

**Spring 2017**

# PSAT™ 10

## IMPORTANT REMINDERS

**1**

A No. 2 pencil is required for the test.  
Do not use a mechanical pencil or pen.

**2**

Sharing any questions with anyone  
is a violation of Test Security  
and Fairness policies and may result  
in your scores being canceled.

5MPT02



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# 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 Edwin O'Connor, *The Last Hurrah*. ©1956 by Edwin O'Connor.

City Hall was a lunatic pile of a building: a great, grim, resolutely ugly dust-catcher which had been designed eighty years before by the then mayor, one  
 Line Clement "Nutsy" McGrath. An ebullient man of  
 5 antic behavior, he was the only mayor of the city ever to be kicked to death by a camel. This had happened in Egypt; he had paused there while on an ill-advised world tour. Wandering about Cairo, he had encountered his first camel—hitherto like the roc,  
 10 a creature of fable to him. This high-spirited and slightly demented man could hardly resist teasing such an odd beast; the response of the camel had been savagely disproportionate, and that had been the end of Nutsy.

15 It was from this man's unskilled and laboriously drawn plans that the present City Hall had arisen, and for generations it had been decried as the prime eyesore of the community. Despite this, the building had its defenders, and intermittent suggestions that it  
 20 be razed had met with howls of protest from those who had worked long within it and who, with a certain rude poetic vision, saw in this inefficient, tangled warren the perfect symbol for municipal administration.

25 It was a noisy and an active place. In its old, high-ceilinged chambers the elected and appointed officials of government slumbered, mused, or conducted the affairs of the city; in this they were guided by the opportunities afforded them and, to a

30 somewhat lesser degree, by the strictures of conscience. Along the endless, outmoded corridors, hard by elevator shafts and water coolers, ranged little bands of political guerillas; having no perceptible tie with the management of the city, they  
 35 were nevertheless perpetually busy with concerns of their own. Red of face, shrewd of eye, agile of tongue, they continually nodded, winked, and flashed the cabalistic signs of confederacy, all the while regarding one another with a surreptitious if  
 40 unremitting attention.

Mayor Frank Skeffington's offices were on the third floor. Normally well-filled, this morning they were jammed to the doors, for with the announcement of last night the re-election band  
 45 wagon officially had begun to roll, and the crowd was rushing to get on board. It was a familiar sight to Skeffington; he had seen it often before, this quick parade of the professionals to the post; and as often as he had seen it, he had felt the same undimmed  
 50 flush of joyous anticipation. Much as he loved to win, he loved the fight to win even more, and in his appraisal of his own strengths he put in first place that of the born campaigner.

This morning, once within the Hall, progress had  
 55 been slow: there were more well-wishers lining his path from the outer door. He had greeted them all, addressing the majority by name. At length he reached his reception room, where the process was repeated; in addition to the individual greetings, he

60 made a short speech, thanking all those assembled for their anticipated support in the campaign to come. Under cover of the cheers that followed this, he bowed, waved, and disappeared into his office.

Here three men waited for him: his chief secretary, Tom Lacy, and his two principal advisers, Sam Weinberg and old John Gorman.

65 “Gentlemen,” Skeffington said. “A grand day to start the ball rolling. As well as heads. What’s on the schedule, Tom?”

70 “Everything’s fairly routine this morning,” Lacy said, planting a small pile of papers upon the great mahogany desk. “These are all for your signature: the notices to all heads of departments about the collection for Tom McCabe’s widow, the Easter proclamation, thank-you letters to the K. of C. and the Polish-American War Veterans. Then there’s the press conference, after which you’re giving the keys to the city to Fats Citronella. Then lunch with the members of the Highway Safety Committee.”

80 Skeffington held up a hand. “One moment,” he said. “A little amplification is required: who is Fats Citronella? And why am I giving him the keys to the city?”

“He’s a piano player. He’s coming here this week for an engagement at the Poli, and the theater people were anxious to have him officially welcomed. Cuke Gillen set it up.”

“And I agreed?”

90 “Yes, one day last week; Cuke caught you on the run. Actually,” Lacy said, “it may not be bad from the standpoint of publicity. Citronella’s apparently quite well known.”

1

In the first paragraph, the anecdote about Nutsy and the camel serves primarily to

- A) reveal Nutsy’s adventurous spirit and open-mindedness.
- B) show the inspiration for Nutsy’s design of City Hall.
- C) illustrate Nutsy’s eccentricity and bad judgment.
- D) depict a humorous incident from Nutsy’s youth.

2

Which conclusion about how city officials regard their jobs can most reasonably be drawn from the passage?

- A) They tend to treat their jobs as means to self-advancement.
- B) They believe that their jobs are essential for the civic good.
- C) They think their jobs are more difficult than the public believes.
- D) They view their jobs as frustrating and thankless.

3

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

- A) Lines 18-24 (“Despite . . . administration”)
- B) Lines 25-31 (“In its . . . conscience”)
- C) Lines 31-36 (“Along . . . own”)
- D) Lines 36-40 (“Red . . . attention”)

4

Why were Skeffington’s offices especially crowded on the morning described in the passage?

- A) Music fans had heard that Skeffington was meeting with Fats Citronella.
- B) People were eager to show their support for Skeffington’s campaign.
- C) Well-wishers wanted to see Skeffington on his final day as mayor.
- D) Reporters had gathered for the press conference at which Skeffington planned to announce his reelection bid.

In lines 49-50, the narrator uses the phrase “the same undimmed flush of joyous anticipation” to emphasize that

- A) despite having been a fixture on the local political scene for a very long time, Skeffington continues to inspire passion in voters.
- B) Skeffington’s extensive experience with elections has not diminished his idealism about politics in general.
- C) the intensity of Skeffington’s enthusiasm is greater than that of any of his supporters or fellow candidates.
- D) having been through numerous elections before has not made Skeffington any less excited to be beginning a new campaign.

6

The narrator most clearly characterizes Skeffington as

- A) ethical and conscientious.
- B) curious and reflective.
- C) generous and amiable.
- D) competitive and confident.

7

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

- A) Lines 42-46 (“Normally . . . board”)
- B) Lines 50-53 (“Much . . . campaigner”)
- C) Lines 57-62 (“At length . . . come”)
- D) Lines 68-69 (“What’s . . . Tom”)

8

The discussion about Fats Citronella in lines 76-92 serves primarily to

- A) mock Skeffington’s lack of familiarity with popular culture.
- B) demonstrate that Skeffington is distracted by the demands of the campaign.
- C) suggest the superficial and pragmatic nature of some of Skeffington’s public activities.
- D) reveal the difficult decisions that are often made during the frenzy of a campaign.

9

When Skeffington asks Lacy for “amplification” (line 81), he means that he wants Lacy to

- A) add clarifying information.
- B) speak at a higher volume.
- C) work harder at his job.
- D) offer more examples.

**Questions 10-18 are based on the following passages.**

Passage 1 is adapted from Booker T. Washington, "The Atlanta Exposition Address," delivered in 1895. Passage 2 is from W. E. B. Du Bois, *The Souls of Black Folk*. Originally published in 1903. Washington and Du Bois were influential African American intellectuals at a time when African Americans were denied basic freedoms in many parts of the United States, particularly the South.

**Passage 1**

Our greatest danger is that in the great leap from slavery to freedom we may overlook the fact that the masses of us are to live by the productions of our hands. . . . No race can prosper till it learns that there is as much dignity in tilling a field as in writing a poem. It is at the bottom of life we must begin, and not at the top. Nor should we permit our grievances to overshadow our opportunities.

To those of the white race . . . as we have proved our loyalty to you in the past, in nursing your children, watching by the sick-bed of your mothers and fathers, and often following them with tear-dimmed eyes to their graves, so in the future, in our humble way, we shall stand by you with a devotion that no foreigner can approach, ready to lay down our lives, if need be, in defence of yours, interlacing our industrial, commercial, civil, and religious life with yours in a way that shall make the interests of both races one. In all things that are purely social we can be as separate as the fingers, yet one as the hand in all things essential to mutual progress. . . .

The wisest among my race understand that the agitation of questions of social equality is the extremest folly, and that progress in the enjoyment of all the privileges that will come to us must be the result of severe and constant struggle rather than of artificial forcing. No race that has anything to contribute to the markets of the world is long in any degree ostracized. It is important and right that all privileges of the law be ours, but it is vastly more important that we be prepared for the exercises of these privileges. The opportunity to earn a dollar in a factory just now is worth infinitely more than the opportunity to spend a dollar in an opera-house.

**Passage 2**

Mr. Washington represents in Negro thought the old attitude of adjustment and submission; but adjustment at such a peculiar time as to make his programme unique. This is an age of unusual

economic development, and Mr. Washington's programme naturally takes an economic cast, becoming a gospel of Work and Money to such an extent as apparently almost completely to overshadow the higher aims of life. Moreover, this is an age when the more advanced races are coming in closer contact with the less developed races, and the race-feeling is therefore intensified; and Mr. Washington's programme practically accepts the alleged inferiority of the Negro races. Again, in our own land, the reaction from the sentiment of war time has given impetus to race-prejudice against Negroes, and Mr. Washington withdraws many of the high demands of Negroes as men and American citizens. In other periods of intensified prejudice all the Negro's tendency to self-assertion has been called forth; at this period a policy of submission is advocated. In the history of nearly all other races and peoples the doctrine preached at such crises has been that manly self-respect is worth more than lands and houses, and that a people who voluntarily surrender such respect, or cease striving for it, are not worth civilizing.

In answer to this, it has been claimed that the Negro can survive only through submission. Mr. Washington distinctly asks that black people give up, at least for the present, three things,—

First, political power,

Second, insistence on civil rights,

Third, higher education of Negro youth,—and concentrate all their energies on industrial education, the accumulation of wealth, and the conciliation of the South. This policy has been courageously and insistently advocated for over fifteen years, and has been triumphant for perhaps ten years. As a result of this tender of the palm-branch, what has been the return? In these years there have occurred:

1. The disfranchisement of the Negro.

2. The legal creation of a distinct status of civil inferiority for the Negro.

3. The steady withdrawal of aid from institutions for the higher training of the Negro.

These movements are not, to be sure, direct results of Mr. Washington's teachings; but his propaganda has, without a shadow of a doubt, helped their speedier accomplishment. The question then comes: Is it possible, and probable, that nine millions of men can make effective progress in economic lines

if they are deprived of political rights, made a servile  
90 caste, and allowed only the most meagre chance for  
developing their exceptional men? If history and  
reason give any distinct answer to these questions, it  
is an emphatic *No*.

10

In context, the reference to the fingers and the hand  
in lines 19-22 serves mainly to

- A) relate an anecdote that illustrates Washington’s point.
- B) make a concession that qualifies Washington’s point.
- C) allude to contemporary events that validate Washington’s point.
- D) provide an analogy that clarifies Washington’s point.

11

Which choice best supports the idea that Du Bois  
feels Washington is partially responsible for the  
worsening conditions facing African Americans?

- A) Lines 39-40 (“This . . . development”)
- B) Lines 49-52 (“Again . . . Negroes”)
- C) Lines 75-76 (“As a . . . return”)
- D) Lines 83-86 (“These . . . accomplishment”)

12

In lines 57-62, Du Bois most likely refers to other  
races and peoples in previous historical periods in  
order to

- A) criticize the ideas prevalent in previous eras.
- B) locate a contentious issue within a larger context.
- C) concede a particular point to Washington.
- D) provide a cautionary example to his supporters.

13

In Passage 2, Du Bois states that Washington  
encouraged African Americans to postpone the  
achievement of

- A) political power, civil rights, and higher education.
- B) economic, artistic, and spiritual development.
- C) industrial training, wealth, and reconciliation with white southerners.
- D) self-confidence, self-expression, and self-sufficiency.

14

As used in line 76, “return” most nearly means

- A) outcome.
- B) replacement.
- C) report.
- D) recurrence.

15

As used in line 81, “steady” most nearly means

- A) trustworthy.
- B) continual.
- C) calm.
- D) secure.

16

Both passages most directly address the issue of

- A) why African Americans should agitate for civil rights.
- B) how African Americans can best achieve equality in American society.
- C) whether African Americans will one day live free from discrimination.
- D) when African Americans will achieve political power in the United States.

17

In response to Du Bois’s claim that Washington’s program would overshadow higher aims in life, Washington would most likely argue that African Americans must first

- A) reclaim their lost agricultural heritage.
- B) focus on achieving economic well-being.
- C) establish an independent civil society.
- D) campaign to secure the social privileges possessed by white citizens.

18

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

- A) Lines 1-4 (“Our . . . hands”)
- B) Lines 7-8 (“Nor . . . opportunities”)
- C) Lines 23-25 (“The wisest . . . folly”)
- D) Lines 33-35 (“The opportunity . . . opera-house”)

**Questions 19-27 are based on the following passage and supplementary material.**

This passage is adapted from Alok Jha, "Brain's Music Pleasure Zone Identified." ©2013 by Guardian News and Media Limited.

Scientists know that music can give intense pleasure by delivering chemical rewards in the brain that are equal to the joy of good food, but now they think they may have identified the part of the brain where this pleasure starts.

Researchers scanned the brains of subjects while they listened to new songs and asked how much they would spend on buying the tracks. They found that the most popular songs—those which people were prepared to pay more for—were also the ones that elicited the strongest response in the nucleus accumbens, a structure in the centre of the brain that is involved in reward processing.

"This area is important because it's involved in forming expectations and these are expectations that could be rewarding," said Valorie Salimpoor of McGill University in Montreal, Canada. "What makes music so emotionally powerful is the creation of expectation. Activity in the nucleus accumbens normally would indicate that expectations are being met or surpassed."

In the experiment, which is published in *Science*, she and her colleagues scanned the brains of 20 people who used an interface to listen to 30-second clips of songs they had never heard before but were in a genre they generally liked. "Instead of just asking them if they liked the music or not, we gave them a chance to buy the music because that gives us a real understanding of what they really like and want," she said. "Immediately after they hear each clip, they make a decision. They could spend zero dollars, 99¢, \$1.29 or \$2."

The brain scans showed a direct relationship between how strong a response someone had in their nucleus accumbens to a song and how much they were willing to pay for it. This part of the brain was not acting alone, however. Salimpoor also found that it was taking in information from the superior temporal gyrus.

"This part of the brain is the part that has stored all the templates of the music we've heard in the past and will be unique for each individual," she

said. "The way that we like music is 100% unique to who we are and what we've heard in the past and the way that our superior temporal gyrus has been shaped. The brain is working a bit like a music-recommendation system."

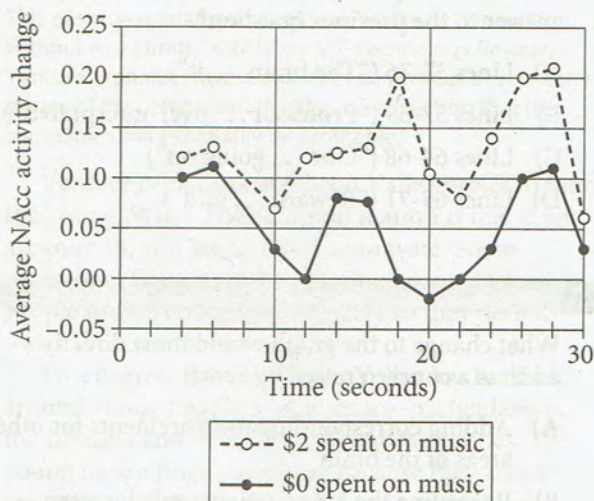
The latest results shed further light into Salimpoor's 2011 study, which found that the experience of pleasure when listening to music was mediated by the release of the brain's reward chemical, dopamine. She said that music seemed to tap into the circuitry in the brain that had evolved to drive human motivation. This ancient reward system, when listening to music, was being used to provide a cognitive reward.

Professor Sophie Scott, a neuroscientist at University College London, cautioned that Salimpoor's results should not be over-interpreted. "It is clearly the case that you get rewards for the music you like [but] I don't think we listen to music in any one way, we listen to music in the same way we read books or read poetry or engage with other sorts of art," she said. "One of the reasons they are things we like is because we can engage with them in multiple ways—you could be enjoying music because of the rhythm, because of the way the singer's singing, there's so much going on."

Reward was only a snapshot of one particular brain system and its involvement in music, Scott said. "But don't think it's telling you everything about the totality of how your brain engages with music."



Average Activity in Nucleus Accumbens (NAcc)  
When Listening to Excerpts of Unfamiliar Music



Adapted from Valorie N. Salimpoor et al., "Interactions between the Nucleus Accumbens and Auditory Cortices Predict Music Reward Value." ©2013 by American Association for the Advancement of Science.

Twenty subjects listened to sixty 30-second song clips and then chose to purchase each clip for \$0, 99¢, \$1.29, or \$2. The researchers averaged the subjects' NAcc activity levels to determine the overall NAcc activity change when the subjects listened to clips they purchased for \$0 and to clips they purchased for \$2.

19

In lines 1 and 18, the words "intense" and "powerful" primarily serve to

- A) strengthen the assertion that individuals have unique music preferences.
- B) illustrate the influence daily activities have on brain activity.
- C) emphasize that many individuals are greatly affected by music.
- D) suggest that dopamine levels frequently fluctuate in an individual.

20

As used in line 2, "delivering" most nearly means

- A) liberating.
- B) proclaiming.
- C) surrendering.
- D) producing.

21

Based on information in the passage, eating a delicious meal would most likely cause an individual's brain to

- A) determine that expectations were not satisfied.
- B) release dopamine to prompt a rewarding experience.
- C) suppress a response in the nucleus accumbens.
- D) emit signals to create a display of emotion.

22

According to the author, what did the researchers take into consideration when selecting the songs the subjects would hear?

- A) The commercial success of the songs
- B) The styles of music preferred by the subjects
- C) The actual retail prices of the songs
- D) The songs most recently purchased by the subjects

23

It can reasonably be inferred from the passage that chemical rewards released by the brain mainly serve to

- A) prompt an individual to try new activities that may be enjoyable.
- B) develop new criteria to determine whether an activity is enjoyable.
- C) stimulate the repetition of an enjoyable activity.
- D) inflate the reasons why certain activities are considered enjoyable.

24

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

- A) Lines 17-19 (“What . . . expectation”)
- B) Lines 30-31 (“Immediately . . . decision”)
- C) Lines 48-52 (“The latest . . . dopamine”)
- D) Lines 52-54 (“She . . . motivation”)

25

Which additional study would Scott most likely say would improve our understanding of the brain’s response to art?

- A) A study that attempts to replicate Salimpoor’s findings on the nucleus accumbens
- B) A study that measures how the brain reacts to different musical components
- C) A study that reexamines whether the brain releases chemical rewards
- D) A study that identifies how individuals communicate music preferences to others

26

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

- A) Lines 33-36 (“The brain . . . it”)
- B) Lines 57-59 (“Professor . . . over-interpreted”)
- C) Lines 64-68 (“One . . . going on”)
- D) Lines 69-71 (“Reward . . . said”)

27

What change to the graph would most directly address a concern raised by Scott?

- A) Adding corresponding measurements for other areas of the brain
- B) Recording the NAcc activity only between 10 and 20 seconds
- C) Incorporating the data for music purchased for 99¢ and \$1.29
- D) Including an explanation for the decrease in NAcc activity at 20 seconds

**Questions 28-37 are based on the following passage and supplementary material.**

This passage is adapted from Vivek Wadhwa, "Innovation without Age Limits." ©2012 by MIT Technology Review. Venture capitalists invest money in companies at very early stages of the companies' development, betting that the companies will eventually be profitable.

Venture capitalists in Silicon Valley prefer to fund the young. Why? The common mantra is that if you are over 35, you are too old to innovate. Some prominent figures are even urging talented young people to skip college, presumably so they do not waste their youth on studying.

To a degree, the cult Silicon Valley has built around young people makes sense—particularly in the Internet and mobile technology industries. The young have a huge advantage because they aren't encumbered by the past. Older technology workers are experts in building and maintaining systems in old computer languages and architectures. They make much bigger salaries. Why should employers pay \$150,000 for a worker with twenty years of irrelevant experience when they can hire a fresh college graduate for \$60,000? After all, the graduate will bring in new ideas and doesn't have to go home early to a family.

But great ideas by themselves don't lead to breakthrough technologies or successful companies. Ideas are a dime a dozen. The value comes from translating ideas and inventions into successful ventures. To do this, you have to collaborate with others, obtain financing, understand markets, price products, develop distribution channels, and deal with rejection and failure. In other words, you need business and management skills *and maturity*. These come with education, experience, and age.

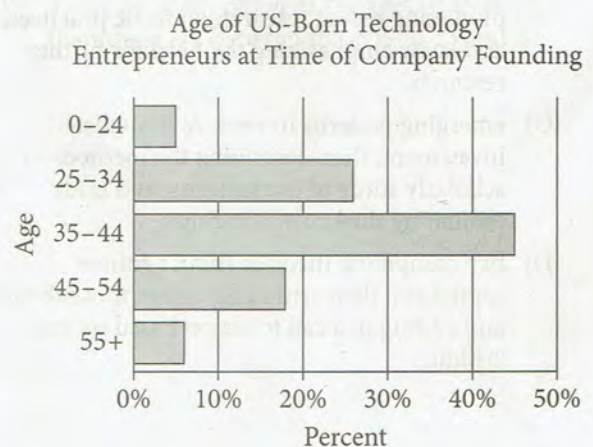
Indeed, research by my team revealed that the average and median age of the founders of *successful* U.S. technology businesses (with real revenues) is 39. We found twice as many successful founders over 50 as under 25, and twice as many over 60 as under 20. So everyone has a shot at success, but it seems age provides a distinct advantage.

Are venture capitalists misguided, then, in funding companies with baby-faced CEOs? Perhaps one answer lies in the results of a study conducted by the Kauffman Foundation. It found that during the period when funding young technology entrepreneurs became the norm, from 1997 to 2007, the venture industry grew dramatically.

But returns actually stagnated and then declined sharply. The returns of the venture industry lagged behind those of the small-cap Russell 2000 Index<sup>1</sup> by ten percent over the ten-year time frame.

When you meet entrepreneurs in India, Ireland, Brazil, and other parts of the world, you find many of the same dynamics at play. The young have the outrageous ideas, but it's older people who achieve business success. In all these countries, youth entrepreneurship is on the rise. And as in the United States, most of these businesses fail. That's okay when you can learn from your failures and start over—again and again. This has been Silicon Valley's advantage: it accepts failure and encourages entrepreneurs to keep trying. It hasn't been like this in other parts of the country and the world. In most places, if you fail, you don't get a second chance. But cultures are changing. They are beginning to accept failure. So entrepreneurs all over the world are trying again and again. In the process, they are getting older and smarter, and eventually achieving success.

<sup>1</sup> A measure of the stock price of 2,000 small companies



Adapted from Vivek Wadhwa, Richard Freeman, and Ben Rissing, "Education and Tech Entrepreneurship." ©2008 by Ewing Marion Kauffman Foundation.

The figure refers to US companies with sales in excess of \$1 million.

28

The main purpose of the passage is to

- A) explain the significance of a recently observed change in venture capitalism.
- B) examine an increasingly popular alternative to entrepreneurship.
- C) advocate a method for predicting the success of technology industry companies.
- D) make a claim about the importance of experience to achieving success in the technology industry.

29

In terms of its overall structure, the passage can best be described as first identifying

- A) a perspective shared by many venture capitalists, then citing data that challenge the perspective, and finally noting trends that correspond to those data.
- B) routine practices among venture capitalists, then discussing recent research on those practices, and lastly emphasizing the need for further research.
- C) emerging patterns in venture capitalist investment, then describing the methods of a scholarly study of the patterns, and lastly evaluating the study's findings.
- D) two competing theories about venture capitalism, then critiquing one of those theories, and ending in a call to action based on that critique.

30

Based on the passage, the author would be most likely to agree with which generalization about younger technology workers?

- A) They negotiate the terms of their salaries less aggressively than do older technology workers.
- B) They demonstrate greater knowledge of computer science than do older technology workers.
- C) They are better informed about consumer trends than are older technology workers.
- D) They are able to devise more novel approaches to current challenges than are older technology workers.

31

The passage suggests that in the technology industry, the most effective entrepreneurs are those who can

- A) maintain extended networks of business connections.
- B) merge their vision with the practical demands of running a business.
- C) match their training with new opportunities in the industry.
- D) avoid the mistakes other entrepreneurs have previously made.

32

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

- A) Lines 22-27 (“Ideas . . . failure”)
- B) Lines 30-32 (“Indeed . . . is 39”)
- C) Lines 33-36 (“We found . . . advantage”)
- D) Lines 39-43 (“Perhaps . . . dramatically”)

33

As used in line 23, “translating” most nearly means

- A) converting.
- B) interpreting.
- C) simplifying.
- D) transferring.

34

As used in line 45, “sharply” most nearly means

- A) accurately.
- B) abruptly.
- C) expertly.
- D) dangerously.

35

In the passage, the author suggests that failure in entrepreneurship is

- A) becoming understood as a step toward eventual success.
- B) developing into a problem that seems to have no easy solution.
- C) happening only to a particular group of individuals.
- D) masking other failures related to business and management.

36

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

- A) Lines 48-52 (“When . . . success”)
- B) Lines 52-54 (“In all . . . fail”)
- C) Lines 55-56 (“That’s . . . and again”)
- D) Lines 61-65 (“But cultures . . . success”)

37

The figure best supports which assertion about US-born technology entrepreneurs at the time that they founded a company?

- A) The least successful are those under the age of 25.
- B) Fewer than 20% are between the ages of 25 and 34.
- C) The largest group is between the ages of 35 and 44.
- D) There are more between the ages of 45 and 54 than there are between the ages of 25 and 34.

**Questions 38-47 are based on the following passage.**

This passage is from John Carey, "Architects of the Swamp."  
©2013 by Scientific American.

Joy Zedler carefully planned three experimental wetlands at the University of Wisconsin–Madison's Arboretum to be identical: parallel marshes 295 feet long and 15 feet wide, carved by engineers into the green landscape. Zedler's contractors planted all three tracts with similar species to see how the vegetation would absorb and clean water runoff during storms.

Zedler's team also allowed the same amount of water to flow into the test beds from a pond at the front ends of the tracts. They planned to measure the nutrients in the water entering each plot and draining into a basin at the far end, as well as soil stability, water absorption, and the productivity and diversity of the grasses and other plants. The scientists expected that each of the three wetlands would behave similarly.

The stakes were higher than for the typical university project. The city of Madison was keenly interested because it wanted to learn how to use wetlands to slow and cleanse storm water pouring out of town into neighboring Lake Wingra, which is suffering from high levels of nutrients such as nitrogen and phosphorus in the runoff. And the question of how to maximize the many valuable so-called ecosystem services that wetlands can provide, from reducing runoff and flood damage to boosting biodiversity, has been growing more urgent by the year as wetlands worldwide vanish at an alarming rate. Zedler, a professor of botany and restoration ecology at the university, had hoped the experiment would provide some insight.

Three years later, however, it was clear that the experiment had raised new questions the researchers had not anticipated. "Nothing about the system behaved as we supposed," Zedler says. The first surprise: even though the tracts were just three feet apart and had been planted and expected to develop similarly, one plot became dominated by cattails, whereas the other two blossomed with up to 29 plant species. Second, although the cattail plot produced more plant material overall, it was lousy at everything Zedler expected from lush growth. It did

not slow floodwater or control soil erosion. It did not absorb much of the nutrients in the water. The other two tracts provided more of the expected benefits—except for high productivity.

Why the surprising differences? Zedler's team discovered that a layer of clay under the cattail marsh was slightly thicker and thus less permeable than the layer under the two adjacent plots—so water ponded instead of percolating into the ground. That allowed storm water and nutrients to race down the channel. Meanwhile the cattails shaded out soil-stabilizing moss—which grew well in the neighboring swales—so soil erosion was higher.

Zedler's unforeseen results are helping her and other experts explain why the track record of past restoration efforts is poor, and they are pointing the way to improving the success rate. The big lesson from multiple investigations is to forget about trying to re-create a fully functioning wetland that is identical to the one being lost. "We don't know how to do it," says Doug Wilcox, professor of wetland science at the College at Brockport, S.U.N.Y. There are too many variables.

Instead scientists should focus on one or two key objectives, such as rebuilding land, improving water quality or boosting fish populations, and engineer the system to optimize those objectives. Then, once the basic engineering is done, let nature fill in the details as it pleases.

Another lesson is to monitor wetland projects for years, as Zedler continues to do with her experiment. That time is needed to uncover the often surprising details of what works and why and to take corrective action when necessary.

38

Which choice best states the central claim in the passage?

- A) The environmental benefits of re-created wetlands are often underestimated.
- B) Runoff and soil erosion make wetland preservation an urgent priority.
- C) Wetland restoration is best accomplished with limited goals in mind.
- D) Wetlands should be restored only after many years of careful observation.

39

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

- A) describing an experiment to challenging the results of that experiment.
- B) summarizing a research study to discussing lessons from the study.
- C) explaining a scientist's tentative findings to questioning the interpretation of those findings.
- D) discussing a theory to detailing the difficulties encountered in testing the theory.

40

The first two paragraphs (lines 1-17) serve mainly to

- A) illustrate Zedler's experience with wetlands.
- B) underscore the collaborative nature of Zedler's work in the field of wetland preservation.
- C) explain Zedler's theory about wetland restoration.
- D) describe the design specifications and planning that went into Zedler's wetland tracts.

41

It can reasonably be inferred from the passage that certain nutrients essential for plant growth

- A) are lacking in soil in which cattails are grown.
- B) increase the number of plants but decrease the variety of plants found in wetlands.
- C) can be detrimental in high concentrations to the overall ecology of lakes.
- D) will not be present in a plot if the plot lacks proper drainage.

42

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

- A) Lines 11-15 ("They . . . plants")
- B) Lines 15-17 ("The scientists . . . similarly")
- C) Lines 19-24 ("The city . . . runoff")
- D) Lines 44-45 ("It did . . . water")

43

As used in line 34, "raised" most nearly means

- A) provoked.
- B) cultivated.
- C) collected.
- D) increased.

44

The author states that two of the three experimental wetlands shared which of the following characteristics in comparison with the third?

- A) Less water absorption
- B) Less soil retention
- C) Less total plant mass
- D) Less absorption of nitrogen and phosphorus

45

The passage suggests that one plot became “dominated by cattails” (line 39) because, compared with the other two plots, it

- A) was planted with the seeds of fewer plant species.
- B) had a more substantial clay base.
- C) accumulated a smaller amount of moss.
- D) received more water in the form of runoff.

46

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

- A) Lines 41-43 (“Second . . . growth”)
- B) Lines 45-47 (“The other . . . productivity”)
- C) Lines 48-52 (“Zedler’s . . . ground”)
- D) Lines 54-56 (“Meanwhile . . . higher”)

47

As used in line 59, “poor” most nearly means

- A) needy.
- B) unfertile.
- C) petty.
- D) unsatisfactory.

## STOP

If you finish before time is called, you may check your work on this section only.

Do not turn to any other section.



## 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.

### Farming for the Future

Until the second half of the twentieth century, rural areas in many parts of the world supported high levels of biodiversity, sheltering a variety of wild plants and animals in addition to those raised by farmers. But as farmers have adopted intensive techniques that make use of greater portions of rural land, populations of wild plants and animals have diminished in many of the world's agricultural regions. **1** Among the organisms threatened by this decline are pollinating insects. This is because of the diminishment of these insects, which play

1

- A) NO CHANGE
- B) Among the organisms threatened by this decline are pollinating insects because of the diminishment faced by these insects,
- C) Pollinating insects are among the organisms threatened by this decline because of the diminishment faced by these insects,
- D) Among the organisms threatened by this decline are pollinating insects,

a vital role in agricultural production. **2** Yet pollinating insects are now threatened by the very agricultural processes they help sustain. As more land comes under cultivation, fewer wild areas remain to provide these insects with food and shelter. In addition, fertilizers and pesticides can weaken or kill pollinating insects and the plants they rely on for food. Because of these dangers, farmers need ways to restore and maintain the biodiversity that sustains valuable insect populations.

2

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

These insects act as pollinators for seventy-five percent of all crops raised for human consumption.

Should the writer make this addition here?

- A) Yes, because it supports an assertion about the importance of insect pollinators in agriculture.
- B) Yes, because it develops a point about how much insect pollinators increase the biodiversity of farmlands.
- C) No, because it contradicts information about insect pollinators elsewhere in the paragraph.
- D) No, because it interrupts the discussion of declining biodiversity.

[1] Some European nations have approached this problem by instituting agri-environmental schemes (AES), programs of financial rewards for farmers who seek to increase and maintain biodiversity on their land.

[2] The specifics of AES vary from country to country, but the programs have several basic features in common.

[3] Farmers are typically asked, first, to reduce

**3** they're reliance on pesticides and nitrogen fertilizers and, second, **4** they must leave portions of their land

fallow or lightly cultivated to encourage the growth of wildlife. [4] To counteract these losses, the governments

of participating nations **5** compensates farmers for leaving some land unfarmed and for using less harmful

but also less effective means of fertilizing and protecting their crops. [5] Although the programs help wild plants

and animals thrive, they also reduce the total amount of crops farmers can grow. **6**

3

- A) NO CHANGE
- B) there
- C) their
- D) its

4

- A) NO CHANGE
- B) leaving
- C) their leaving
- D) to leave

5

- A) NO CHANGE
- B) compensate
- C) compensating
- D) having compensated

6

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 3.

Studies **7** witness that European AES, while not equally effective in every type of landscape, generally seem to do a good job of increasing the numbers of pollinating insects living in farmlands. Some commentators are concerned that the existing AES will not be sufficient to protect these **8** insects; as human development continues to put their habitats at risk. Researchers, therefore, **9** continuing to study which

7

- A) NO CHANGE
- B) indicate
- C) connote
- D) render

8

- A) NO CHANGE
- B) insects as
- C) insects—as
- D) insects. As

9

- A) NO CHANGE
- B) in continuing
- C) continue
- D) to continue

AES are best at encouraging farmers to adopt practices that preserve populations of pollinating insects. **10** Even if the programs must be augmented in the years to come, **11** the importance of pollinating insects and the impact they have on European agriculture cannot be overstated.

10

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

Some studies have found that, in addition to restoring and preserving pollinating insects, AES have had positive effects on bird and plant populations.

Should the writer make this addition here?

- A) Yes, because it develops a point made in the previous sentence about the improvements AES can bring about.
- B) Yes, because it reinforces a claim made in the opening sentence of the passage.
- C) No, because it distracts from the paragraph's focus on pollinating insect populations.
- D) No, because it contradicts the point made earlier in the paragraph that current AES are not equally effective.

11

The writer wants an effective conclusion that suggests the broader significance of the topic the passage has discussed. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) leaving farmland fallow some of the time is important not only for preserving populations of pollinating insects but also for maintaining the long-term fertility of that land.
- C) European AES serve as important foundations on which future policies can be built and potential models for nations outside Europe looking to preserve the productivity of their farmlands.
- D) as more farmers sign on to European AES, these programs will need to focus less on making short-term gains in populations of pollinating insects and more on preserving the gains that have already been made.

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

### The Science behind the Northern Lights

The aurora borealis, more commonly called the northern lights, is a remarkable natural phenomenon in which colored displays of light appear in the sky, usually in the higher latitudes around the North Pole.

Explanations of the phenomenon have varied across time periods and cultures. **12** Nevertheless, some Alaska

Natives once thought the lights were frolicking spirits.

The Vikings believed the lights were caused by gods galloping across the sky. Benjamin Franklin theorized that the displays he observed in the sky were related to energy and magnetic fields.

12

- A) NO CHANGE
- B) For example,
- C) However,
- D) As a result,

**13** The Sun's outer atmosphere, the corona, can reach over one million degrees Celsius, and it produces a steady stream of charged particles called the solar wind. These particles flow outward from the Sun at **14** speeds, which can exceed 300 miles per second, coming into contact with Earth's magnetic field three days after leaving the Sun. Most solar wind particles are deflected by this field, but a small number can channel down into the polar regions. At the poles, the charged particles (mostly electrons) accelerate along magnetic field **15** lines until they enter the atmosphere and collide with atoms and molecules of oxygen and nitrogen, creating light.

13

Which choice most effectively introduces the topic of this paragraph?

- A) Today scientists know that the source of the northern lights is, in fact, the Sun.
- B) Now, because of science, we have more information.
- C) It is easy for nonscientists to underestimate the intense heat of the Sun and the power of the solar wind.
- D) To understand the northern lights, one has to understand the parts of the Sun, the function of the solar wind, and the location of Earth's magnetic fields.

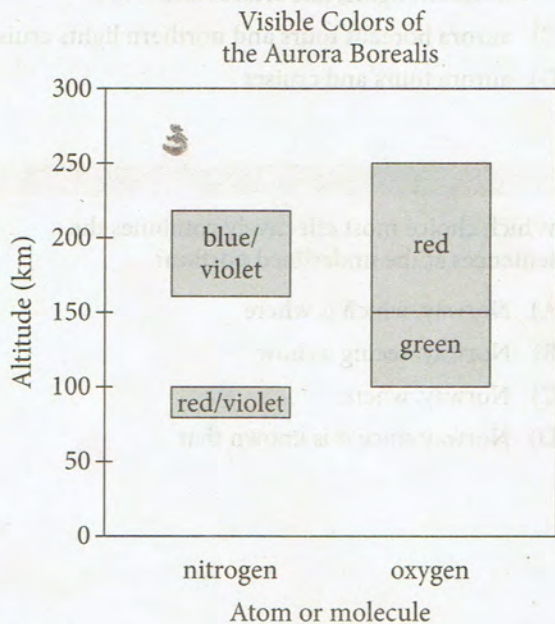
14

- A) NO CHANGE
- B) speeds (which can exceed 300 miles per second)
- C) speeds that can exceed 300 miles per second,
- D) speeds, that can exceed 300 miles per second,

15

- A) NO CHANGE
- B) lines; until
- C) lines. Until
- D) lines until then

The color of the light **16** depends, on two factors, the altitude at which the collisions occur and the type of element—oxygen or nitrogen—with which the electron particles collide. When a collision happens, energy is transferred to the oxygen or nitrogen. As the atoms and molecules return to their lower-energy state, they emit light. As shown in the chart, at altitudes between 100 and 150 kilometers, the oxygen emits green light. **17** The light appears red at all altitudes between 150 and 250 kilometers. The light emitted from the collision of electrons and nitrogen at altitudes above 160 kilometers glows blue or violet; at around 100 kilometers, the light appears as a red or violet fringe.



Source: Data from Bob King, "Technicolor Auroras? A Reality Check."  
©2013 by Universe Today.

16

- A) NO CHANGE
- B) depends on two factors: the
- C) depends on two factors. The
- D) depends on two factors; the

17

After reviewing the passage and chart, the writer determines that the claim made in the underlined sentence is not accurate. Which change should the writer make to the sentence to correct the inaccuracy?

- A) When the same event occurs at altitudes between 150 and 250 kilometers, the light appears red.
- B) People will then see that the light turns into subtle shades of blue and violet.
- C) Red is the most visible color of the northern lights at altitudes between 150 and 250 kilometers.
- D) This green light then overlaps once the altitude reaches 150 kilometers.



Though the auroral display is continuously present, there are certain times when it is at **18** its strongest. Every eleven years, the Sun experiences a solar maximum, when sunspots produce more solar flares and enormous eruptions called coronal mass ejections (CMEs) occur. CMEs can eject highly energetic particles into the solar **19** wind—at nearly 600 miles per second. The particles can reach Earth in less than two days.

The best place to view the aurora borealis is at high latitudes. Alaska and Canada are popular viewing locations. A new industry focusing on **20** tourism has sprung up in **21** Norway. There, the northern lights are visible almost every night.

18

- A) NO CHANGE
- B) its'
- C) it's
- D) their

19

- A) NO CHANGE
- B) wind
- C) wind,
- D) wind;

20

- A) NO CHANGE
- B) Norwegian tourist activities related to the northern lights, like cruises and tours,
- C) aurora borealis tours and northern lights cruises
- D) aurora tours and cruises

21

Which choice most effectively combines the sentences at the underlined portion?

- A) Norway, which is where
- B) Norway, seeing as how
- C) Norway, where
- D) Norway since it is known that

Question 22 asks about the previous passage as a whole.

Think about the previous passage as a whole as you answer question 22.

22

For which claim from the passage does the chart provide the most support?

- A) Charged particles flow outward from the Sun.
- B) The Sun produces a stream of charged particles that travel at 300 miles per second.
- C) Popular spots for viewing the northern lights include Alaska, Canada, and Norway.
- D) The color of the light depends on the atom or molecule with which the electron collides.

Questions 23-33 are based on the following passage.

### Finding Zora

On August 15, 1973, writer Alice Walker arrived in Orlando, Florida, on a mission to find the unmarked grave of Zora Neale Hurston. **23** Hurston was a trained anthropologist and writer. She had been one of the key contributors to the Harlem Renaissance cultural movement. Her works, however, were not widely recognized during her lifetime; most were out of print by the time Hurston died, impoverished, in 1960.

23

Which choice most effectively combines the underlined sentences?

- A) Hurston, a trained anthropologist and writer, had been one of the key contributors to the Harlem Renaissance cultural movement.
- B) Hurston was a trained anthropologist and writer, being one of the key contributors to the Harlem Renaissance cultural movement besides that.
- C) Hurston was a trained anthropologist and writer, and additionally she had been one of the key contributors to the Harlem Renaissance cultural movement.
- D) Hurston had been one of the key contributors to the Harlem Renaissance cultural movement, and she also trained as an anthropologist and was a writer.

[1] Walker's journey began when she read Hurston's then-little-known novel *Their Eyes Were Watching God*, which was set in the small town of Eatonville, Florida, the first incorporated African American settlement in the United States. [2] Hurston had grown up in Eatonville, and its residents inspired many of the characters—rural, southern, and **24** black, in her writing. [3] Her efforts culminated in an essay published by *Ms.* magazine titled “In Search of Zora Neale Hurston.” [4] Walker felt a strong connection **25** for the author and began researching Hurston's life and other works. [5] When she discovered that Hurston had been buried in an unmarked grave, Walker began a quest to find the grave and, ultimately, to revive interest in Hurston's works. **26**

24

- A) NO CHANGE
- B) black—
- C) black:
- D) black;

25

- A) NO CHANGE
- B) around
- C) to
- D) by

26

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

- A) where it is now.
- B) after sentence 1.
- C) after sentence 4.
- D) after sentence 5.

The “Zora Hurston expedition,” as Walker called it in her essay, started in Eatonville, **27** which was named for Josiah Eaton, who served as mayor of the neighboring town of Maitland. From Eatonville, Walker then traveled to Fort Pierce, **28** and this is where Hurston had lived in a welfare home during her last year of life. There she learned of Hurston’s final resting place: an old segregated cemetery called the Garden of Heavenly Rest. **29** The cemetery is located on Seventeenth Street.

27

Which choice provides the detail most pertinent to the development of the passage’s narrative?

- A) NO CHANGE
- B) where Walker found residents who told her stories of Hurston as a child.
- C) whose first mayor, Joe Clark, was the inspiration for Jody Starks in *Their Eyes Were Watching God*.
- D) where Walker was eager to begin her quest to find Hurston’s grave.

28

- A) NO CHANGE
- B) where Hurston had lived
- C) Hurston had lived there
- D) this was where Hurston lived

29

The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?

- A) Kept, because it introduces a detail that is discussed later in the passage.
- B) Kept, because it provides support for the passage’s central idea.
- C) Deleted, because it repeats information that is mentioned elsewhere in the passage.
- D) Deleted, because it adds unnecessary information that blurs the focus of the passage.

Armed with a crudely drawn map, Walker drove to the cemetery, which she was shocked to find was a neglected acre-sized **30** field of weeds that came up to her waist. Braving the danger of hidden snakes, Walker trekked through the field but could not find the center of the cemetery, where Hurston was supposed to be buried. **31** Of course, when all seemed hopeless, Walker began to **32** beg and implore Hurston herself for help, calling out, "Zora! I'm here. Are you?" As Walker stumbled on, continuing her one-way conversation with Hurston, she stepped into a grave-sized sunken rectangle roughly in the center of the field. This, Walker felt sure, was Hurston's grave.

30

- A) NO CHANGE
- B) field: of weeds that came up to
- C) field, of weeds, that came up to
- D) field of weeds that came up to:

31

- A) NO CHANGE
- B) Finally,
- C) Moreover,
- D) Thus,

32

- A) NO CHANGE
- B) beg and beseech
- C) plead with Hurston and ask
- D) implore

Back in town, Walker ordered a headstone, engraved with Hurston's name and the epitaph "A Genius of the South," to be set at Hurston's grave. Two years later, Ms. published Walker's essay, a poignant account of her quest to honor Hurston by finding her final resting spot. Thanks to the popularity of the essay and to Walker's continued advocacy, Zora Neale Hurston's works and legacy **33** has been rediscovered and her voice was finally added to the literary canon.

33

- A) NO CHANGE
- B) having been
- C) were
- D) was

Questions 34-44 are based on the following passage.

### Emoticon Intelligence

— 1 —

In 1982 Carnegie Mellon professor Scott Fahlman **34** proposed a symbol to accompany jokes posted to an online bulletin board maintained by his university: a colon, a **35** hyphen; and a parenthesis, which, when put together and viewed sideways, looked like a smiling face. Fahlman had invented the emoticon, a tool that continues to enhance and enliven online communication to this day.

34

- A) NO CHANGE
- B) proposed, a symbol,
- C) proposed—a symbol
- D) proposed a symbol,

35

- A) NO CHANGE
- B) hyphen: and
- C) hyphen and,
- D) hyphen, and



— 2 —

By conveying valuable social cues that mimic those in face-to-face encounters, such as body language and tone of voice, emoticons play a vital role in augmenting online text. They were invented, in fact, for precisely this reason.

Fahlman proposed the smile symbol in response to

**36** confusion, and that arose on Carnegie Mellon's online bulletin board when humorous posts were misinterpreted. Critics claim that emoticons weaken language by providing a lackluster substitute for precise phrasing—journalist Paul Andrews, for instance, holds that **37** “for centuries humans communicated perfectly

well”—but Fahlman contends that online communication is “a different medium, with different properties.” Emoticons are well suited to the fast-paced, informal quality of much online communication. For example, in a 2008 survey of 216 college students who used emoticons when instant **38** messaging.

Respondents indicated that emoticons enabled them to clarify the meaning and tone of ambiguous statements and convey information more quickly.

**36**

- A) NO CHANGE
- B) confusion, this
- C) confusion of which it
- D) confusion that

**37**

The writer wants a direct quotation that supports the claim made in the first part of the sentence. Which choice most effectively accomplishes this goal?

- A) NO CHANGE
- B) emoticons “got their start as an emotional emblem or shorthand”—
- C) “wherever humans gathered in digital form, [emoticons] were soon to follow”—
- D) “a deft turn of phrase needs nothing to clarify or punctuate”—

**38**

- A) NO CHANGE
- B) messaging; respor
- C) messaging, respor
- D) messaging and res

— 3 —

By filling in the cues otherwise lost in text-based messages, emoticons actually enrich online text. In a 2007 study, Professors Kristin Byron and David C. Baldrige compared the reactions of test subjects who received emails containing emoticons with **39** subjects who received emails that lacked emoticons but were otherwise identical. Subjects who received emails with emoticons formed more favorable impressions of the messages' senders. **40** Although emoticons are a worldwide phenomenon, many are culture specific. Byron and Baldrige explain that people are most comfortable **41** in particular situations: at times when they can predict how others will act in a social situation. By offering information about intentions, emoticons contribute to this comforting sense of reliability.

39

- A) NO CHANGE
- B) that of subjects who received
- C) subjects who received those
- D) those of subjects who received

40

The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?

- A) Kept, because it anticipates the reasoning about human behavior provided in the following sentence.
- B) Kept, because it establishes the fact that emoticons are not just a US phenomenon.
- C) Deleted, because it offers an irrelevant detail that interrupts the discussion of the research findings.
- D) Deleted, because it repeats information about emoticons that was provided earlier in the passage.

41

- A) NO CHANGE
- B) in times where
- C) when
- D) in situations during which

— 4 —

Online messages have increased in volume and **42** complexity, and the symbols have **43** proliferated and grown rapidly to indicate surprise, suspicion, and many other social cues besides emotions. Their continued use helps humanize the Internet, making digital communication more comfortable and comprehensible.

42

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

complexity since Fahlman proposed the first emoticon,

Should the writer make this revision?

- A) Yes, because it enhances the cohesion of the passage by referencing the opening anecdote about Fahlman.
- B) Yes, because it anticipates the claim about humanization made in the next sentence.
- C) No, because it needlessly repeats information about emoticons that was provided elsewhere in the passage.
- D) No, because it interrupts the conclusion of the passage by offering an irrelevant detail about emoticons.

43

- A) NO CHANGE
- B) proliferated
- C) expanded and proliferated
- D) experienced a rapid proliferation and growth so as

Question 44 asks about the previous passage as a whole.

Think about the previous passage as a whole as you answer question 44.

44

The writer wants to add the following sentence to the passage.

Emoticons provide not only comprehensibility but also reassurance and social cohesion.

To make the passage most logical, the sentence should be placed immediately

- A) before the first sentence in paragraph 2.
- B) before the first sentence in paragraph 3.
- C) before the first sentence in paragraph 4.
- D) after the last sentence in paragraph 4.

**STOP**

If you finish before time is called, you may check your work on this section only.

Do not turn to any other section.



# Math Test – No Calculator

25 MINUTES, 17 QUESTIONS

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

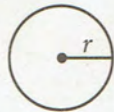
### DIRECTIONS

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

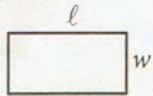
- The use of a calculator is **not permitted**.
- All variables and expressions used represent real numbers unless otherwise indicated.
- Figures provided in this test are drawn to scale unless otherwise indicated.
- All figures lie in a plane unless otherwise indicated.
- Unless otherwise indicated,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

### REFERENCE

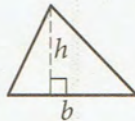


$$A = \pi r^2$$

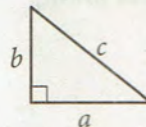
$$C = 2\pi r$$



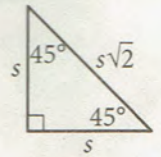
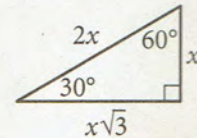
$$A = lw$$



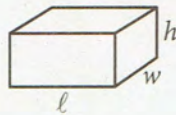
$$A = \frac{1}{2}bh$$



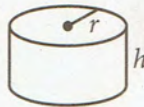
$$c^2 = a^2 + b^2$$



Special Right Triangles



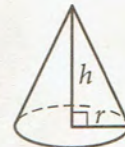
$$V = lwh$$



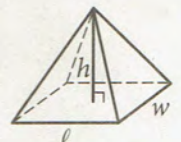
$$V = \pi r^2 h$$



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



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



$$V = \frac{1}{3}lwh$$

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.



1

A movie theater charges \$11 for each full-price ticket and \$8.25 for each reduced-price ticket. For one movie showing, the theater sold a total of 214 full-price and reduced-price tickets for \$2,145. Which of the following systems of equations could be used to determine the number of full-price tickets,  $f$ , and the number of reduced-price tickets,  $r$ , sold?

- A)  $f + r = 2,145$   
 $11f + 8.25r = 214$
- B)  $f + r = 214$   
 $11f + 8.25r = 2,145$
- C)  $f + r = 214$   
 $8.25f + 11r = 2,145$
- D)  $f + r = 2,145$   
 $8.25f + 11r = 214$

2

If  $4m + 2 = 42$ , what is the value of  $2m + 1$ ?

- A) 10  
 B) 11  
 C) 21  
 D) 22

3

Which of the following is a solution to the equation

$$2x^2 - 4 = x^2?$$

- A) 1  
 B) 2  
 C) 3  
 D) 4

4

In a city transit system, bus rides cost \$2 each and subway rides cost \$3 each. Last month, Brianna spent no more than \$56 on bus and subway rides, and she paid for at least 20 bus rides. What is the greatest possible number of subway rides Brianna could have paid for last month?

- A) 3  
 B) 4  
 C) 5  
 D) 6

5

$$(z^2 - 10z) - 2(14z + 6)$$

Which of the following is equivalent to the expression above?

- A)  $z^2 - 38z + 6$   
 B)  $z^2 + 34z + 6$   
 C)  $z^2 - 38z - 12$   
 D)  $z^2 - 38z + 12$



6

$$P = 1.20x + 5.00$$

The equation above gives the total monthly price  $P$ , in dollars, for using an online gaming service. The total monthly price for the online service consists of a flat monthly fee and a charge for each game played during a month. Of the following, which is the best interpretation of the value of  $x$  in this context?

- A) The number of games played during a month
- B) The charge, in dollars, for playing  $x$  games
- C) The flat monthly fee, in dollars, for the gaming service
- D) The number of months the gaming service was used

7

$$v^2 = \frac{LT}{m}$$

The formula above expresses the square of the speed  $v$  of a wave moving along a string in terms of tension  $T$ , mass  $m$ , and length  $L$  of the string. What is  $T$  in terms of  $m$ ,  $v$ , and  $L$ ?

- A)  $T = \frac{mv^2}{L}$
- B)  $T = \frac{m}{v^2L}$
- C)  $T = \frac{mL}{v^2}$
- D)  $T = \frac{L}{mv^2}$

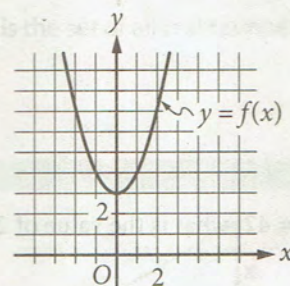
8

$$\begin{aligned} y &= x^2 + 2x + 1 \\ x + y + 1 &= 0 \end{aligned}$$

If  $(x_1, y_1)$  and  $(x_2, y_2)$  are the two solutions to the system of equations above, what is the value of  $y_1 + y_2$ ?

- A)  $-3$
- B)  $-2$
- C)  $-1$
- D)  $1$

9



The graph of the function  $f$  defined by  $f(x) = x^2 + 3$  is shown in the  $xy$ -plane above. If the graph of  $f$  is shifted right 2 units and up 4 units, the resulting graph represents the function  $g$  (not shown). Which of the following defines  $g$ ?

- A)  $g(x) = (x - 2)^2 + 7$
- B)  $g(x) = (x - 2)^2 - 4$
- C)  $g(x) = (x + 2)^2 + 4$
- D)  $g(x) = (x + 4)^2 + 2$



0

Hector used a tool called an auger to remove corn from a storage bin at a constant rate. The bin contained 24,000 bushels of corn when Hector began to use the auger. After 5 hours of using the auger, 19,350 bushels of corn remained in the bin. If the auger continues to remove corn at this rate, what is the total number of hours Hector will have been using the auger when 12,840 bushels of corn remain in the bin?

- A) 3
- B) 7
- C) 8
- D) 12

1

The population  $P$  of a certain city  $y$  years after the last census is modeled by the equation below, where  $r$  is a constant and  $P_0$  is the population when  $y = 0$ .

$$P = P_0(1 + r)^y$$

If during this time the population of the city decreases by a fixed percent each year, which of the following must be true?

- A)  $r < -1$
- B)  $-1 < r < 0$
- C)  $0 < r < 1$
- D)  $r > 1$

12

If  $a = c + d$ , which of the following is equivalent to the expression  $x^2 - c^2 - 2cd - d^2$ ?

- A)  $(x + a)^2$
- B)  $(x - a)^2$
- C)  $(x + a)(x - a)$
- D)  $x^2 - ax - a^2$

13

Carol purchased 45 ceramic figures from an online store. The online store charged  $(d + 5)$  dollars per figure for the first 30 figures and  $d$  dollars per figure for each figure in excess of 30. Which of the following represents the amount  $A$ , in dollars, Carol was charged for her purchase in terms of  $d$ ?

- A)  $A = 30d + 45$
- B)  $A = 30d + 150$
- C)  $A = 45d + 45$
- D)  $A = 45d + 150$





**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  $\begin{array}{|c|c|c|c|} \hline 3 & 1 & / & 2 \\ \hline \circ & \circ & \circ & \circ \\ \hline \end{array}$  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.

Write answer in boxes. →

← Fraction line

← Decimal point

Grid in result. →

Answer: $\frac{7}{12}$			
7	/	1	2
○	○	○	○
0	0	0	0
①	①	①	①
②	②	②	②
③	③	③	③
④	④	④	④
⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

Answer: 2.5			
2	.	5	
○	○	○	○
0	0	0	0
①	①	①	①
②	②	②	②
③	③	③	③
④	④	④	④
⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

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

2	/	3	
○	○	○	○
0	0	0	0
①	①	①	①
②	②	②	②
③	③	③	③
④	④	④	④
⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

.	6	6	6
○	○	○	○
0	0	0	0
①	①	①	①
②	②	②	②
③	③	③	③
④	④	④	④
⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

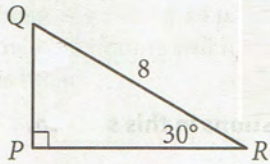
.	6	6	7
○	○	○	○
0	0	0	0
①	①	①	①
②	②	②	②
③	③	③	③
④	④	④	④
⑤	⑤	⑤	⑤
⑥	⑥	⑥	⑥
⑦	⑦	⑦	⑦
⑧	⑧	⑧	⑧
⑨	⑨	⑨	⑨

Answer: 201 – either position is correct

2	0	1	
○	○	○	○
0	0	0	0
①	①	①	①
②	②	②	②
③	③	③	③

2	0	1	
○	○	○	○
0	0	0	0
①	①	①	①
②	②	②	②
③	③	③	③

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



In the right triangle shown above, what is the length of  $\overline{PQ}$  ?

The equation  $y = mx + b$ , where  $m$  and  $b$  are constants, is graphed in the  $xy$ -plane. If the line contains the points  $(-20, 0)$  and  $(0, 40)$ , what is the value of  $m$  ?

16

If  $\sqrt[5]{x^3}$  is rewritten as  $x^a$  and  $x > 1$ , what is the value of  $a$  ?

17

$$\begin{aligned}x + y &= 9 \\3x + y &= 17\end{aligned}$$

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

## STOP

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



# 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

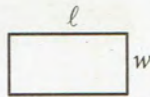
1. The use of a calculator is permitted.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the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

## REFERENCE

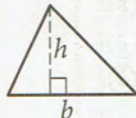


$$A = \pi r^2$$

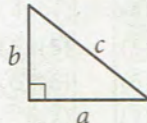
$$C = 2\pi r$$



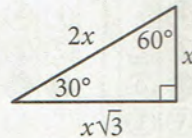
$$A = \ell w$$



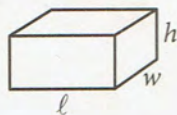
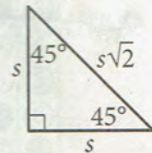
$$A = \frac{1}{2}bh$$



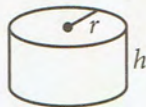
$$c^2 = a^2 + b^2$$



Special Right Triangles



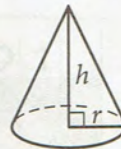
$$V = \ell wh$$



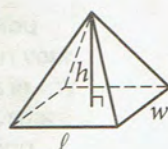
$$V = \pi r^2 h$$



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



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



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

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.



1

Jamal reads a book at a rate of 20 pages per half hour. At this rate, how many hours will it take him to read 80 pages of this book?

- A) 1
- B) 1.5
- C) 2
- D) 3

2

Rita's total bill at a restaurant was \$25.00, including tax. If she left a tip of 20% of the total bill, what was the amount of the tip?

- A) \$3.50
- B) \$4.00
- C) \$4.50
- D) \$5.00

3

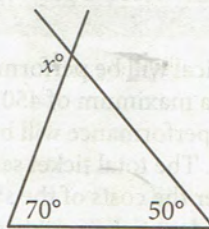
The high temperature, in degrees Fahrenheit ( $^{\circ}\text{F}$ ), in a certain city was recorded for each of 5 days. The data are shown below.

Day	1	2	3	4	5
High temperature ( $^{\circ}\text{F}$ )	81	80	81	81	82

Over this 5-day period, which of the following is NOT equal to  $81^{\circ}\text{F}$ ?

- A) Median of the high temperatures
- B) Mean of the high temperatures
- C) Mode of the high temperatures
- D) Range of the high temperatures

4



In the figure above, two sides of a triangle are extended. What is the value of  $x$ ?

- A) 110
- B) 120
- C) 130
- D) 140



5

The ideal gas law formula is  $PV = nRT$ , where  $P$  is the pressure of the gas,  $V$  is the volume of the gas,  $n$  is the number of moles of gas molecules,  $R$  is a constant, and  $T$  is the absolute temperature of the gas. What is  $n$  in terms of  $P$ ,  $V$ ,  $R$ , and  $T$ ?

- A)  $\frac{PV}{RT}$   
 B)  $\frac{RT}{PV}$   
 C)  $PV + RT$   
 D)  $PV \times RT$

6

A school musical will be performed in an auditorium that can hold a maximum of 450 people. Ticket prices for the performance will be \$8 for students and \$15 for adults. The total ticket sales must be at least \$4,500 to cover the costs of the show. If  $s$  is the number of student tickets sold and  $a$  is the number of adult tickets sold, which of the following systems satisfies these conditions?

- A)  $s + a = 450$   
 $8s + 15a \leq 4,500$   
 B)  $s + a \geq 450$   
 $8s + 15a = 4,500$   
 C)  $s + a \leq 450$   
 $8s + 15a \geq 4,500$   
 D)  $s + a \geq 450$   
 $8s + 15a \geq 4,500$

7

The density of an object is equal to its mass divided by its volume, and gold has a density of 19.3 grams per cubic centimeter. A piece of metal is 25% gold by volume. If the volume of the piece of metal is 8 cubic centimeters, what is the mass of the gold, in grams, in the piece of metal?

- A) 0.60  
 B) 38.6  
 C) 60.3  
 D) 154.4

8

To investigate the effectiveness of a new sleep medication, a researcher selected a random sample of 125 people 30 to 45 years old from a county to take part in a sleep study. Of the following, which is the largest population to which the results of this study can be generalized?

- A) All people 18 years or older in the world  
 B) All people 18 years or older in the county  
 C) All people 30 to 45 years old in the world  
 D) All people 30 to 45 years old in the county



9

$$a(3 - x) - b = -1 - 2x$$

In the equation above,  $a$  and  $b$  are constants. If the equation has infinitely many solutions, what are the values of  $a$  and  $b$ ?

- A)  $a = 2$  and  $b = 1$
- B)  $a = 2$  and  $b = 7$
- C)  $a = -2$  and  $b = 5$
- D)  $a = -2$  and  $b = -5$

Year	Population (in millions)
1970	11.1
1980	11.4
1990	11.7
2000	12.1
2010	12.5

10

The profit, in dollars, that a school will earn from selling tickets to a dance can be modeled by the function  $p(x) = -25x^2 + 400x$ , where  $x$  is the price, in dollars, of each ticket. What is the price per ticket for which the school will earn its maximum profit?

- A) \$8
- B) \$16
- C) \$25
- D) \$400

Region	Percentage of Population
Illinois	11%
Other midwestern states	36%
Southern states	37%
Other	16%

11

$$y = x + 2$$

$$y = x^2$$

A system consisting of a linear equation and a quadratic equation is shown above. If  $(x, y)$  is a solution to the system, which of the following is a possible value of  $x$ ?

- A)  $-2$
- B)  $-1$
- C)  $0$
- D)  $1$

12

Which of the following expressions is equivalent to  $x^2 - 5$ ?

- A)  $(x + \sqrt{5})^2$
- B)  $(x - \sqrt{5})^2$
- C)  $(x + \sqrt{5})(x - \sqrt{5})$
- D)  $(x + 5)(x - 1)$



13

A miniature replica of a full-sized car has a 1:20 scale ratio. For example, a 1-inch measurement on the replica corresponds to a 20-inch measurement on the full-sized car. If the length of the full-sized car is 14 feet, what is the length, in inches, of the replica? (1 foot = 12 inches)

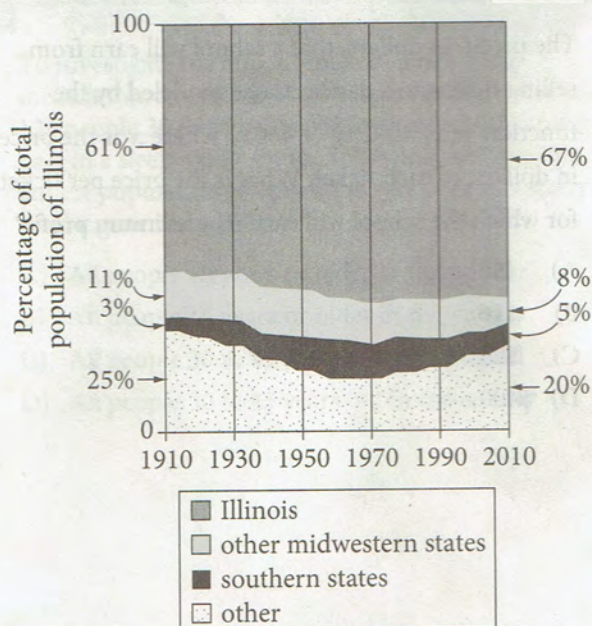
- A) 0.7  
 B) 1.4  
 C) 8.4  
 D) 168.0

Questions 14-16 refer to the following information.

The table below shows the total population of the midwestern state of Illinois in 20-year increments from 1910 to 2010. The graph shows how the percentage of Illinois residents who were born in various regions changed from 1910 to 2010.

Year	Total population of Illinois (in millions)
1910	5.67
1930	7.64
1950	8.74
1970	11.11
1990	11.45
2010	12.80

Birthplaces of People Living in Illinois  
 1910–2010



Adapted from Gregor Aisch et al., "Where We Came from and Where We Went, State by State." ©2014 by the New York Times Company.



14

Of the following, in which year was the largest percentage of the population of Illinois born in Illinois?

- A) 1910
- B) 1930
- C) 1950
- D) 1970

Year	Revenue per unit	Expense per unit
1910	22.00	22.00
1930	22.00	22.00
1950	22.00	22.00
1970	22.00	22.00

15

Approximately how many people living in Illinois in 2010 were born in a midwestern state other than Illinois?

- A) 670,000
- B) 750,000
- C) 1,020,000
- D) 8,580,000

16

In 1990, about 800,000 people living in Illinois were born in a southern state. If 5,000 people who lived in Illinois in 1990 were selected at random, about how many would be expected to have been born in a southern state?

- A) 160
- B) 350
- C) 625
- D) 1,431

17

Coat color	Eye color		Total
	Deep blue	Light brown	
Cream-tortoiseshell	16	16	32
Chocolate	12	4	16
Total	28	20	48

The data on the coat color and eye color for 48 Himalayan kittens available for adoption were collected and summarized in the table above. What fraction of the chocolate-colored kittens has deep blue eyes?

- A)  $\frac{12}{48}$
- B)  $\frac{12}{28}$
- C)  $\frac{16}{32}$
- D)  $\frac{12}{16}$





18

$$\left(\frac{1}{2}x + 3\right) - \left(\frac{2}{3}x - 5\right)$$

Which of the following is equivalent to the expression above?

- A)  $-\frac{1}{6}x + 8$
- B)  $-\frac{1}{6}x - 2$
- C)  $-\frac{1}{3}x^2 + \frac{1}{2}x + 15$
- D)  $-\frac{1}{3}x^2 - \frac{9}{2}x - 15$

Eye color	Coat color		Total
	Deep blue	Light brown	
Green	10	10	20
Chocolate	12	4	16
Total	22	14	36

Questions 19 and 20 refer to the following information.

Matthew and Claire each sell fishing lures on the Internet. Matthew's profit, in dollars, for selling  $x$  lures at \$6.50 per lure can be modeled by the expression  $6.5x - 4.25x - 125$ . Claire's revenue and expenses for selling her fishing lures are shown in the table below.

Claire's Lures

Revenue per lure	Expense per lure	Onetime start-up expense
\$5.50	\$3.00	\$200

Profit = Revenue - Expenses

19

If Matthew and Claire sold the same number of lures and made the same profit, how many lures did each person sell?

- A) 60
- B) 300
- C) 325
- D) 1,300



20

If Matthew had instead decided to sell the lures for 20% less than his price of \$6.50 per lure and his expenses including the start-up cost remained the same, which of the following functions  $f$  would model his profit, in dollars, in terms of the number of lures sold,  $x$ ?

- A)  $f(x) = 0.95x - 125$   
 B)  $f(x) = 0.95x - 100$   
 C)  $f(x) = 3.1x - 125$   
 D)  $f(x) = 3.1x - 100$

21

	Human Resources	Accounting
Bachelor's degree	4	3
Master's degree	2	6

The table above shows the number of people who work in the Human Resources and Accounting departments of a company and the highest level of education they have completed. A person from one of these departments is to be chosen at random. If the person chosen works in the Human Resources department, what is the probability that the highest level of education the person completed is a master's degree?

- A)  $\frac{2}{15}$   
 B)  $\frac{1}{3}$   
 C)  $\frac{1}{4}$   
 D)  $\frac{8}{15}$

22

A certain commuter train has a maximum speed of 55 miles per hour. What is the train's maximum speed, in feet per second, rounded to the nearest whole number? (1 mile = 5,280 feet)

- A) 96  
 B) 88  
 C) 81  
 D) 38



23

Penguin Exhibit

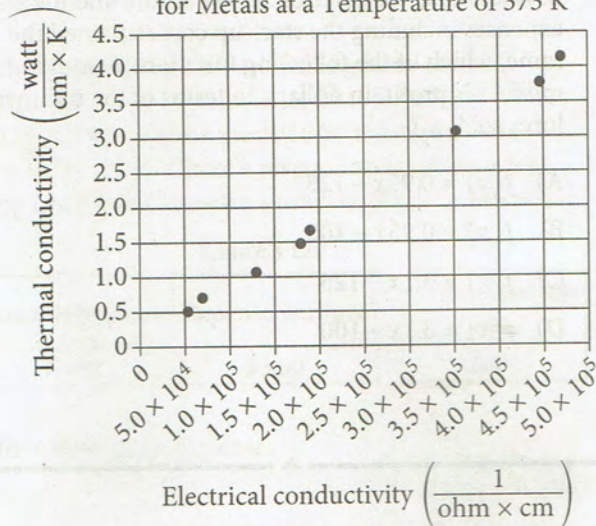
Type of penguin	Male	Female	Total
Chinstrap	41	59	100
Emperor	8	27	35
Gentoo	49	54	103
Macaroni	42	40	82
Total	140	180	320

The number of penguins in a zoo exhibit, sorted by gender and type of penguin, is shown in the table above. Which type of penguin has a female

population that is the closest to being  $\frac{1}{3}$  of the total female penguin population in the exhibit?

- A) Chinstrap
- B) Emperor
- C) Gentoo
- D) Macaroni

24

Conductivity Relationship  
for Metals at a Temperature of 373 K

Eight different metals are heated to 373 kelvins (K).

The electrical conductivity of each metal is measured in  $\frac{1}{\text{ohm} \times \text{cm}}$ , and the thermal conductivity of each metal is measured in  $\frac{\text{watt}}{\text{cm} \times \text{K}}$ . The data for each

metal are recorded in the scatterplot above. Based on the graph, which of the following best predicts the

thermal conductivity, in  $\frac{\text{watt}}{\text{cm} \times \text{K}}$ , for a metal whose electrical conductivity is  $2.8 \times 10^5 \frac{1}{\text{ohm} \times \text{cm}}$ ?

- A) 1
- B) 2.5
- C) 3.5
- D) 4.5



25

The function  $f$  is defined by  $f(x) = px + 8$ , where  $p$  is a constant. If the graph of  $f$  in the  $xy$ -plane has an  $x$ -intercept of 4, what is the value of  $p$ ?

- A)  $-2$   
 B)  $1$   
 C)  $\frac{1}{2}$   
 D)  $2$

26

	Amount invested	Balance increase
Account A	\$500	6% annual interest
Account B	\$1,000	\$25 per year

Two investments were made as shown in the table above. The interest in Account A is compounded once per year. Which of the following is true about the investments?

- A) Account A always earns more money per year than Account B.  
 B) Account A always earns less money per year than Account B.  
 C) Account A earns more money per year than Account B at first but eventually earns less money per year.  
 D) Account A earns less money per year than Account B at first but eventually earns more money per year.

27

According to data provided by the US Department of Energy, the average price per gallon of regular gasoline in the United States from September 1, 2014, to December 1, 2014, is modeled by the function  $F$  defined below, where  $F(x)$  is the average price per gallon  $x$  months after September 1.

$$F(x) = 2.74 - 0.19(x - 3)$$

The constant 2.74 in this function estimates which of the following?

- A) The average monthly decrease in the price per gallon  
 B) The difference in the average price per gallon from September 1, 2014, to December 1, 2014  
 C) The average price per gallon on September 1, 2014  
 D) The average price per gallon on December 1, 2014


**DIRECTIONS**

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

- 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.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
- Mixed numbers** such as  $3\frac{1}{2}$  must be gridded as 3.5 or 7/2. (If 

3	1	/	2
.	.	.	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

 is entered into the grid, it will be interpreted as  $\frac{31}{2}$ , not  $3\frac{1}{2}$ .)
- 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.

Write answer in boxes.

Grid in result.

Answer:  $\frac{7}{12}$

7	/	1	2
.	.	.	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

← Fraction line

Answer: 2.5

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

← Decimal point

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

2	/	3	
.	.	.	.
0	0	0	0
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

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

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

Answer: 201 – either position is correct

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

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

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



28

In the  $xy$ -plane, the lines with equations  $4x - 8y = 16$  and  $3x + 3y = 30$  intersect at the point  $(x, y)$ . What is the value of  $x + y$  ?

29

$x$	$f(x)$
-2	-5
-1	0
0	3
1	4
2	3

The table above gives values of the quadratic function  $f$  for selected values of  $x$ . The quadratic function  $g$  is defined by  $g(x) = -x^2 + 2x + 15$ . The maximum value of  $g(x)$  is how many units greater than the maximum value of  $f(x)$  ?

Tree trunk diameter $x$ (inches)	Number of trees	Growing stock volume (cubic feet)
$1 \leq x < 2$	11,448	2,292,000
$2 \leq x < 3$	3,944	10,250,000
$3 \leq x < 4$	1,232	27,600,000
$4 \leq x < 5$	263	11,202,500
$5 \leq x < 6$		
$6 \leq x < 7$		
$7 \leq x < 8$		
$8 \leq x < 9$		
Total	17,905	72,294,500



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

Estimates of the number of living trees contained in the United States and their growing stock volumes are made by the Forest Inventory and Analysis National Program. Growing stock volume is the total volume of living trees that have a trunk diameter that falls into a specified range.

The partially completed table below shows the number of live trees reported to be in the US territory of American Samoa in 2007 sorted by diameter. No information was given about trees with a trunk diameter of less than 1 inch.

Trees in American Samoa

Tree trunk diameter, $x$ (inches)	Number of trees	Growing stock volume (cubic feet)
$1 \leq x < 5$	11,445	5,592,000
$5 \leq x < 9$	3,944	16,850,000
$9 \leq x < 13$	1,555	17,860,000
$13 \leq x < 17$	565	11,505,000
$17 \leq x < 21$		
$21 \leq x$		
Total	17,905	72,291,000

30

What is the mean volume, in cubic feet, of a living tree reported to be in American Samoa in 2007 with a tree trunk diameter greater than or equal to 1 inch but less than 0.75 feet? Round your answer to the nearest whole number.

(1 foot = 12 inches)

31

To the nearest hundredth of a percent, 13.02% of the 17,905 trees reported to be in American Samoa in 2007 had a trunk diameter greater than or equal to 9 inches but less than 21 inches. To the nearest whole number, how many of the reported trees had a trunk diameter greater than or equal to 17 inches but less than 21 inches?

## STOP

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

# Question-Level Feedback

## Reading

Question #	Correct	Difficulty	Subscore	Cross-Test Score
1	C	■ ■ ■		
2	A	■ ■ ■		
3	B	■ ■ ■		
4	B	■ ■ ■		
5	D	■ ■ ■	WIC	
6	D	■ ■ ■		
7	B	■ ■ ■	COE	
8	C	■ ■ ■		
9	A	■ ■ ■	WIC	
10	D	■ ■ ■		HSS
11	D	■ ■ ■	COE	HSS
12	B	■ ■ ■		HSS
13	A	■ ■ ■		HSS
14	A	■ ■ ■	WIC	HSS
15	B	■ ■ ■	WIC	HSS
16	B	■ ■ ■		HSS
17	B	■ ■ ■		HSS
18	D	■ ■ ■	COE	HSS
19	C	■ ■ ■	WIC	SCI
20	D	■ ■ ■	WIC	SCI
21	B	■ ■ ■		SCI
22	B	■ ■ ■		SCI
23	C	■ ■ ■		SCI
24	D	■ ■ ■		SCI
25	B	■ ■ ■		SCI
26	C	■ ■ ■	COE	SCI
27	A	■ ■ ■	COE	SCI
28	D	■ ■ ■		HSS
29	A	■ ■ ■		HSS
30	D	■ ■ ■		HSS
31	B	■ ■ ■		HSS
32	A	■ ■ ■	COE	HSS
33	A	■ ■ ■	WIC	HSS
34	B	■ ■ ■	WIC	HSS
35	A	■ ■ ■		HSS
36	D	■ ■ ■	COE	HSS
37	C	■ ■ ■	COE	HSS
38	C	■ ■ ■		SCI
39	B	■ ■ ■		SCI
40	D	■ ■ ■		SCI
41	C	■ ■ ■		SCI
42	C	■ ■ ■	COE	SCI
43	A	■ ■ ■	WIC	SCI
44	C	■ ■ ■		SCI
45	B	■ ■ ■		SCI
46	C	■ ■ ■	COE	SCI
47	D	■ ■ ■	WIC	SCI

## Writing and Language

Question #	Correct	Difficulty	Subscore	Cross-Test Score
1	D	■ ■ ■	WIC, EOI	
2	A	■ ■ ■	COE, EOI	
3	C	■ ■ ■	SEC	
4	D	■ ■ ■	SEC	
5	B	■ ■ ■	SEC	
6	D	■ ■ ■	EOI	
7	B	■ ■ ■	WIC, EOI	
8	B	■ ■ ■	SEC	
9	C	■ ■ ■	SEC	
10	C	■ ■ ■	COE, EOI	
11	C	■ ■ ■	EOI	
12	B	■ ■ ■	EOI	SCI
13	A	■ ■ ■	EOI	SCI
14	C	■ ■ ■	SEC	
15	A	■ ■ ■	SEC	
16	B	■ ■ ■	SEC	
17	A	■ ■ ■	COE, EOI	SCI
18	A	■ ■ ■	SEC	
19	B	■ ■ ■	SEC	
20	D	■ ■ ■	WIC, EOI	SCI
21	C	■ ■ ■	WIC, EOI	SCI
22	D	■ ■ ■	COE, EOI	SCI
23	A	■ ■ ■	WIC, EOI	
24	B	■ ■ ■	SEC	
25	C	■ ■ ■	SEC	
26	D	■ ■ ■	EOI	
27	B	■ ■ ■	COE, EOI	
28	B	■ ■ ■	SEC	
29	D	■ ■ ■	COE, EOI	
30	A	■ ■ ■	SEC	
31	B	■ ■ ■	EOI	
32	D	■ ■ ■	WIC, EOI	
33	C	■ ■ ■	SEC	
34	A	■ ■ ■	SEC	
35	D	■ ■ ■	SEC	
36	D	■ ■ ■	SEC	
37	D	■ ■ ■	COE, EOI	HSS
38	C	■ ■ ■	SEC	
39	D	■ ■ ■	SEC	
40	C	■ ■ ■	COE, EOI	HSS
41	C	■ ■ ■	WIC, EOI	HSS
42	A	■ ■ ■	EOI	HSS
43	B	■ ■ ■	WIC, EOI	HSS
44	B	■ ■ ■	EOI	HSS

## Math Test – Calculator

Question #	Correct	Difficulty	Subscore	Cross-Test Score
1	C	■ ■ ■	PSD	
2	D	■ ■ ■	PSD	
3	D	■ ■ ■	PSD	
4	B	■ ■ ■		
5	A	■ ■ ■	PAM	SCI
6	C	■ ■ ■	HOA	
7	B	■ ■ ■	HOA	SCI
8	D	■ ■ ■	PSD	SCI
9	B	■ ■ ■	HOA	
10	A	■ ■ ■	PAM	
11	B	■ ■ ■	PAM	
12	C	■ ■ ■	PAM	
13	C	■ ■ ■	PSD	
14	D	■ ■ ■	PSD	HSS

Question #	Correct	Difficulty	Subscore	Cross-Test Score
15	C	■ ■ ■	PSD	HSS
16	B	■ ■ ■	PSD	HSS
17	D	■ ■ ■	PSD	
18	A	■ ■ ■	PAM	
19	B	■ ■ ■	HOA	
20	A	■ ■ ■	HOA	
21	B	■ ■ ■	PSD	HSS
22	C	■ ■ ■	PSD	SCI
23	A	■ ■ ■	PSD	SCI
24	B	■ ■ ■	PSD	SCI
25	A	■ ■ ■	HOA	
26	A	■ ■ ■	PSD	HSS
27	D	■ ■ ■	HOA	HSS

Question #	Correct	Difficulty	Subscore	Cross-Test Score
28	10	■ ■ ■	HOA	
29	12	■ ■ ■	PAM	
30	1458	■ ■ ■	PSD	
31	211, 212	■ ■ ■	PSD	

## Math Test – No Calculator

Question #	Correct	Difficulty	Subscore	Cross-Test Score
1	B	■ ■ ■	HOA	
2	C	■ ■ ■	HOA	
3	B	■ ■ ■	PAM	
4	C	■ ■ ■	HOA	
5	C	■ ■ ■	PAM	
6	A	■ ■ ■	HOA	
7	A	■ ■ ■	PAM	SCI

Question #	Correct	Difficulty	Subscore	Cross-Test Score
8	D	■ ■ ■	PAM	
9	A	■ ■ ■	PAM	
10	D	■ ■ ■	HOA	
11	B	■ ■ ■	PAM	HSS
12	C	■ ■ ■	PAM	
13	D	■ ■ ■	HOA	

Question #	Correct	Difficulty	Subscore	Cross-Test Score
14	4	■ ■ ■		
15	2	■ ■ ■	HOA	
16				
17	20	■ ■ ■	HOA	

### Subscore

- COE Command of Evidence
- WIC Words in Context
- EOI Expression of Ideas
- SEC Standard English Conventions
- HOA Heart of Algebra
- PSD Problem Solving and Data Analysis
- PAM Passport to Advanced Math

### Key:

- ✓ Correct
- ⊘ Omitted
- U Unscorable
- ■ ■ Easy
- ■ ■ Medium
- ■ ■ Hard

### Cross-Test Score:

- HSS Analysis in History/Social Studies
- SCI Analysis in Science

Access Code  
**PGDM2DUPXF**

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