NO CHANGE
B) year, the shorebirds never fail
C) year, yet the shorebirds never fail
D) year; yet the shorebirds never failing

**14**

A) NO CHANGE
B) Arctic, regardless of latitude
C) Arctic, regardless of latitude,
D) Arctic: regardless of latitude,

**15**

A) NO CHANGE
B) mortality if they keep going.
C) mortality and death.
D) mortality.

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CONTINUE

[1] A four-year study by a team of Canadian scientists, headed by student Laura McKinnon of the Université du Québec, **16** provide evidence in support of this hypothesis. [2] The scientists created artificial nests that resembled a typical shorebird's nest. [3] Then each year, during the shorebirds' breeding season, forty of the nests were placed in each of seven locations that ranged in latitude from the low Arctic to the high Arctic. [4] Each nest had been baited with four **17** quail egg's, which are similar in size and shape to a shorebird's eggs. [5] The scientists returned to the nests many times over nine days to check how many eggs remained in the nests. [6] A nest was said to have survived if, at the end of the nine days, it contained at least one undisturbed quail egg. **18**

**16**

A) NO CHANGE
B) provides
C) are providing
D) have provided

**17**

A) NO CHANGE
B) quail eggs,
C) quail eggs',
D) quails eggs,

**18**

To make this paragraph most logical, sentence 5 should be placed

A) where it is now.
B) after sentence 1.
C) after sentence 2.
D) after sentence 6.

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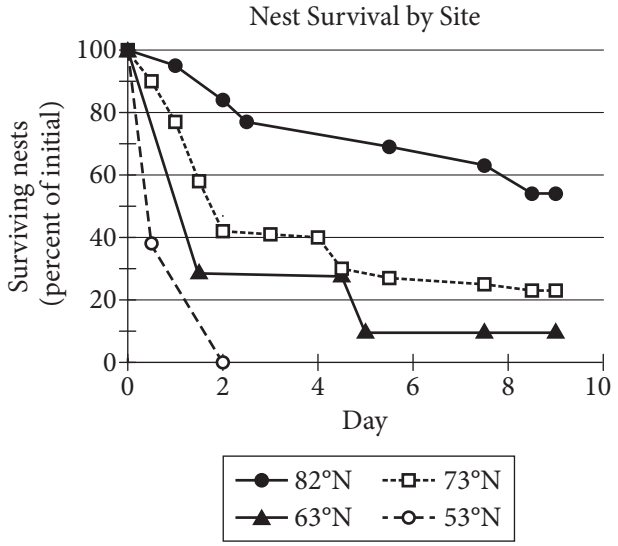
CONTINUE




Adapted from L. McKinnon et al., "Lower Predation Risk for Migratory Birds at High Latitudes." ©2010 by American Association for the Advancement of Science.

The figure shows the results for the nesting **19** sites, furthermore, at four of the seven locations, averaged over the four years of the study. The **20** number of predators invading the nests increased over time at each location. This result confirmed that predators were present at the researchers' chosen locations. The researchers found that the percent of **21** surviving nests was greater at locations having higher latitudes. For example, on day 9, approximately 55 percent of nests were found to have survived at the 82°N location compared to approximately 10 percent of nest survival at the 63°N location. This

**19**

A) NO CHANGE
B) sites
C) sites, however,
D) sites, in addition,

**20**

Which choice makes the writer's description of data represented in the figure most accurate?

A) NO CHANGE
B) numbers of predators invading the nests decreased
C) percent of surviving nests decreased
D) percent of surviving nests increased

**21**

Which choice makes the writer's description of data represented in the figure most accurate?

A) NO CHANGE
B) surviving nests was smaller
C) surviving nests remained the same
D) eggs was much lower

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CONTINUE

study provides the first known quantifiable evidence for the previously unanswered question of why shorebirds continue on to the high Arctic. 22 The shorebirds risk their own survival by flying farther. Their offspring have a better chance of survival because fewer predators invade the nests.

22

Which choice most effectively combines the underlined sentences?

A) Although the shorebirds risk their own survival by flying farther, their offspring have a better chance of survival because fewer predators invade the nests.

B) The shorebirds risk their own survival because they fly farther; in addition, their offspring have a better chance of survival because fewer predators invade the nests.

C) Flying farther and risking their own survival is what the shorebirds do, and this gives their offspring a better chance of survival because fewer predators invade the nests.

D) The shorebirds' offspring have a better chance of survival, fewer predators invade their nests, and they risk their own survival by flying farther.

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CONTINUE

**Questions 23-33 are based on the following passage.**

**Teaching the World to Swing**

In 1924, when jazz trumpeter Louis Armstrong rehearsed with Fletcher Henderson's band for the first time, he shocked Henderson by refusing to **23** bond with the score as written and playing notes at whatever volume he wanted. The other band members, who were used to playing standard dance music in meticulous, predictable arrangements, purportedly responded to Armstrong's untraditional methods with skepticism and derision. Over a short time, though, Armstrong won over Henderson and the band with his undeniably brilliant musical talent.

As band members grew to admire Armstrong's masterful **24** improvisations. They in turn began to experiment with incorporating improvised solos of their own. In one of the earliest recordings of Armstrong playing with Henderson's band, the band mainly follows the standard written arrangement of a dance song. The exceptions are a couple of short solos—not only **25** Armstrong's performances but also by saxophonist Coleman Hawkins. Not long afterward, the group's style transformed dramatically. A 1925 recording of "Sugarfoot Stomp" by Henderson's band features an extended solo by Armstrong, his trumpet blazing out against the saxophone backup. **26** Band member Howard Scott recalls a particular night at the Roseland Ballroom: "My goodness, people stopped dancing to come around and listen to him. . . . The next night you couldn't get into the place."

**23**

A) NO CHANGE
B) emulate
C) adhere to
D) cohere with

**24**

A) NO CHANGE
B) improvisations they
C) improvisations; they
D) improvisations, they

**25**

A) NO CHANGE
B) Armstrong-performed solos
C) by Armstrong
D) Armstrong solos

**26**

At this point, the writer is considering adding the following sentence.

> With these stunning solos, Armstrong became a sensation with the patrons of local dance halls.

Should the writer make this addition here?

A) Yes, because it sets up the quotation in the following sentence.
B) Yes, because it explains why Armstrong was skilled at improvisation.
C) No, because it merely repeats an idea stated earlier in the paragraph.
D) No, because it blurs the focus of the paragraph.

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CONTINUE

27 In addition to incorporating solos into its performances, the band evolved in other ways. Henderson had been working with musician and composer Don Redman to develop arrangements of songs that used a call-and-response 28 structure. According to jazz historians Gary Giddins and Scott DeVeaux, Redman acknowledged that he had, in fact, 29 adjusted and altered the structure of his musical arrangements in part to accommodate Armstrong's distinct style. Giddins and DeVeaux describe the result as

**27**

The writer wants a transition that makes a connection to the main topic of the previous paragraph. Which choice best accomplishes this goal?

A) NO CHANGE
B) Thanks to the enthusiastic patrons of New York City dance halls,
C) In addition to performing music arranged by Don Redman,
D) Despite their reputation as a somewhat conservative dance orchestra,

**28**

The writer is considering revising the underlined portion to the following.

> structure that, for example, featured a melody played by the saxophone section followed by an answer from the trumpet section.

Should the writer make this revision?

A) Yes, because it mentions the musical instrument that was associated with Armstrong.
B) Yes, because it clarifies a term used to describe Redman's arrangements.
C) No, because it interrupts the discussion of Redman's arrangements with irrelevant information.
D) No, because it diverges from the paragraph's point about Henderson.

**29**

A) NO CHANGE
B) adjusted and changed
C) adjusted, through reworking,
D) adjusted

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CONTINUE

music 30 that, "began to take on a commanding directness and sharper rhythmic gait."

Armstrong left Henderson's band in 1925. His influence, 31 for instance, is discernible in the band's later recordings. The collaboration between Armstrong and Henderson had put into motion a significant stylistic

**30**

A) NO CHANGE
B) that—
C) that
D) that:

**31**

A) NO CHANGE
B) therefore,
C) likewise,
D) however,

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CONTINUE

shift in jazz music: the polished sound of dance-hall music had given 32 away to the prominent solo features and call-and-response 33 arrangements, that would become hallmarks of the 1930s swing era music.

32

A) NO CHANGE
B) way to
C) in to
D) away for

33

A) NO CHANGE
B) arrangements, which
C) arrangements, these
D) arrangements that

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CONTINUE

**Questions 34-44 are based on the following passage.**

**Cleveland Rocks (for Artists)**

[1] It used to be that a move to a metropolis such as New York City was an inevitable step for aspiring artists. [2] Back when geography was everything, an artist had to get her painting, song, poem, or dance in front of as large an audience as possible. [3] To some degree, these tales may have been true. [4] That was much easier in a city with a teeming population. [5] Geographical proximity helped artists meet other artists, be inspired by them, and compete with them. [6] Stories of talented, ambitious young people getting by on "pluck and luck" in the big city were commonplace. [7] These days, however, they are more fiction than fact. **34**

Today the United States economy is much less forgiving. Once **35** an artist could make a living as a temporary office worker or a waiter, leaving plenty of time to practice your art. In many of the nation's largest cities, **36** therefore, this life is no longer possible. There are very few cheap, empty lofts waiting to be transformed with an attitude and a paintbrush. Real estate prices have skyrocketed, and survival, for all but the luckiest few, has

**34**

To make this paragraph most logical, sentence 3 should be placed

A) where it is now.
B) after sentence 1.
C) after sentence 4.
D) after sentence 6.

**35**

A) NO CHANGE
B) artists
C) one
D) you

**36**

A) NO CHANGE
B) however,
C) consequently,
D) for instance,

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CONTINUE

become more difficult. In many large cities, affordable theaters, jazz cafes, and art galleries are being replaced by **37** other places, including expensive restaurants, couture boutiques, and exclusive nightclubs, so there are fewer and fewer opportunities for the artist just starting out. When business leaders in New York, for example, go **38** so far as to declare the city a "luxury brand," they are not appealing to potential customers who struggle to survive as artists.

**37**

Which choice most effectively sets up the list of examples that follows in the sentence and completes the contrast introduced earlier in the sentence?

A) NO CHANGE
B) locations where artists are unlikely to spend money:
C) upscale venues such as
D) attractive options such as

**38**

A) NO CHANGE
B) too far
C) farther
D) DELETE the underlined portion.

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CONTINUE

One exception to this trend **39** is Cleveland, Ohio; a great place for young artists. Once a center for manufacturing, Cleveland still boasts a well-maintained infrastructure though many factories and jobs have moved overseas. The city is working hard to attract artists. In 2013 it hosted a "Welcome to Cleveland" weekend, providing a steep discount for hotels, paying fully for ground transportation, and offering an array of meals and free cultural events to artists who were willing to visit the city and consider **40** moving to Cleveland. Perhaps the real sign of welcome is Cleveland's artist housing plan: homes will be sold to qualifying artists at prices similar to **41** an economy car. Cleveland may be doing the most to attract the creative class, but many

**39**

A) NO CHANGE
B) is: Cleveland, Ohio, a
C) is Cleveland, Ohio—a
D) is Cleveland, Ohio (a

**40**

A) NO CHANGE
B) the possibility of a potential move to Cleveland.
C) what it would be like to move there.
D) moving there.

**41**

A) NO CHANGE
B) that of an economy car.
C) an economy car's.
D) those of economy cars.

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CONTINUE

other smaller cities, including Pittsburgh, Pennsylvania; Corvallis, Oregon; and Burlington, Vermont, are following **42** its lead. **43**

If you're an artist trying to reach an audience, move to a place where you can live well and where you are needed. Don't **44** undermine smaller cities such as Cleveland as you search for your place of inspiration.

**42**

A) NO CHANGE
B) they're
C) it's
D) their

**43**

At this point, the writer is considering adding the following sentence.

> In many cases, communities that are arts friendly are bicycle friendly too.

Should the writer add this sentence here?

A) Yes, because it adds support to the writer's stated claim that Cleveland is a great place for artists to live.
B) Yes, because it helps define the lifestyle priorities of those to whom the writer refers as the "creative class."
C) No, because it adds a loosely related detail that the writer doesn't connect to the claims made in the paragraph.
D) No, because it should be placed instead in the passage's final paragraph to support the claim that artists can live well in smaller cities.

**44**

A) NO CHANGE
B) discount
C) blow off
D) give the cold shoulder to

# STOP

**If you finish before time is called, you may check your work on this section only. Do not turn to any other section.**

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# Math Test – No Calculator

## 25 MINUTES, 17 QUESTIONS

**Turn to Section 3 of your answer sheet to answer the questions in this section.**

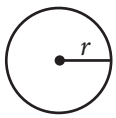
**DIRECTIONS**

**For questions 1-13**, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 14-17**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 14 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

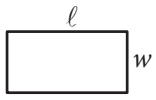
**NOTES**

1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function $f$ is the set of all real numbers $x$ for which $f(x)$ is a real number.

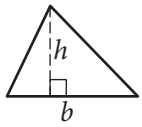
**REFERENCE**



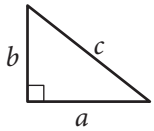

$A = \pi r^2$
$C = 2\pi r$



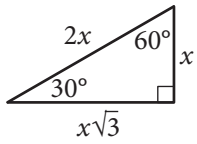

$A = \ell w$

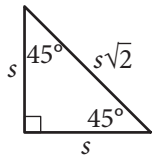



$A = \frac{1}{2}bh$

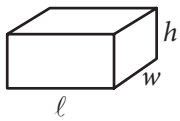



$c^2 = a^2 + b^2$

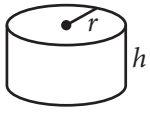



Special Right Triangles

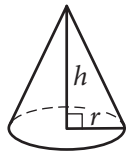



$V = \ell wh$

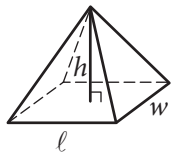



$V = \pi r^2 h$

$V = \frac{4}{3}\pi r^3$




$V = \frac{1}{3}\pi r^2 h$




$V = \frac{1}{3}\ \ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is $2\pi$.
The sum of the measures in degrees of the angles of a triangle is 180.

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CONTINUE

**1**

Which of the following is an equivalent form of the expression $15x + 24ax$ ?

A) $39ax^2$

B) $39(a + 2x)$

C) $(5 + 8a)x$

D) $(15 + 24a)x$

**2**

The formula $d = rt$ is used to calculate the distance an object travels over a period of time, $t$, at a constant rate, $r$. Based on this formula, what is the rate, $r$, in terms of $d$ and $t$ ?

A) $r = \frac{d}{t}$

B) $r = dt$

C) $r = \frac{t}{d}$

D) $r = d - t$

**3**

Which of the following ordered pairs $(x, y)$ satisfies both equations $y = x^2 + 3x - 4$ and $x = y - 4$ ?

A) $(0, -4)$

B) $(2, 6)$

C) $(3, 14)$

D) $(5, 9)$

**4**

Which of the following is a solution to the equation $2x^2 + 4x = 3 + 3x^2$ ?

A) $-1$

B) $0$

C) $3$

D) $6$

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CONTINUE

5

$$-3x - 4y = 20$$
$$x - 10y = 16$$

If $(x, y)$ is the solution to the system of equations above, what is the value of $x$ ?

A) $-14$

B) $-12$

C) $-4$

D) $16$

6

The equation $y = 36 + 18x$ models the relationship between the height $y$, in inches, of a typical golden delicious apple tree and the number of years, $x$, after it was planted. If the equation is graphed in the $xy$-plane, what is indicated by the $y$-intercept of the graph?

A) The age, in years, of a typical apple tree when it is planted

B) The height, in inches, of a typical apple tree when it is planted

C) The number of years it takes a typical apple tree to grow

D) The number of inches a typical apple tree grows each year

7

Giovanni wants to buy shirts that cost $19.40 each and sweaters that cost $24.80 each. An 8% sales tax will be applied to the entire purchase. If Giovanni buys 2 shirts, which equation relates the number of sweaters purchased, $p$, and the total cost in dollars, $y$ ?

A) $1.08(38.80 + 24.80p) = y$

B) $38.80 + 24.80p = 0.92y$

C) $38.80 + 24.80p = 1.08y$

D) $0.92(38.80 + 24.80p) = y$

8

A line is graphed in the $xy$-plane. If the line has a positive slope and a negative $y$-intercept, which of the following points cannot lie on the line?

A) $(-3, -3)$

B) $(-3, 3)$

C) $(3, -3)$

D) $(3, 3)$

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CONTINUE

9

A parachute design uses 18 separate pieces of rope. Each piece of rope must be at least 270 centimeters and no more than 280 centimeters long. What inequality represents all possible values of the total length of rope $x$, in centimeters, needed for the parachute?

A) $270 \leq x \leq 280$

B) $4{,}860 \leq x \leq 4{,}870$

C) $4{,}860 \leq x \leq 5{,}040$

D) $5{,}030 \leq x \leq 5{,}040$

10

A carpenter has \$60 with which to buy supplies. The carpenter needs to buy both nails and screws. Nails cost \$12.99 per box, and screws cost \$14.99 per box. If $n$ represents the number of boxes of nails and $s$ represents the number of boxes of screws, which of the following systems of inequalities models this situation?

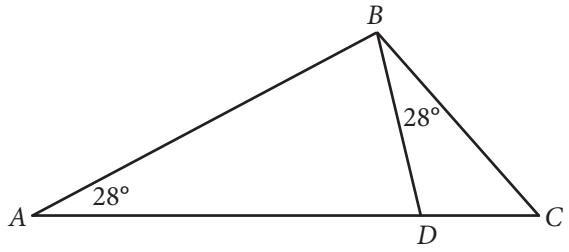
A) $\begin{cases} 12.99n + 14.99s \geq 60 \\ n + s \leq 1 \end{cases}$

B) $\begin{cases} 12.99n + 14.99s \leq 60 \\ n + s \leq 1 \end{cases}$

C) $\begin{cases} 12.99n + 14.99s \geq 60 \\ n \geq 1 \\ s \geq 1 \end{cases}$

D) $\begin{cases} 12.99n + 14.99s \leq 60 \\ n \geq 1 \\ s \geq 1 \end{cases}$

11




In the figure above, which of the following ratios has the same value as $\frac{AB}{BC}$ ?

A) $\frac{BD}{DC}$

B) $\frac{BC}{AC}$

C) $\frac{AD}{BD}$

D) $\frac{DC}{BC}$

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CONTINUE

12

$$(x^2y^3)^{\frac{1}{2}}(x^2y^3)^{\frac{1}{3}} = x^{\frac{a}{3}}y^{\frac{a}{2}}$$

If the equation above, where $a$ is a constant, is true for all positive values of $x$ and $y$, what is the value of $a$ ?

A) 2

B) 3

C) 5

D) 6

13

If the equation $y = (x - 6)(x + 12)$ is graphed in the $xy$-plane, what is the $x$-coordinate of the parabola's vertex?

A) $-6$

B) $-3$

C) 3

D) 6

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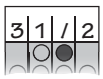
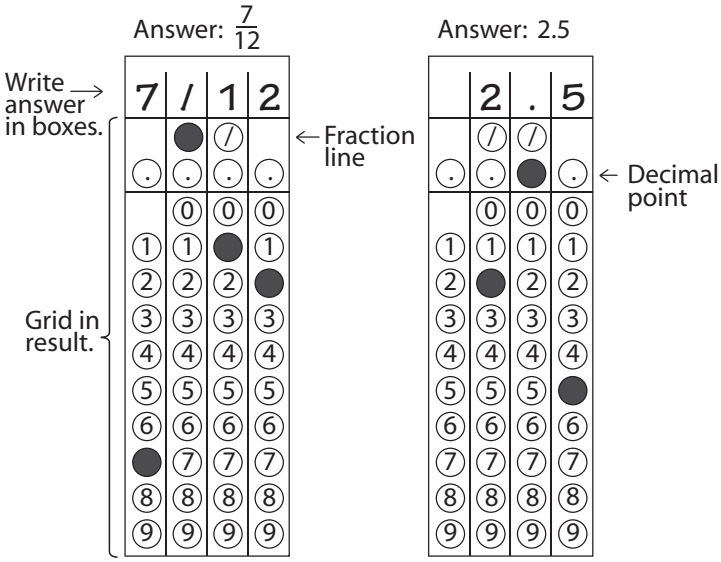
CONTINUE

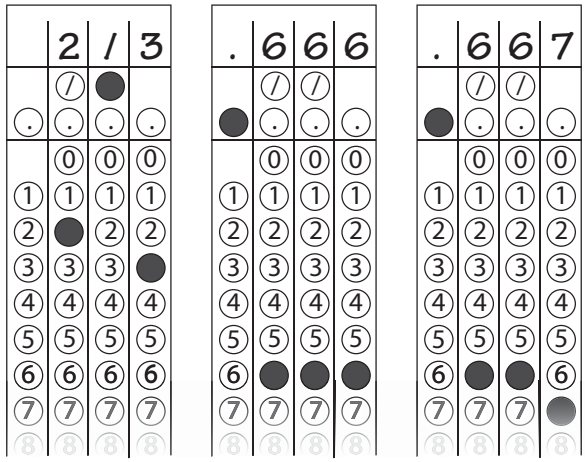
**DIRECTIONS**

**For questions 14-17,** solve the problem and enter your answer in the grid, as described below, on the answer sheet.

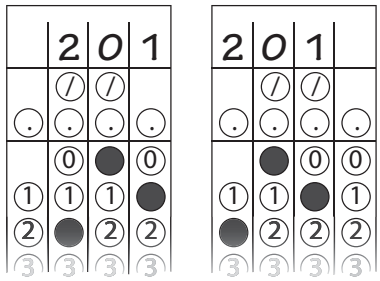
1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one correct answer. In such cases, grid only one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.




Acceptable ways to grid $\frac{2}{3}$ are:




Answer: 201 – either position is correct




**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

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CONTINUE

14

$$21x + 14 = 7(3x + a)$$

In the equation above, $a$ is a constant. For what value of $a$ does the equation have an infinite number of solutions?

15

Juliene practiced her dance routine for twice as many minutes on Monday as she did on Tuesday. She practiced her routine those two days for a total of 2 hours and 15 minutes. For how many minutes did Juliene practice her dance routine on Monday?

16

In the expression below, $a$ is an integer.

$$12x^2 + ax - 20$$

If $3x + 4$ is a factor of the expression above, what is the value of $a$ ?

17

$$(ax + by)(cx - dy)$$

In the expression above, $a$, $b$, $c$, and $d$ are non-zero constants and $ad = bc$. If $ac = 18$ and $bd = 50$, what is the value of the coefficient of the $xy$ term when the expression is multiplied out and the like terms are collected?

# STOP

**If you finish before time is called, you may check your work on this section only.**
**Do not turn to any other section.**

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# Math Test – Calculator

## 45 MINUTES, 31 QUESTIONS

**Turn to Section 4 of your answer sheet to answer the questions in this section.**

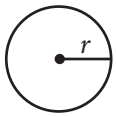
### DIRECTIONS

**For questions 1-27**, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 28-31**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 28 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

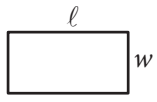
### NOTES

1. The use of a calculator **is permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function $f$ is the set of all real numbers $x$ for which $f(x)$ is a real number.

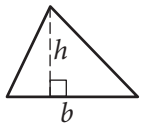
### REFERENCE



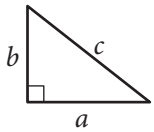

$A = \pi r^2$
$C = 2\pi r$



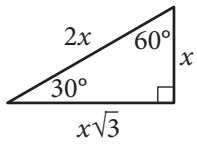

$A = \ell w$

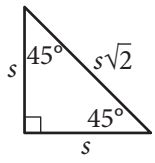



$A = \frac{1}{2}bh$

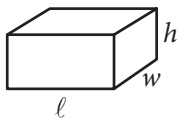



$c^2 = a^2 + b^2$

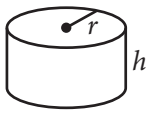



Special Right Triangles

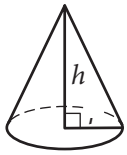



$V = \ell wh$

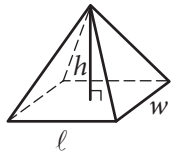



$V = \pi r^2 h$

$V = \frac{4}{3}\pi r^3$




$V = \frac{1}{3}\pi r^2 h$




$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is $2\pi$.
The sum of the measures in degrees of the angles of a triangle is 180.

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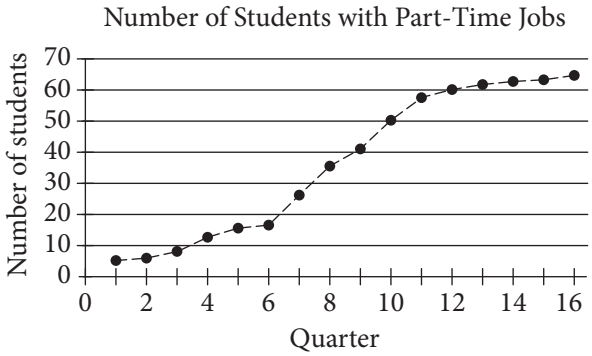
CONTINUE

1

A high school counselor conducted a study over 16 consecutive quarters to determine the number of students with part-time jobs. Each student in the 2014 graduating class is surveyed once per quarter for all four years of high school. The graph below shows the data for each quarter the survey was conducted.




During which of the following periods is the increase in the number of students with part-time jobs largest?

A) Quarters 4 through 6

B) Quarters 7 through 10

C) Quarters 11 through 14

D) Quarters 13 through 16

2

Eli saves money each month to buy a new computer. The total amount he has saved, $T$, can be calculated by the equation $T = 83 + 30m$, where $m$ is the number of months since he started saving. What does the number 83 represent in the equation?

A) The amount of money Eli started with

B) The number of months Eli has been saving

C) The amount of money Eli saves each month

D) The total amount of money Eli wants to save

3

According to the Department of Agriculture, consuming 100 grams of banana provides 0.15 milligram of zinc. Which of the following is closest to the number of milligrams of zinc provided by 140 grams of banana?

A) 0.15

B) 0.21

C) 0.25

D) 0.93

4

When the equation $y = 5x + p$, where $p$ is a constant, is graphed in the $xy$-plane, the line passes through the point $(-2, 1)$. What is the value of $p$ ?

A) $-9$

B) $-2$

C) $3$

D) $11$

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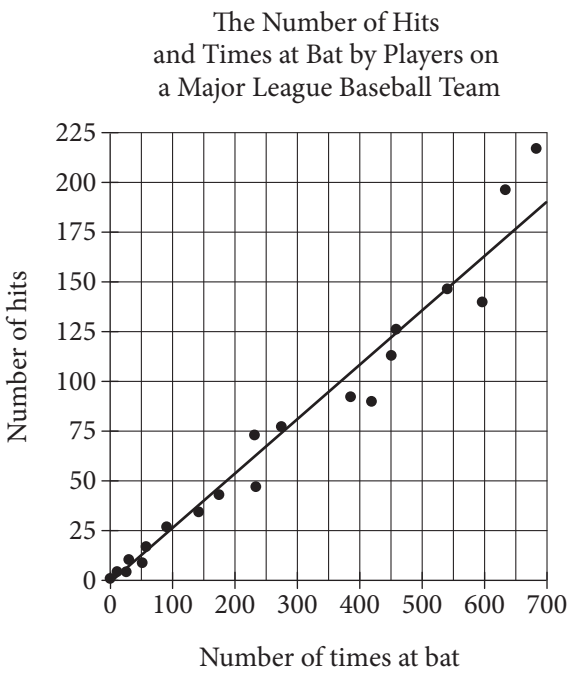
CONTINUE

**Questions 5 and 6 refer to the following information.**




The scatterplot above shows the number of hits and the number of times at bat by each of 20 players on a major league baseball team. The line of best fit for the data is also shown.

**5**

Which of the following statements about the relationship between the number of times at bat and the number of hits is true?

A) As the number of times at bat increases, the number of hits decreases.

B) As the number of times at bat increases, the number of hits increases.

C) As the number of times at bat increases, the number of hits remains constant.

D) As the number of times at bat decreases, the number of hits increases.

**6**

For the player with 450 times at bat, the actual number of hits the player had is approximately how many fewer than the number of hits predicted by the line of best fit?

A) 10

B) 20

C) 30

D) 40

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CONTINUE

**7**

An advertisement states that the printing rate of a certain printer is 400 characters per second. According to the convention that 1 word consists of 5 characters, what would be the advertised printing rate, in words per minute?

A) 2,000

B) 4,800

C) 24,000

D) 120,000

**8**

| Year | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|
| Salary | 38,000 | 39,140 | 40,314 | 41,524 | 42,769 |

The table above shows the yearly salary, in dollars, of an employee at a company. Which of the following best describes the type of model that fits the data in the table?

A) Linear, increasing by approximately \$1,140 per year

B) Linear, increasing by approximately \$1,245 per year

C) Exponential, increasing by approximately 3% each year

D) Exponential, increasing by approximately 9% each year

**9**

$$(x^2y - 3y^2 + 5xy^2) - (-x^2y + 3xy^2 - 3y^2)$$

Which of the following is equivalent to the expression above?

A) $2x^2y + 2xy^2$

B) $8xy^2 - 6y^2$

C) $2x^2y + 8xy^2 - 6y^2$

D) $x^4y^2 + 9xy^4 - 15xy^2$

**10**

$$4x - \frac{1}{2}x - 7 = 7\left(\frac{1}{2}x - 7\right)$$

Which of the following describes the solution to the equation above?

A) $x = 0$

B) $x = 10\frac{1}{2}$

C) The equation has infinitely many solutions.

D) The equation has no solutions.

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CONTINUE

11

The table below shows the monthly electricity bills of Joseph and Samuel for the first five months of a year.

Electricity Bills

| Month | Joseph | Samuel |
|---|---|---|
| January | $184.66 | $188.99 |
| February | $193.12 | $181.27 |
| March | $175.99 | $176.35 |
| April | $145.30 | $149.23 |
| May | $180.33 | $185.66 |

Based on the information in the table, which of these statements is true about the ranges and medians of the bills?

A) Both the range and median of Joseph's bills are less than the range and median of Samuel's bills.

B) Both the range and median of Joseph's bills are greater than the range and median of Samuel's bills.

C) The range of Joseph's bills is less than the range of Samuel's bills, while the median of Joseph's bills is greater than the median of Samuel's bills.

D) The range of Joseph's bills is greater than the range of Samuel's bills, while the median of Joseph's bills is less than the median of Samuel's bills.

12

Cars in Service on a Railroad

| | In service less than 10 years | In service 10 or more years |
|---|---|---|
| Single level | 215 | 497 |
| Double-decker | 16 | 82 |

The table above presents information about the 810 train cars in service on a railroad. Approximately what percentage of the train cars in service are double-decker cars that have been in service for less than 10 years?

A) 2 percent

B) 7 percent

C) 10 percent

D) 16 percent

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CONTINUE

13

A moving company uses plastic wrap to bundle groups of boxes together. If a portion of plastic wrap that measures 900 inches in length is used to bundle each group of boxes, how many groups of boxes can be bundled using 1,500 feet of the same type of plastic wrap?

A) 15

B) 20

C) 25

D) 30

14

The table below shows the number of calories in a cheeseburger at six different restaurants.

Calories in a Cheeseburger

| Restaurant | Calories |
|---|---|
| Blue Jay | 810 |
| Clear Lake Cafe | 900 |
| Molly's | 740 |
| Riverside Diner | 1,120 |
| Maya's Bistro | 1,050 |
| Tom's Place | 700 |

What is the difference in the number of calories in a cheeseburger at the Riverside Diner and the median number of calories in cheeseburgers at all six restaurants?

A) 190

B) 233

C) 265

D) 390

15

A circle is graphed in the $xy$-plane. If the circle has a radius of 3 and the center of the circle is at $(4, -2)$, which of the following could be an equation of the circle?

A) $(x+4)^2 + (y-2)^2 = 3$

B) $(x+4)^2 - (y-2)^2 = 3$

C) $(x-4)^2 + (y+2)^2 = 9$

D) $(x-4)^2 - (y+2)^2 = 9$

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CONTINUE

**Questions 16-18 refer to the following information.**

A high school developed a program called Propel, which offers extra guidance and support during the 9th-grade year. Before the school year began, 327 rising 9th graders were selected at random to participate in a study; 109 of those students were randomly assigned to enroll in the Propel program and the remaining students served as a control group. A summary of the year-end grade point averages (GPA) for the 327 9th-grade students who were chosen for the study is shown in the table below.

GPA for the 327 9th-Grade Students

| GPA | Enrolled in Propel | Not enrolled in Propel |
|---|---|---|
| 3.0 or greater | 61 | 95 |
| Less than 3.0 | 48 | 123 |

16

If a 9th-grade student at the high school is chosen at random, which of the following is closest to the probability that the student will have a GPA of 3.0 or greater?

A) 0.64
B) 0.48
C) 0.33
D) 0.19

17

What is the difference, to the nearest whole percent, between the percentage of students enrolled in Propel who had a GPA of 3.0 or greater and the percentage of students not enrolled in Propel who had a GPA of 3.0 or greater?

A) 4%
B) 8%
C) 10%
D) 12%

18

Of the students enrolled in the Propel program, the ratio of boys to girls is approximately 2:3. Which of the following is the best estimate of the number of girls enrolled in the program?

A) 44
B) 65
C) 73
D) 131

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CONTINUE

19

An artist is creating a sculpture using bendable metal rods of equal length. One rod is formed into the shape of a square and another rod into the shape of an equilateral triangle. If each side of the triangle is 2 inches longer than each side of the square, how long, in inches, is each rod?

A) 16

B) 18

C) 24

D) 30

20

$$f(x) = \frac{2x - 4}{2x^2 + 2x - 4}$$

A rational function is defined above. Which of the following is an equivalent form that displays values not included in the domain as constants or coefficients?

A) $f(x) = \dfrac{x - 2}{x^2 + x - 2}$

B) $f(x) = \dfrac{2(x - 2)}{2(x + 2)(x - 1)}$

C) $f(x) = \dfrac{1}{x + 1}$

D) $f(x) = \dfrac{1}{2x^2}$

21

A landscaper is designing a rectangular fountain with a 4-foot-wide path around it. The equation $A = 4p + 64$ will relate the area $A$, in square feet, of the path to the perimeter $p$, in feet, of the fountain. In the design, how many feet will the perimeter of the fountain increase for each additional square foot of the path's area?

A) $\dfrac{1}{64}$

B) $\dfrac{1}{4}$

C) 4

D) 64

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CONTINUE

22

In the $xy$-plane the graph of the function $q$ is a parabola. The graph intersects the $x$-axis at $(-1, 0)$ and $(r, 0)$. If the vertex of $q$ occurs at the point $(2, 4)$, what is the value of $r$ ?

A) 0

B) 3

C) 4

D) 5

23

Liquid going through a cooling system is chilled so that its temperature decreases at a constant rate from 100°C to 25°C in 5 seconds. Which of the following functions represents the temperature $C$, in degrees Celsius, as a function of the time $t$, in seconds, after chilling began, for $0 \leq t \leq 5$ ?

A) $C = -25 + 15t$

B) $C = 25 - 15t$

C) $C = 25 + 15t$

D) $C = 100 - 15t$

24

$$V = \frac{4}{3}\pi r^3$$

The formula for the volume of a sphere with radius $r$ is shown above. The radius of the planet Jupiter is about 11 times the radius of planet Earth. Assuming that planets are spheres, about how many times larger is the volume of Jupiter than the volume of Earth?

A) 11

B) 121

C) 1,331

D) 1,775

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CONTINUE

25

The population of squirrels in a park has been doubling every 15 years. Which of the following statements describes the type of function that best models the relationship between the population of squirrels in the park and the number of 15-year time periods?

A) Exponential growth, because the population of squirrels is increasing by the same amount each 15-year time period

B) Exponential growth, because the population of squirrels is increasing by the same percentage each 15-year time period

C) Linear growth, because the population of squirrels is increasing by the same amount each 15-year time period

D) Linear growth, because the population of squirrels is increasing by the same percentage each 15-year time period

26

If function $f$ is defined by $f(x) = 3x^2 - 5x + 4$, what is $f(x-4)$ ?

A) $f(x-4) = 3x^2 - 5x$

B) $f(x-4) = 3x^2 - 5x + 72$

C) $f(x-4) = 3x^2 - 29x + 52$

D) $f(x-4) = 3x^2 - 29x + 72$

27

$$x = \frac{1}{3}y$$

$$154 - 4y = 10x$$

The equations of two lines are shown above. If the lines are graphed in the $xy$-plane, which of the following ordered pairs represents the point at which the lines would intersect?

A) $(1, 3)$

B) $(3, 9)$

C) $(5, 15)$

D) $(7, 21)$

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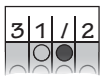
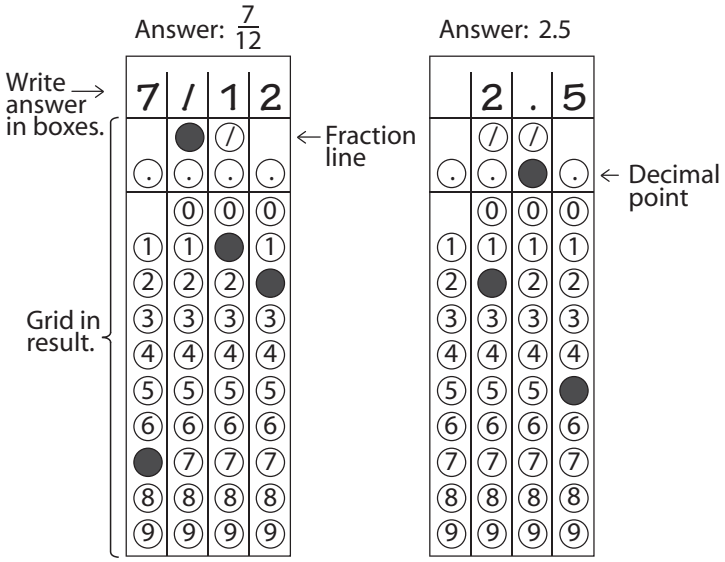
CONTINUE

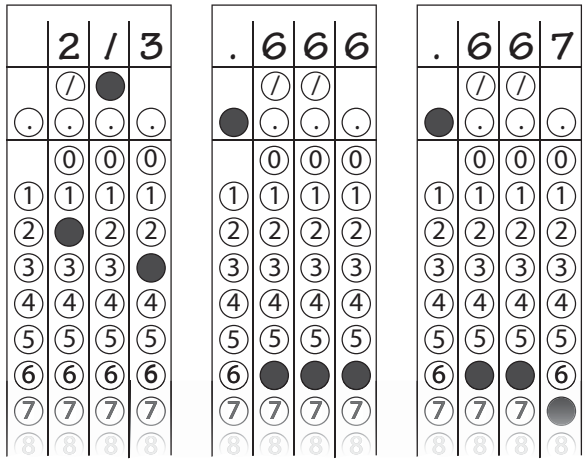
**DIRECTIONS**

**For questions 28-31**, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

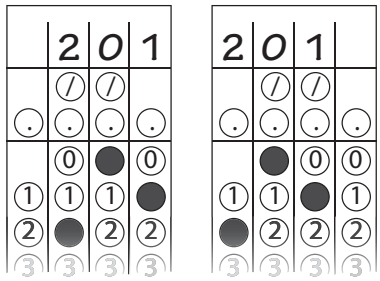
1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.
4. Some problems may have more than one correct answer. In such cases, grid only one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If  is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.




Acceptable ways to grid $\frac{2}{3}$ are:



Answer: 201 – either position is correct



**NOTE:** You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

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CONTINUE

28

| Type of meal | Fat (g) | Carbohydrates (g) |
|---|---|---|
| Stir-fry | 4 | 40 |
| Szechuan chicken | 5 | 35 |

A grocer carries two types of frozen meals that have the fat and carbohydrate content shown in the table above. John wants to purchase a combination of the two types of meals with no more than 350 grams of fat and no more than 2975 grams of carbohydrates. If John purchases 10 Szechuan chicken meals, what is the greatest number of stir-fry meals he can purchase so that the combination will satisfy the requirements?

29

$$y = x^2 - 4x + 3$$
$$y = x - 1$$

If $(x, y)$ is a solution to the system of equations above, what is one possible value of the product of $x$ and $y$ ?

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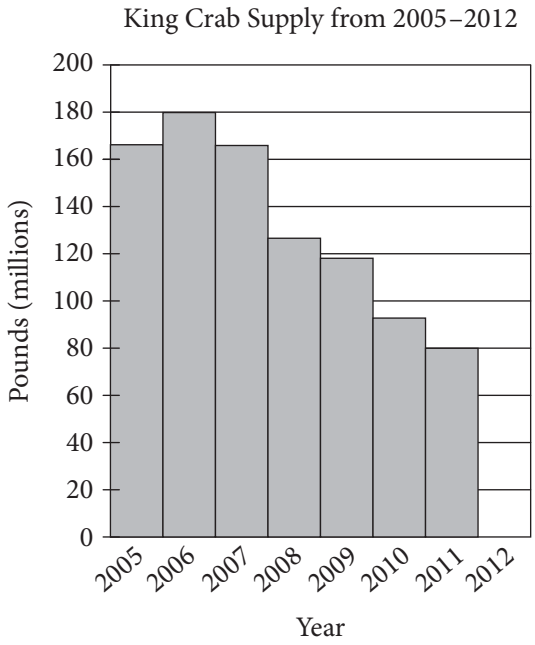
CONTINUE

**Questions 30 and 31 refer to the following information.**




The graph above shows the supply, in millions of pounds, of king crab harvested and sold from 2005 to 2011. The information for the year 2012 is not included in the graph.

**30**

In 2006, the price of king crab was \$8 per pound at the beginning of the year and dropped to \$7 per pound toward the end of the year. If 60% of the king crab supply was sold at the higher price per pound and the rest was sold at the lower price per pound, what was the total revenue generated, in millions of dollars, from the sales of king crab in 2006 ? (Disregard the \$ when gridding your answer.)

**31**

In 2011, the price of king crab was \$17 per pound. In 2012, $x$ million pounds of king crab were sold at \$16 per pound. If the total money generated from sales each year was the same, what is the value of $x$ ?

# STOP

**If you finish before time is called, you may check your work on this section only. Do not turn to any other section.**

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## Resources to Help You Prepare

The College Board is committed to offering the best practice — free, to the world — and to do so, we partnered with Khan Academy® to help propel students to success. When you upload your answers to this practice test to the Khan Academy engine, we can offer you individualized instruction in the areas you need most. Learn more at **collegeboard.org/psatscoring**.

When you take the PSAT/NMSQT in fall 2016, you will have a good idea of what you will see on the SAT. Be sure to start using the resources available to you through your online score report at **studentscores.collegeboard.org** and find out how to use your PSAT/NMSQT results to power your study at **satpractice.org**.

The contents of the PSAT/NMSQT and SAT are not a mystery. You can prepare by visiting **sat.org** to learn more about the tests.

## Your PSAT/NMSQT Score

When you take the PSAT/NMSQT, you will receive an Evidence-Based Reading and Writing score and a Math score; you will also receive a Selection Index, which National Merit Scholarship Corporation uses in its National Merit® Scholarship Program. The Selection Index is calculated by doubling the sum of the Reading, Writing and Language, and Math Test scores. For example, assuming that your Reading score is 22, your Writing and Language score is 24, and your Math score is 28.5, your Selection Index would be 149. [2(22 + 24 + 28.5)]

## Make the best use of your practice test.

Practice makes a difference! Take the full-length test on the preceding pages, then find detailed instructions on how to score the test at **collegeboard.org/psatpractice**. You'll also find comprehensive answer explanations and a link to Official SAT Practice on Khan Academy.

**Correct Answers** Black letter after answer indicates difficulty level (e = easy, m = medium, h = hard).

### READING TEST

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | A | e | 8. | A | e | 15. | C | h | 22. | D | e | 29. | D | h | 36. | C | h | 43. | A | m |
| 2. | B | m | 9. | D | m | 16. | B | m | 23. | B | m | 30. | B | h | 37. | B | h | 44. | A | e |
| 3. | B | m | 10. | A | m | 17. | D | e | 24. | D | m | 31. | D | h | 38. | C | m | 45. | A | m |
| 4. | B | e | 11. | D | e | 18. | B | e | 25. | C | m | 32. | A | h | 39. | C | m | 46. | D | m |
| 5. | C | m | 12. | D | e | 19. | A | m | 26. | B | m | 33. | C | h | 40. | C | h | 47. | C | m |
| 6. | D | h | 13. | D | h | 20. | C | m | 27. | B | m | 34. | A | e | 41. | B | m | | | |
| 7. | B | h | 14. | A | m | 21. | B | m | 28. | A | m | 35. | A | m | 42. | B | m | | | |

### WRITING AND LANGUAGE TEST

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | D | e | 8. | B | m | 15. | D | h | 22. | A | e | 29. | D | h | 36. | B | m | 43. | C | e |
| 2. | B | e | 9. | A | m | 16. | B | m | 23. | C | h | 30. | C | h | 37. | C | m | 44. | B | h |
| 3. | C | h | 10. | D | m | 17. | B | m | 24. | D | m | 31. | D | m | 38. | A | m | | | |
| 4. | C | m | 11. | D | e | 18. | A | m | 25. | C | m | 32. | B | m | 39. | C | h | | | |
| 5. | B | m | 12. | B | h | 19. | B | m | 26. | A | m | 33. | D | h | 40. | D | h | | | |
| 6. | B | h | 13. | C | e | 20. | C | m | 27. | A | m | 34. | D | m | 41. | D | h | | | |
| 7. | A | m | 14. | C | e | 21. | A | e | 28. | B | m | 35. | D | h | 42. | A | h | | | |

### MATH TEST – NO CALCULATOR

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | D | m | 4. | C | m | 7. | A | m | 10. | D | m | 13. | B | h | 16. | 1 | h | | | |
| 2. | A | e | 5. | C | m | 8. | B | m | 11. | A | h | 14. | 2 | m | 17. | 0 | h | | | |
| 3. | B | m | 6. | B | m | 9. | C | m | 12. | C | h | 15. | 90 | h | | | | | | |

### MATH TEST – CALCULATOR

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | B | e | 6. | A | m | 11. | D | m | 16. | B | m | 21. | B | h | 26. | D | h | 31. | 85 | h |
| 2. | A | e | 7. | B | m | 12. | A | m | 17. | D | h | 22. | D | h | 27. | D | h | | | |
| 3. | B | e | 8. | C | m | 13. | B | m | 18. | B | h | 23. | D | h | 28. | 65 | h | | | |
| 4. | D | m | 9. | A | m | 14. | C | m | 19. | C | m | 24. | C | m | 29. | 0,12 | h | | | |
| 5. | B | e | 10. | D | m | 15. | C | m | 20. | B | h | 25. | B | h | 30. | 1368 | h | | | |

5LPT01

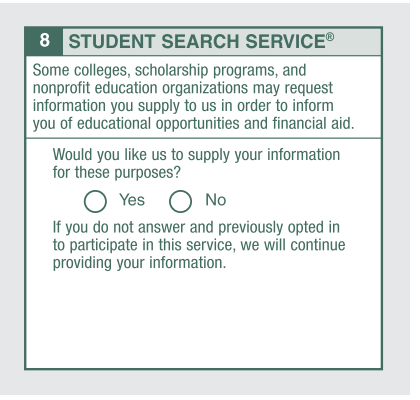
**REMINDER FOR THE ACTUAL TEST**

# Fill out all sections on your answer sheet

Take full advantage of the benefits of the PSAT/NMSQT®

## Have information sent straight to you from PSAT/NMSQT, colleges, and scholarship programs

- Make sure to fill in your name and address accurately on your answer sheet.
- If you would like to receive free information from colleges and other educational opportunity organizations:
  - Choose to participate in the Student Search Service (**box 8** on your answer sheet).
  - Fill in your email address.
- If you have questions about how the information you provide will be used, please visit **collegeboard.org/privacy-policy**.



**8 STUDENT SEARCH SERVICE®**

Some colleges, scholarship programs, and nonprofit education organizations may request information you supply to us in order to inform you of educational opportunities and financial aid.

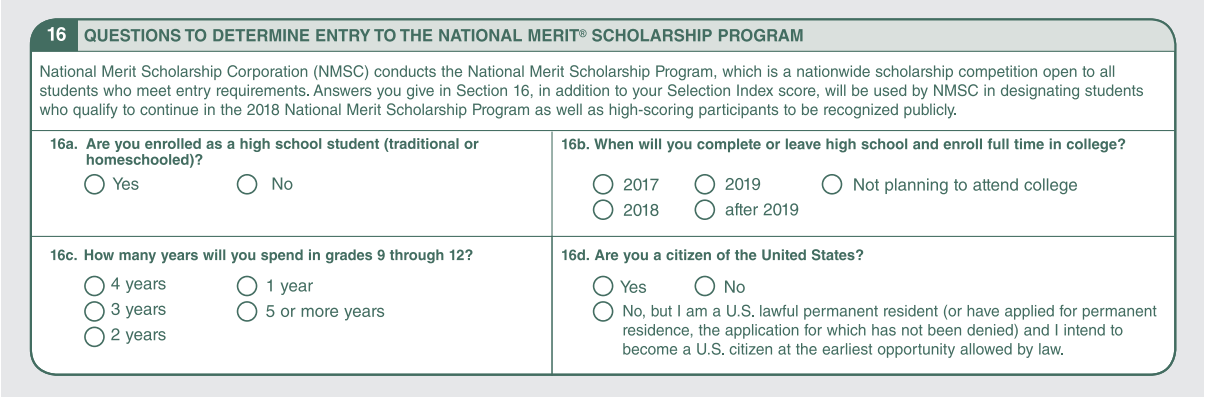
Would you like us to supply your information for these purposes?

◯ Yes ◯ No

If you do not answer and previously opted in to participate in this service, we will continue providing your information.

## Enter the National Merit® Scholarship Program

- Fill in the circles for ALL questions in **box 16** on your answer sheet.
- This information lets National Merit Scholarship Corporation (NMSC) determine whether you meet requirements to participate in its 2018 National Merit Scholarship Program.



**16 QUESTIONS TO DETERMINE ENTRY TO THE NATIONAL MERIT® SCHOLARSHIP PROGRAM**

National Merit Scholarship Corporation (NMSC) conducts the National Merit Scholarship Program, which is a nationwide scholarship competition open to all students who meet entry requirements. Answers you give in Section 16, in addition to your Selection Index score, will be used by NMSC in designating students who qualify to continue in the 2018 National Merit Scholarship Program as well as high-scoring participants to be recognized publicly.

**16a. Are you enrolled as a high school student (traditional or homeschooled)?**

◯ Yes ◯ No

**16b. When will you complete or leave high school and enroll full time in college?**

◯ 2017 ◯ 2019 ◯ Not planning to attend college
◯ 2018 ◯ after 2019

**16c. How many years will you spend in grades 9 through 12?**

◯ 4 years ◯ 1 year
◯ 3 years ◯ 5 or more years
◯ 2 years

**16d. Are you a citizen of the United States?**

◯ Yes ◯ No
◯ No, but I am a U.S. lawful permanent resident (or have applied for permanent residence, the application for which has not been denied) and I intend to become a U.S. citizen at the earliest opportunity allowed by law.

## Agree to test regulations

Read the test regulations in the *PSAT/NMSQT Student Guide* before test day. On test day you'll be asked not to share any test information and to copy the following statement in your own handwriting (cursive is NOT required):

*"I hereby agree to the terms set forth in the guidelines and regulations and certify that I am the person whose name, address, and signature appear on this answer sheet."*

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