The SAT®

Practice Test #7

Make time to take the practice test.
It's one of the best ways to get ready for the SAT.

After you've taken the practice test, score it right away at sat.org/scoring.

CollegeBoard

© 2016 The College Board. College Board, SAT, and the acorn logo are registered trademarks of the College Board.

K2-5MSA07

1

Reading Test

65 MINUTES, 52 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 1-10 are based on the following passage.

This passage is adapted from George Eliot, *Silas Marner*. Originally published in 1861. Silas was a weaver and a notorious miser, but then the gold he had hoarded was stolen. Shortly after, Silas adopted a young child, Eppie, the daughter of an impoverished woman who had died suddenly.

Unlike the gold which needed nothing, and must be worshipped in close-locked solitude—which was hidden away from the daylight, was deaf to the song of birds, and started to no human tones—Eppie was a creature of endless claims and ever-growing desires, seeking and loving sunshine, and living sounds, and living movements; making trial of everything, with trust in new joy, and stirring the human kindness in all eyes that looked on her. The gold had kept his thoughts in an ever-repeated circle, leading to nothing beyond itself; but Eppie was an object compacted of changes and hopes that forced his thoughts onward, and carried them far away from their old eager pacing towards the same blank limit—carried them away to the new things that would come with the coming years, when Eppie would have learned to understand how her father Silas cared for her; and made him look for images of that time in the ties and charities that bound together the families of his neighbors. The gold had asked that he should sit weaving longer and longer, deafened and blinded more and more to all things except the monotony of his loom and the repetition of his web; but Eppie called him away from his weaving, and made him think all its pauses a holiday, reawakening his senses with her fresh life, even to the old winter-flies that came crawling forth in the early spring sunshine, and warming him into joy because *she* had joy.

And when the sunshine grew strong and lasting, so that the buttercups were thick in the meadows, Silas might be seen in the sunny mid-day, or in the late afternoon when the shadows were lengthening under the hedgerows, strolling out with uncovered head to carry Eppie beyond the Stone-pits to where the flowers grew, till they reached some favorite bank where he could sit down, while Eppie toddled to pluck the flowers, and make remarks to the winged things that murmured happily above the bright petals, calling "Dad-dad's" attention continually by bringing him the flowers. Then she would turn her ear to some sudden bird-note, and Silas learned to please her by making signs of hushed stillness, that they might listen for the note to come again: so that when it came, she set up her small back and laughed with gurgling triumph. Sitting on the banks in this way, Silas began to look for the once familiar herbs again; and as the leaves, with their unchanged outline and markings, lay on his palm, there was a sense of crowding remembrances from which he turned away timidly, taking refuge in Eppie's little world, that lay lightly on his enfeebled spirit.

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

1

expanding awareness

As the child's mind was growing into knowledge, his mind was growing into memory: as her life unfolded, his soul, long stupefied in a cold narrow prison, was unfolding too, and trembling gradually into full consciousness. ← engagement with life

It was an influence which must gather force with every new year: the tones that stirred Silas' heart grew articulate, and called for more distinct answers; shapes and sounds grew clearer for Eppie's eyes and ears, and there was more that "Dad-dad" was imperatively required to notice and account for. Also, by the time Eppie was three years old, she developed a keen capacity for mischief, and for devising ingenious ways of being troublesome, which found much exercise, not only for Silas' patience, but for his watchfulness and penetration. Sorely was poor Silas puzzled on such occasions by the incompatible demands of love.

8, 9

1

Which choice best describes a major theme of the passage?

A) The corrupting influence of a materialistic society

B) The moral purity of young children

C) The bittersweet brevity of childhood naïveté

(D) The restorative power of parental love

2

As compared with Silas's gold, Eppie is portrayed as having more

(A) vitality.

B) durability.

C) protection.

D) self-sufficiency.

She is vibrant and alive. Having more vitality means being more alive

3

Which statement best describes a technique the narrator uses to represent Silas's character before he adopted Eppie?

(A) The narrator emphasizes Silas's former obsession with wealth by depicting his gold as requiring certain behaviors on his part.

B) The narrator underscores Silas's former greed by describing his gold as seeming to reproduce on its own.

C) The narrator hints at Silas's former antisocial attitude by contrasting his present behavior toward his neighbors with his past behavior toward them. Doesn't mention his past behavior toward neighbors

D) The narrator demonstrates Silas's former lack of self-awareness by implying that he is unable to recall life before Eppie.

4

The narrator uses the phrase "making trial of everything" (line 7) to present Eppie as

A) friendly.

(B) curious.

C) disobedient.

D) judgmental.

She tried everything

5

According to the narrator, one consequence of Silas adopting Eppie is that he

A) has renounced all desire for money.

B) better understands his place in nature.

C) seems more accepting of help from others.

(D) looks forward to a different kind of future.

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

1

6

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

A) Lines 9-11 ("The gold . . . itself")
B) Lines 11-16 ("but Eppie . . . years")
C) Lines 41-43 ("Then . . . stillness")
D) Lines 61-63 ("shapes . . . for")

7

What function does the second paragraph (lines 30-52) serve in the passage as a whole?

A) It presents the particular moment at which Silas realized that Eppie was changing him.
B) It highlights Silas's love for Eppie by depicting the sacrifices that he makes for her.
C) It illustrates the effect that Eppie has on Silas by describing the interaction between them.
D) It reveals a significant alteration in the relationship between Silas and Eppie.

8

In describing the relationship between Eppie and Silas, the narrator draws a connection between Eppie's

A) physical vulnerability and Silas's emotional fragility.
B) expanding awareness and Silas's increasing engagement with life.
C) boundless energy and Silas's insatiable desire for wealth.
D) physical growth and Silas's painful perception of his own mortality.

9

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

A) Lines 1-9 ("Unlike . . . her")
B) Lines 30-41 ("And when . . . flowers")
C) Lines 46-48 ("Sitting . . . again")
D) Lines 53-57 ("As the . . . consciousness")

10

As used in line 65, "fine" most nearly means

A) acceptable.
B) delicate.
C) ornate.
D) keen. → sharp/smart

Unauthorized copying or reuse of any part of this page is illegal.

1

Questions 11-21 are based on the following passage and supplementary material.

This passage is adapted from David Rotman, "How Technology Is Destroying Jobs." ©2013 by MIT Technology Review.

MIT business scholars Erik Brynjolfsson and Andrew McAfee have argued that impressive advances in computer technology—from improved industrial robotics to automated translation services—are largely behind the sluggish employment growth of the last 10 to 15 years. Even more ominous for workers, they foresee dismal prospects for many types of jobs as these powerful new technologies are increasingly adopted not only in manufacturing, clerical, and retail work but in professions such as law, financial services, education, and medicine.

That robots, automation, and software can replace people might seem obvious to anyone who's worked in automotive manufacturing or as a travel agent. But Brynjolfsson and McAfee's claim is more troubling and controversial. They believe that rapid technological change has been destroying jobs faster than it is creating them, contributing to the stagnation of median income and the growth of inequality in the United States. And, they suspect, something similar is happening in other technologically advanced countries.

As evidence, Brynjolfsson and McAfee point to a chart that only an economist could love. In economics, productivity—the amount of economic value created for a given unit of input, such as an hour of labor—is a crucial indicator of growth and wealth creation. It is a measure of progress. On the chart Brynjolfsson likes to show, separate lines represent productivity and total employment in the United States. For years after World War II, the two lines closely tracked each other, with increases in jobs corresponding to increases in productivity. The pattern is clear: as businesses generated more value from their workers, the country as a whole became richer, which fueled more economic activity and created even more jobs. Then, beginning in 2000, the lines diverge; productivity continues to rise robustly, but employment suddenly wilts. By 2011, a significant gap appears between the two lines, showing economic growth with no parallel increase in job creation. Brynjolfsson and McAfee call it the "great decoupling." And Brynjolfsson says he is confident that technology is behind both the healthy growth in productivity and the weak growth in jobs.

It's a startling assertion because it threatens the faith that many economists place in technological progress. Brynjolfsson and McAfee still believe that technology boosts productivity and makes societies wealthier, but they think that it can also have a dark side: technological progress is eliminating the need for many types of jobs and leaving the typical worker worse off than before. Brynjolfsson can point to a second chart indicating that median income is failing to rise even as the gross domestic product soars. "It's the great paradox of our era," he says. "Productivity is at record levels, innovation has never been faster, and yet at the same time, we have a falling median income and we have fewer jobs. People are falling behind because technology is advancing so fast and our skills and organizations aren't keeping up."

While technological changes can be painful for workers whose skills no longer match the needs of employers, Lawrence Katz, a Harvard economist, says that no historical pattern shows these shifts leading to a net decrease in jobs over an extended period. Katz has done extensive research on how technological advances have affected jobs over the last few centuries—describing, for example, how highly skilled artisans in the mid-19th century were displaced by lower-skilled workers in factories. While it can take decades for workers to acquire the expertise needed for new types of employment, he says, "we never have run out of jobs. There is no long-term trend of eliminating work for people. Over the long term, employment rates are fairly stable. People have always been able to create new jobs. People come up with new things to do."

Still, Katz doesn't dismiss the notion that there is something different about today's digital technologies—something that could affect an even broader range of work. The question, he says, is whether economic history will serve as a useful

Unauthorized copying or reuse of any part of this page is illegal.

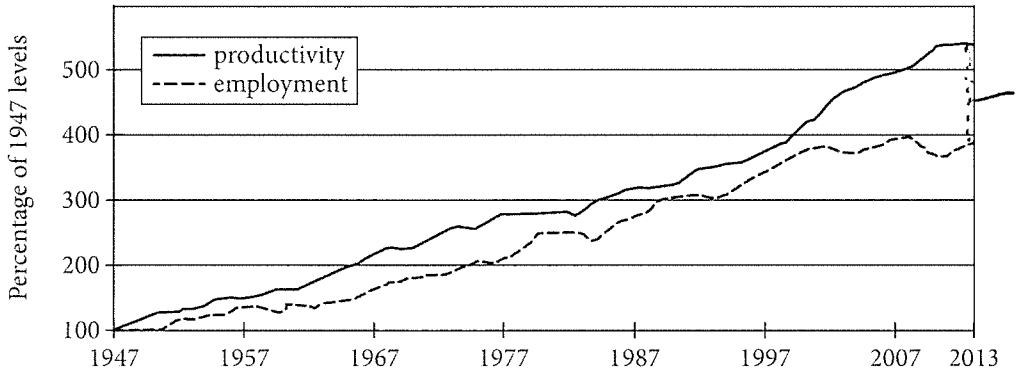
CONTINUE

1

guide. Will the job disruptions caused by technology be temporary as the workforce adapts, or will we see a science-fiction scenario in which automated processes and robots with superhuman skills take over a broad swath of human tasks? Though Katz expects the historical pattern to hold, it is "genuinely a question," he says. "If technology disrupts enough, who knows what will happen?"

Figure 1

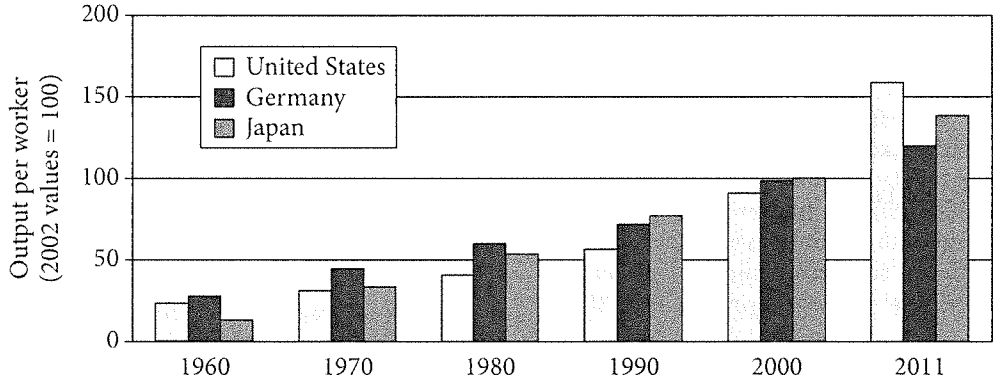
United States Productivity and Employment



(indexed: 1947 = 100)

Figure 2

Output per Employed Person in Manufacturing as Factories Have Become More Automated



Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

1

11

The main purpose of the passage is to

A) examine the role of technology in workers' lives during the last century.

B) advocate for better technology to enhance workplace conditions.

C) argue for changes in how technology is deployed in the workplace.

D) assess the impact of advancements in technology on overall job growth.

12

According to Brynjolfsson and McAfee, advancements in technology since approximately the year 2000 have resulted in

A) low job growth in the United States.

B) global workplace changes.

C) more skilled laborers in the United States.

D) no global creation of new jobs.

13

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

A) Lines 1-6 ("MIT . . . years")

B) Lines 13-15 ("That . . . agent")

C) Lines 21-23 ("And . . . countries")

D) Lines 35-38 ("as businesses . . . jobs")

14

The primary purpose of lines 26-28 ("the amount . . . labor") is to

A) describe a process.

B) highlight a dilemma.

C) clarify a claim.

D) explain a term.

These lines define "productivity"

15

As used in line 35, "clear" most nearly means

A) pure.

B) keen.

C) untroubled.

D) unmistakable.

16

Which of the following best characterizes Katz's attitude toward "today's digital technologies" (lines 81-82)?

A) He is alarmed about countries' increasing reliance on them.

B) He is unconcerned about their effect on the economy.

C) He is uncertain how they might affect job growth.

D) He is optimistic that they will spur job creation to a degree not seen since the mid-nineteenth century.

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

1

17

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

A) Lines 68-72 ("Katz . . . factories")
B) Lines 73-75 ("While . . . jobs")
C) Line 79 ("People come . . . do")
D) Lines 91-92 ("If . . . happen")

18

As used in line 83, "range" most nearly means

A) region.
B) scope.
C) distance.
D) position.

19

According to figure 1, which of the following years showed the widest gap between percentages of productivity and employment?

A) 1987
B) 1997
C) 2007
D) 2013

20

Which statement is supported by figure 2?

A) The country with the greatest growth in output per manufacturing worker from 1960 to 1990 was Germany. x Japan
B) Japan experienced its smallest increase in output per manufacturing worker from 2000 to 2011. x That is its largest increase
C) Each of the three countries experienced an increase in its output per manufacturing worker from 1960 to 2011. Each bar is taller than in 1960
D) Of the three countries, the United States had the greatest output per manufacturing worker for each of the years shown. x Only for 2011

21

Which additional information, if presented in figure 2, would be most useful in evaluating the statement in lines 57-60 ("Productivity . . . jobs")?

A) The median income of employees as it compares across all three countries in a single year
B) The number of people employed in factories from 1960 to 2011 — The first part of the statement is supported by figure 2, but we need to know about jobs to evaluate the 2nd part.
C) The types of organizations at which output of employed persons was measured
D) The kinds of manufacturing tasks most frequently taken over by machines

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

1

Questions 22-31 are based on the following passage.

This passage is adapted from Patricia Waldron, "Why Birds Fly in a V Formation." ©2014 by American Association for the Advancement of Science.

Anyone watching the autumn sky knows that migrating birds fly in a V formation, but scientists have long debated why. A new study of ibises finds that these big-winged birds carefully position their wingtips and sync their flapping, presumably to catch the preceding bird's updraft—and save energy during flight.

There are two reasons birds might fly in a V formation: It may make flight easier, or they're simply following the leader. Squadrons of planes can save fuel by flying in a V formation, and many scientists suspect that migrating birds do the same. Models that treated flapping birds like fixed-wing airplanes estimate that they save energy by drafting off each other, but currents created by airplanes are far more stable than the oscillating eddies coming off of a bird. "Air gets pretty unpredictable behind a flapping wing," says James Usherwood, a locomotor biomechanist at the Royal Veterinary College at the University of London in Hatfield, where the research took place.

The study, published in *Nature*, took advantage of an existing project to reintroduce endangered northern bald ibises (*Geronticus eremita*) to Europe. Scientists used a microlight plane to show hand-raised birds their ancestral migration route from Austria to Italy. A flock of 14 juveniles carried data loggers specially built by Usherwood and his lab. The device's GPS determined each bird's flight position to within 30 cm, and an accelerometer showed the timing of the wing flaps.

Just as aerodynamic estimates would predict, the birds positioned themselves to fly just behind and to the side of the bird in front, timing their wing beats to catch the uplifting eddies. When a bird flew directly behind another, the timing of the flapping reversed so that it could minimize the effects of the downdraft coming off the back of the bird's body. "We didn't think this was possible," Usherwood says, considering that the feat requires careful flight and incredible awareness of one's neighbors. "Perhaps these big V formation birds can be thought of quite like an airplane with wings that go up and down."

The findings likely apply to other long-winged birds, such as pelicans, storks, and geese, Usherwood says. Smaller birds create more complex wakes that would make drafting too difficult. The researchers did not attempt to calculate the bird's energy savings because the necessary physiological measurements would be too invasive for an endangered species. Previous studies estimate that birds can use 20 percent to 30 percent less energy while flying in a V.

"From a behavioral perspective it's really a breakthrough," says David Lentink, a mechanical engineer at Stanford University in Palo Alto, California, who was not involved in the work. "Showing that birds care about syncing their wing beats is definitely an important insight that we didn't have before."

Scientists do not know how the birds find that aerodynamic sweet spot, but they suspect that the animals align themselves either by sight or by sensing air currents through their feathers. Alternatively, they may move around until they find the location with the least resistance. In future studies, the researchers will switch to more common birds, such as pigeons or geese. They plan to investigate how the animals decide who sets the course and the pace, and whether a mistake made by the leader can ripple through the rest of the flock to cause traffic jams.

"It's a pretty impressive piece of work as it is, but it does suggest that there's a lot more to learn," says Ty Hedrick, a biologist at the University of North Carolina, Chapel Hill, who studies flight aerodynamics in birds and insects. However they do it, he says, "birds are awfully good hang-glider pilots."

22

The main purpose of the passage is to

A) describe how squadrons of planes can save fuel by flying in a V formation.

B) discuss the effects of downdrafts on birds and airplanes.

C) explain research conducted to study why some birds fly in a V formation.

D) illustrate how birds sense air currents through their feathers.

1

23

The author includes the quotation "Air gets pretty unpredictable behind a flapping wing" (lines 17-18) to

(A) explain that the current created by a bird differs from that of an airplane.

B) stress the amount of control exerted by birds flying in a V formation.

C) indicate that wind movement is continuously changing.

D) emphasize that the flapping of a bird's wings is powerful.

24

What can reasonably be inferred about the reason Usherwood used northern bald ibises as the subjects of his study?

A) The ibises were well acquainted with their migration route.

B) Usherwood knew the ibises were familiar with carrying data loggers during migration.

C) The ibises have a body design that is similar to that of a modern airplane.

(D) The ibises were easily accessible for Usherwood and his team to track and observe.

25

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

A) Lines 3-7 ("A new . . . flight")

B) Lines 10-12 ("Squadrons . . . same")

(C) Lines 22-24 ("The study . . . Europe")

D) Lines 29-31 ("The device's . . . flaps")

26

What is the most likely reason the author includes the 30 cm measurement in line 30?

(A) To demonstrate the accuracy with which the data loggers collected the data

B) To present recorded data about how far an ibis flies between successive wing flaps

C) To provide the wingspan length of a juvenile ibis

D) To show how far behind the microlight plane each ibis flew

27

What does the author imply about pelicans, storks, and geese flying in a V formation?

A) They communicate with each other in the same way as do ibises.

B) They have the same migration routes as those of ibises.

(C) They create a similar wake to that of ibises.

D) They expend more energy than do ibises.

28

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

A) Lines 35-38 ("When . . . body")

(B) Lines 47-48 ("Smaller . . . difficult")

C) Lines 52-54 ("Previous . . . a V")

D) Lines 66-67 ("Alternatively . . . resistance")

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

1

29

What is a main idea of the seventh paragraph (lines 62-73)?

A) Different types of hierarchies exist in each flock of birds.

B) Mistakes can happen when long-winged birds create a V formation.

C) Future research will help scientists to better understand V formations.

D) Long-winged birds watch the lead bird closely to keep a V formation intact.

30

The author uses the phrase "aerodynamic sweet spot" in line 63 most likely to

A) describe how the proper structural design of an airplane helps to save fuel.

B) show that flying can be an exhilarating experience.

C) describe the birds' synchronized wing movement.

D) suggest that a certain position in a V formation has the least amount of wind resistance.

31

As used in line 72, "ripple" most nearly means

A) fluctuate.

B) spread.

C) wave.

D) undulate.

1

Questions 32-41 are based on the following passages.

Passage 1 is adapted from Alexis de Tocqueville, *Democracy in America, Volume 2*. Originally published in 1840. Passage 2 is adapted from Harriet Taylor Mill, "Enfranchisement of Women." Originally published in 1851. As United States and European societies grew increasingly democratic during the nineteenth century, debates arose about whether freedoms enjoyed by men should be extended to women as well.

Passage 1

I have shown how democracy destroys or modifies the different inequalities which originate in society; but is this all? or does it not ultimately affect
Line that great inequality of man and woman which has
5 seemed, up to the present day, to be eternally based in human nature? I believe that the social changes which bring nearer to the same level the father and son, the master and servant, and superiors and inferiors generally speaking, will raise woman and
10 make her more and more the equal of man. But here, more than ever, I feel the necessity of making myself clearly understood; for there is no subject on which the coarse and lawless fancies of our age have taken a freer range.

15 There are people in Europe who, confounding together the different characteristics of the sexes, would make of man and woman beings not only equal but alike. They would give to both the same functions, impose on both the same duties, and grant
20 to both the same rights; they would mix them in all things—their occupations, their pleasures, their business. It may readily be conceived, that by thus attempting to make one sex equal to the other, both are degraded; and from so preposterous a medley of
25 the works of nature nothing could ever result but weak men and disorderly women.

It is not thus that the Americans understand that species of democratic equality which may be established between the sexes. They admit, that as
30 nature has appointed such wide differences between the physical and moral constitution of man and woman, her manifest design was to give a distinct employment to their various faculties; and they hold that improvement does not consist in making beings
35 so dissimilar do pretty nearly the same things, but in getting each of them to fulfill their respective tasks in the best possible manner. The Americans have applied to the sexes the great principle of political economy which governs the manufactures of our age,
40 by carefully dividing the duties of man from those of woman, in order that the great work of society may be the better carried on.

Passage 2

As society was constituted until the last few generations, inequality was its very basis; association
45 grounded on equal rights scarcely existed; to be equals was to be enemies; two persons could hardly coöperate in anything, or meet in any amicable relation, without the law's appointing that one of them should be the superior of the other.

50 Mankind have outgrown this state, and all things now tend to substitute, as the general principle of human relations, a just equality, instead of the dominion of the strongest. But of all relations, that between men and women, being the nearest and
55 most intimate, and connected with the greatest number of strong emotions, was sure to be the last to throw off the old rule, and receive the new; for, in proportion to the strength of a feeling is the tenacity with which it clings to the forms and
60 circumstances with which it has even accidentally become associated. . . .

. . . The proper sphere for all human beings is the largest and highest which they are able to attain to. What this is, cannot be ascertained without complete
65 liberty of choice. . . . Let every occupation be open to all, without favor or discouragement to any, and employments will fall into the hands of those men or women who are found by experience to be most capable of worthily exercising them. There need be
70 no fear that women will take out of the hands of men any occupation which men perform better than they. Each individual will prove his or her capacities, in the only way in which capacities can be proved,—by trial; and the world will have the benefit of the best
75 faculties of all its inhabitants. But to interfere beforehand by an arbitrary limit, and declare that whatever be the genius, talent, energy, or force of

41 (cont'd next page)

In other words, by not allowing talents to be used because of someone's gender, those talents will be lost.

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

1

mind, of an individual of a certain sex or class, those faculties shall not be exerted, or shall be exerted only in some few of the many modes in which others are permitted to use theirs, is not only an injustice to the individual, and a detriment to society, which loses what it can ill spare, but is also the most effectual way of providing that, in the sex or class so fettered, the qualities which are not permitted to be exercised shall not exist.

41

32

As used in line 9, "raise" most nearly means

A) increase.
B) cultivate.
C) nurture.
D) elevate. → Their status will go up

33

In Passage 1, Tocqueville implies that treatment of men and women as identical in nature would have which consequence?

A) Neither sex would feel oppressed.
B) Both sexes would be greatly harmed.
C) Men would try to reclaim their lost authority.
D) Men and women would have privileges they do not need.

34

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

A) Lines 15-18 ("There . . . alike")
B) Lines 18-20 ("They . . . rights")
C) Lines 22-24 ("It may . . . degraded")
D) Lines 27-29 ("It is . . . sexes")

35

As used in line 53, "dominion" most nearly means

A) omnipotence.
B) supremacy. = greater power
C) ownership.
D) territory.

36

In Passage 2, Mill most strongly suggests that gender roles are resistant to change because they

A) have long served as the basis for the formal organization of society. She doesn't indicate this
B) are matters of deeply entrenched tradition.
C) can be influenced by legislative reforms only indirectly. Not in this passage
D) benefit the groups and institutions currently in power.

This might be true, but the passage doesn't say it.

37

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

A) Lines 43-44 ("As society . . . basis")
B) Lines 46-49 ("two . . . other")
C) Lines 58-61 ("in proportion . . . associated")
D) Lines 67-69 ("employments . . . them")

38

Both authors would most likely agree that the changes in gender roles that they describe would be

A) part of a broad social shift toward greater equality.
B) unlikely to provide benefits that outweigh their costs.
C) inevitable given the economic advantages of gender equality.
D) at odds with the principles of American democracy.

Unauthorized copying or reuse of any part of this page is illegal.

1

39

Tocqueville in Passage 1 would most likely characterize the position taken by Mill in lines 65-69 in Passage 2 ("Let . . . them") as

A) less radical about gender roles than it might initially seem.

B) persuasive in the abstract but difficult to implement in practice.

C) ill-advised but consistent with a view held by some other advocates of gender equality.

D) compatible with economic progress in the United States but not in Europe.

40

Which choice best describes the ways that the two authors conceive of the individual's proper position in society?

A) Tocqueville believes that an individual's position should be defined in important ways by that individual's sex, while Mill believes that an individual's abilities should be the determining factor.

B) Tocqueville believes that an individual's economic class should determine that individual's position, while Mill believes that class is not a legitimate consideration.

C) Tocqueville believes that an individual's temperament should determine that individual's position, while Mill believes that temperament should not be a factor in an individual's position.

D) Tocqueville believes that an individual's position should be determined by what is most beneficial to society, while Mill believes it should be determined by what an individual finds most rewarding.

41

Based on Passage 2, Mill would most likely say that the application of the "great principle of political economy" (lines 38-39, Passage 1) to gender roles has which effect?

A) It prevents many men and women from developing to their full potential.

B) It makes it difficult for men and women to sympathize with each other.

C) It unintentionally furthers the cause of gender equality.

D) It guarantees that women take occupations that men are better suited to perform.

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

1

Questions 42-52 are based on the following passage and supplementary material.

This passage is adapted from Brian Greene, "How the Higgs Boson Was Found." ©2013 by Smithsonian Institution. The Higgs boson is an elementary particle associated with the Higgs field. Experiments conducted in 2012–2013 tentatively confirmed the existence of the Higgs boson and thus of the Higgs field.

Nearly a half-century ago, Peter Higgs and a handful of other physicists were trying to understand the origin of a basic physical feature: mass. You can think of mass as an object's heft or, a little more precisely, as the resistance it offers to having its motion changed. Push on a freight train (or a feather) to increase its speed, and the resistance you feel reflects its mass. At a microscopic level, the freight train's mass comes from its constituent molecules and atoms, which are themselves built from fundamental particles, electrons and quarks. But where do the masses of these and other fundamental particles come from?

When physicists in the 1960s modeled the behavior of these particles using equations rooted in quantum physics, they encountered a puzzle. If they imagined that the particles were all massless, then each term in the equations clicked into a perfectly symmetric pattern, like the tips of a perfect snowflake. And this symmetry was not just mathematically elegant. It explained patterns evident in the experimental data. But—and here's the puzzle—physicists knew that the particles did have mass, and when they modified the equations to account for this fact, the mathematical harmony was spoiled. The equations became complex and unwieldy and, worse still, inconsistent.

What to do? Here's the idea put forward by Higgs. Don't shove the particles' masses down the throat of the beautiful equations. Instead, keep the equations pristine and symmetric, but consider them operating within a peculiar environment. Imagine that all of space is uniformly filled with an invisible substance—now called the Higgs field—that exerts a drag force on particles when they accelerate through it. Push on a fundamental particle in an effort to increase its speed and, according to Higgs, you would feel this drag force as a resistance. Justifiably, you would interpret the resistance as the particle's mass. For a mental toehold, think of a ping-pong ball submerged in water. When you push on the ping-pong ball, it will feel much more massive than it does outside of water. Its interaction with the watery environment has the effect of endowing it with mass. So with particles submerged in the Higgs field.

In 1964, Higgs submitted a paper to a prominent physics journal in which he formulated this idea mathematically. The paper was rejected. Not because it contained a technical error, but because the premise of an invisible something permeating space, interacting with particles to provide their mass, well, it all just seemed like heaps of overwrought speculation. The editors of the journal deemed it "of no obvious relevance to physics."

But Higgs persevered (and his revised paper appeared later that year in another journal), and physicists who took the time to study the proposal gradually realized that his idea was a stroke of genius, one that allowed them to have their cake and eat it too. In Higgs's scheme, the fundamental equations can retain their pristine form because the dirty work of providing the particles' masses is relegated to the environment.

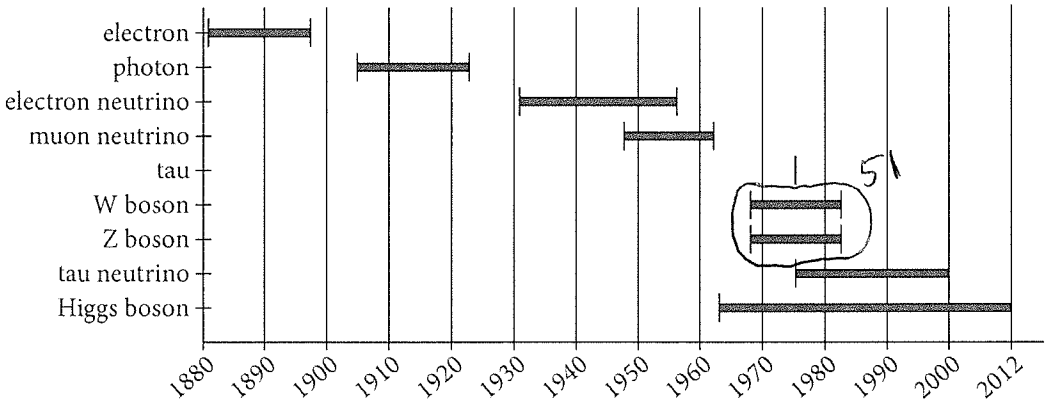
While I wasn't around to witness the initial rejection of Higgs's proposal in 1964 (well, I was around, but only barely), I can attest that by the mid-1980s, the assessment had changed. The physics community had, for the most part, fully bought into the idea that there was a Higgs field permeating space. In fact, in a graduate course I took that covered what's known as the Standard Model of Particle Physics (the quantum equations physicists have assembled to describe the particles of matter and the dominant forces by which they influence each other), the professor presented the Higgs field with such certainty that for a long while I had no idea it had yet to be established experimentally. On occasion, that happens in physics. Mathematical equations can sometimes tell such a convincing tale, they can seemingly radiate reality so strongly, that they become entrenched in the vernacular of working physicists, even before there's data to confirm them.

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

1

Years from Introduction of Concept of Particle to Experimental Confirmation



Adapted from the editors of *The Economist*, "Worth the Wait." ©2012 by The Economist Newspaper Limited.

42

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

A) a technical account of the Higgs field to a description of it aimed at a broad audience.

B) a review of Higgs's work to a contextualization of that work within Higgs's era.

C) an explanation of the Higgs field to a discussion of the response to Higgs's theory.

D) an analysis of the Higgs field to a suggestion of future discoveries that might build upon it.

43

The main purpose of the analogy of the ping-pong ball (line 40) is to

A) popularize a little-known fact.

B) contrast competing scientific theories.

C) criticize a widely accepted explanation.

D) clarify an abstract concept.

It makes clear what the Higgs field is.

44

The author most strongly suggests that the reason the scientific community initially rejected Higgs's idea was that the idea

A) addressed a problem unnoticed by other physicists.

B) only worked if the equations were flawless.

C) rendered accepted theories in physics obsolete.

D) appeared to have little empirical basis.

45

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

A) Lines 30-32 ("Instead . . . environment")

B) Lines 46-48 ("In 1964 . . . mathematically")

C) Lines 48-53 ("Not . . . speculation")

D) Lines 67-70 ("The physics . . . space")

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

1

46

The author notes that one reason Higgs's theory gained acceptance was that it

(A) let scientists accept two conditions that had previously seemed irreconcilable.

B) introduced an innovative approach that could be applied to additional problems.

C) answered a question that earlier scientists had not even raised.

D) explained why two distinct phenomena were being misinterpreted as one phenomenon.

47

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

A) Lines 36-39 ("Push . . . mass")

B) Lines 43-45 ("Its interaction . . . field")

(C) Lines 55-63 ("But . . . environment")

D) Lines 78-83 ("On occasion . . . them")

48

Which statement best describes the technique the author uses to advance the main point of the last paragraph?

(A) He recounts a personal experience to illustrate a characteristic of the discipline of physics.

B) He describes his own education to show how physics has changed during his career.

C) He provides autobiographical details to demonstrate how Higgs's theory was confirmed.

D) He contrasts the status of Higgs's theory at two time periods to reveal how the details of the theory evolved.

See underlines in the last paragraph.

49

As used in line 77, "established" most nearly means

(A) validated. = proven

B) founded.

C) introduced.

D) enacted.

50

What purpose does the graph serve in relation to the passage as a whole?

A) It indicates that the scientific community's quick acceptance of the Higgs boson was typical.

(B) It places the discussion of the reception of the Higgs boson into a broader scientific context.

C) It demonstrates that the Higgs boson was regarded differently than were other hypothetical particles.

D) It clarifies the ways in which the Higgs boson represented a major discovery.

It shows other theories that took a long time to prove

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

1

51

Which statement is best supported by the data presented in the graph?

(A) The W boson and the Z boson were proposed and experimentally confirmed at about the same time.

B) The Higgs boson was experimentally confirmed more quickly than were most other particles. X It took longest

C) The tau neutrino was experimentally confirmed at about the same time as the tau. X 25 years apart

D) The muon neutrino took longer to experimentally confirm than did the electron neutrino. X Not nearly as long.

52

Based on the graph, the author's depiction of Higgs's theory in the mid-1980s is most analogous to which hypothetical situation?

A) The muon neutrino was widely disputed until being confirmed in the early 1960s.

B) Few physicists in 2012 doubted the reality of the tau neutrino.

C) No physicists prior to 1960 considered the possibility of the W or Z boson. Its existence wasn't confirmed until the 1950s

(D) Most physicists in 1940 believed in the existence of the electron neutrino. → Just like with the Higgs field, most physicists beleived in the electron neutrino before it was confirmed by experiments.

STOP

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

Do not turn to any other section.

Unauthorized copying or reuse of any part of this page is illegal.

No Test Material On This Page

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.

NASA: A Space Program with Down-to-Earth Benefits

The National Aeronautics and Space Administration (NASA) is a US government agency whose budget is frequently 1 many times contested. Many people think of NASA's programs as trivial. In truth, the agency has a widespread positive 2 effect on society by serving as a catalyst for innovation and scientific understanding,

1 Redundancy

A) NO CHANGE
B) oftentimes
C) repeatedly
D) DELETE the underlined portion.

} Redundant with "frequently"

2 Commonly confused, idiom

A) NO CHANGE
B) affect on
C) effect to ← Not idiomatic.
D) affects on

affect: verb
effect: noun

Both correct { The agency affects society
The agency has an effect on society

Incorrect { The agency has an affect on...
The agency effects...

2

3 to create jobs, and showing humanity its place within the universe.

In 1958, the program's first year, very few people believed that it was even possible for a manned spacecraft to leave the atmosphere and orbit Earth. But by initiating and collaborating on projects such as the Apollo Moon missions, the space shuttle program, the Hubble Space 4 Telescope, and unmanned planetary exploration, NASA has continually challenged its scientists and engineers to do things that were previously thought impossible. All along, these NASA projects have 5 greatly increased international cooperation. A short list of inventions 6 elaborated by NASA includes communications satellites, invisible braces, and cordless tools. All these inventions (plural) 7 spawns (singular) new industries, and with those industries, jobs. NASA also sponsors the Small Business Innovation Research and Small Business Technology Transfer programs, which are specifically designed to support technological development in the private sector.

3 Parallelism

A) NO CHANGE
B) creating jobs, ← matches ~~creating~~ "serving" and "showing."
C) for job creation,
D) the creation of jobs,

4 Commas

A) NO CHANGE
B) Telescope; and } semi-colon requires full sentences before and after it.
C) Telescope and;
D) Telescope and ← Comma goes before "and" because "and" is part of "unmanned planetary exploration."

5

Which choice most effectively sets up the list of examples that follows in the next sentence?

A) NO CHANGE
B) garnered national publicity for the agency.
C) generated a steady stream of new technology. ← Examples in next sentence are of inventions or technology.
D) made a lot of money for the agency.

6 Word choice Has to do w/ speaking.

A) NO CHANGE
B) evolved ← Usually takes no object. You don't "evolve" something—it evolves on its own.
C) developed ← Commonly paired with "inventions"
D) progressed ← Similar explanation to "evolved."

7 Verb tense / subject-verb agreement

A) NO CHANGE ← Don't match "inventions."
B) spawned
C) has spawned ←
D) spawning ← Creates sentence fragment.

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

2

[1] A report by the Space Foundation estimated that NASA contributed $180 billion to the economy in 2005. [2] More than 60 percent of the contribution 8 coming from commercial goods and services created by companies using space-related technology. [3] This translates as excellent returns from an agency that received approximately 17.7 billion in tax dollars in 2014. [4] This investment by taxpayers enhances not only the national economy but also the United States' competitiveness in the international market. [5] Moreover, the benefits of NASA funding extend beyond the purely economic, as astrophysicist Neil deGrasse Tyson indicated in his testimony before the US Senate: "For . . . a penny on a dollar—we can transform the country from a sullen, dispirited nation, weary of economic struggle, to one where it has reclaimed its twentieth-century birthright to dream of tomorrow." 9

8

A) NO CHANGE
B) which came
C) to come
D) came

Creates sentence fragment as none of these can act as the main verb of the sentence.

↑ Main verb.

9

To make this paragraph most logical, sentence 1 should be placed

A) where it is now. ← It is a logical topic sentence, and the beginning of sentence 2 does not make sense without sentence 2 before it.
B) after sentence 2.
C) after sentence 3.
D) after sentence 4.

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

2

Tyson's expansive vision for the agency hints at another mission of NASA's, illuminated in this observation by Apollo 14 astronaut Edgar Mitchell: "You develop an instant global consciousness, a people orientation, an intense dissatisfaction with the state of the world, and a compulsion to do something about it." 10 With world population topping seven billion, humanity is in need of some perspective. 11 Therefore, we should continue to support NASA not only for practical reasons but also because it is a necessary vehicle for increasing our awareness of how we can fulfill our responsibilities to the planet and each other.

Because of this, we should

"Therefore" conveys this.

10

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

> In addition, NASA has facilities in Washington, DC, Florida, Texas, California, and other states.

Should the writer make this addition here?

A) Yes, because it serves as a counterargument to the quotation from astrophysicist Neil deGrasse Tyson. False

B) Yes, because it reinforces the passage's point about the importance of NASA's work. False.

C) No, because it undermines the passage's claim about the economic benefits of NASA's work. False,

D) No, because it blurs the paragraph's focus by introducing information that does not support the paragraph's claim about the importance of NASA's work. doesn't just support this claim.

11

A) NO CHANGE

B) Instead, ← Indicate contradiction

C) For example, Indicates an example

D) However, ←

Unauthorized copying or reuse of any part of this page is illegal.

2

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

Professional Development: A Shared Responsibility

New theories, 12 new practices too, and technologies are transforming the twenty-first-century workplace at lightning speed. To perform their jobs successfully in this dynamic environment, workers in many 13 fields—from social services to manufacturing, must continually acquire relevant knowledge and update key skills. This practice of continued education, also known as professional development, benefits not only employees but also their employers. 14 Accordingly, meaningful professional development is a shared responsibility: it is the responsibility of employers to provide useful programs, and it is also the responsibility of employees to take advantage of the opportunities offered to them.

Critics of employer-provided professional development argue that employees 15 might consider a popular career path. If employees find themselves falling behind in the workplace, these critics 16 contend. Then it is the duty of those employees to identify, and even pay

12 Parallelism

A) NO CHANGE
B) also new practices,
C) in addition to practices,
D) practices, ← Matches "theories" and "technologies"

13

A) NO CHANGE ← Does not match comma (after "manufacturing." Both must be commas or dashes.
B) fields
C) fields, ← Separates unnecessary info from the rest of the sentence.
D) fields; ← Requires a full sentence before it.

14

A) NO CHANGE ← Means "since this is the case..."
B) Nevertheless, ← Indicate a contrary conclusion
C) Regardless,
D) Similarly, ← Indicates another example, not a conclusion or next logical step.

15

Which choice best establishes the argument that follows?

A) NO CHANGE
B) should lean heavily on their employers.
C) must be in charge of their own careers. ← Sets up that employees should do their own professional development
D) will be ready for changes in the job market.

16

A) NO CHANGE ← Fragment
B) contend; then ← Requires a full sentence before it.
C) contend then
D) contend, then ← Needed to separate independent and dependent clauses (complete and incomplete sentences).

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

2

for, appropriate resources to 17 show them how and why they are falling behind and what they should do about it. This argument ignores research pointing to high employee turnover and training of new staff as significant costs plaguing employers in many fields. Forward-thinking employers recognize the importance of investing in the employees they have rather than hiring new staff when the skills of current workers 18 get old and worn out.

17

A) NO CHANGE
(B) address their deficiencies. ← succinct and clear
C) deal with their flaws and shortcomings. ← too informal
D) allow them to meet their employers' needs in terms of the knowledge they are supposed to have.

Too wordy

18

A) NO CHANGE
B) are no good anymore.
(C) become obsolete. ← Too ~~Too~~ Tone consistent with the rest of the passage
D) have lost their charm.

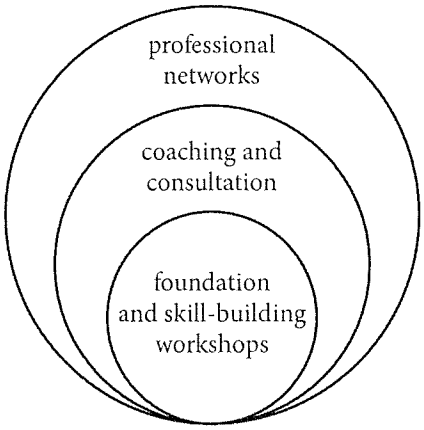
Too conversational

Unauthorized copying or reuse of any part of this page is illegal.

2

The most common forms of professional development provided to employees 19 includes coaching, mentoring, technical assistance, and workshops. Some employers utilize several approaches simultaneously, developing a framework that suits the particular needs of their employees. 20 Around the same time, the figure illustrates a simple yet comprehensive professional-development model created for special education personnel. As the figure suggests, 21 receiving coaching and consultation is the overarching framework, while the opportunity to belong to professional networks and participate in activities such as foundation and skill-building workshops is relatively unimportant.

Professional-Development Framework



Adapted from Northern Suburban Special Education District, "Professional Development Framework." ©2014 by Northern Suburban Special Education Program.

19

A) NO CHANGE
B) include
C) including
D) has included

20

A) NO CHANGE
B) Besides that,
C) Nevertheless,
D) DELETE the underlined portion and begin the sentence with a capital letter.

21

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

A) NO CHANGE
B) participation in foundation and skill-building workshops is the overarching framework within which staff receive coaching and consultation as well as the opportunity to belong to a professional network.
C) membership in a professional network is the overarching framework within which staff receive coaching and consultation as well as the opportunity to attend foundation and skill-building workshops.
D) receiving coaching and consultation is the overarching framework within which staff have the opportunity to belong to a professional network as well as attend foundation and skill-building workshops.

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

2

A recent trend in professional development that has provided advantages to both employers and employees is online instruction. From an employer perspective, the first and perhaps most obvious advantage is the lower cost of online professional development compared with that of in-person workshops and training. Employers can also 22 identify, which employees have successfully completed instructional modules and which need to be offered additional training. For employees, online professional development provides the opportunity to receive instruction at their own pace and interact with other professionals online. This exciting trend has the potential to make the shared responsibility of professional development less burdensome for both employers and employees.

22

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

"identify" requires the words after it and should not be separated from them by any punctuation.

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

2

Questions 23-33 are based on the following passage.

The Evolution of Slow Food

In 1986, McDonald's caused a stir in Italy when it opened a restaurant next to Rome's historic Spanish Steps. Young, on-the-go eaters were thrilled; 23 specifically, those who prized regional foods and Italy's convivial culture built on cooking and long meals feared that the restaurant signaled the death of a way of life. To counter the rise of fast food and fast 24 life, a cohort of chefs, journalists, and sociologists spearheaded a Slow Food movement, declaring loyalty to unhurried enjoyment. 25

From its beginning, the movement 26 had opposed the standardization of taste that fast food chains promote. For example, a McDonald's hamburger made in Boston tastes more or less the same as one made in Beijing. This consistency is made possible by industrial mass production. Slow Food supporters, by contrast, back methods of growing and preparing food based on regional culinary traditions. When produced using traditional methods, goat cheese made in France tastes different from goat cheese made in Vermont. A goat

23

A) NO CHANGE
B) for example,
C) however,
D) in fact,

24

A) NO CHANGE
B) life; a
C) life: a
D) life. A

25

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

> The group's philosophy was connected to the tale of the hare and the tortoise, in which the tortoise wins the race.

Should the writer make this addition here?

A) Yes, because it explains the primary belief that led to the development of the Slow Food movement.
B) Yes, because it reinforces a claim that the writer makes earlier in the paragraph.
C) No, because it blurs the paragraph's focus by introducing a new idea that is not clearly explained.
D) No, because it distracts from the paragraph's emphasis on the Slow Food movement's origins and beliefs.

26

A) NO CHANGE
B) opposes
C) will oppose
D) has opposed

2

ingests the vegetation particular to the meadow in which it grazes, which, along with other environmental 27 factors such as altitude and weather shapes the cheese's taste and texture. If all foods were produced under the industrial model, 28 we would have meals that are not very flavorful.

During 29 their early years, the movement also focused on the value of 30 spending lots of time with friends and family during long meals. It emphasized the importance of preserving these "easygoing, slow

27 Commas

A) NO CHANGE
B) factors, such as altitude and weather,
C) factors such as, altitude and weather,
D) factors, such as altitude and weather

Unnecessary info. Test ↓ by removing it from the sentence.

28

Which choice most effectively supports the central point of the paragraph?

A) NO CHANGE
B) the public would not be interested in learning about traditional foods.
C) people would not be able to determine how a particular food was made.
D) consumers would lose this diversity of flavors.

The paragraph claims that fast food has the same flavors, not that it lacks flavor.

What traditional food has over fast food.

29

A) NO CHANGE ← plural ("movement" is singular)
B) there ← indicates place
C) its ← matches "movement"
D) it's ← means "it is"

30

A) NO CHANGE Not as concise as
B) leisurely meals with friends and family.
C) eating slowly and in the company of loved ones such as friends and family. Wordy
D) joining friends as well as family for time-consuming meals.

Negative about something the movement likes.

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

2

pleasures." As the movement grew beyond Italy's borders—today Slow Food International boasts more than 100,000 members in 150 countries—this emphasis on pleasure 31 pictured criticism for being elitist. Critics have also asked if growing food using traditional methods, as opposed to mass production, 32 can adequately and affordably feed the world? Given the hectic pace of modern life, who among us has the time and resources for elaborate meals? Such questions, in addition to environmental concerns, are at the heart of perennial debates about food production.

Over time, Slow Food has broadened its mission to focus on food that is good, clean, and fair for all. Members assert that food should be flavorful, carrying the properties of a particular region; it should be raised using environmentally sustainable practices that preserve biodiversity; and it should be accessible to all without exploiting the labors of those who produced it. 33 In short, Slow Food runs programs that support small-scale producers in marketing regional foods in a world where food corporations threaten to drive them out of the marketplace and homogenize food choices.

31 Word choice - idiom

A) NO CHANGE
B) portrayed
C) drew
D) sketched

"drew criticism" is an idiomatic phrase meaning "brought criticism on the subject"

32

A) NO CHANGE ← Question marks go at the end of direct questions,
B) adequately and affordably can feed the world? ←
C) can adequately and affordably feed the world. ← most clear
D) adequately and affordably can feed the world.

Could be modifying "using traditional methods."

33

A) NO CHANGE
B) Nonetheless,
C) To these ends, → Means "In order to achieve these goals"
D) By the same token,

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

Questions 34-44 are based on the following passage.

Was the Hoax a Hoax?

For an hour on the evening of October 30, 1938, Orson Welles and other performers from the Mercury Theatre flooded the airwaves with alarming "news bulletins" about a Martian invasion supposedly occurring in Grover's Mill, New Jersey. They were performing a radio play adapted from *The War of the Worlds*, a science fiction novel by H. G. Wells. The next day, a front-page 34 headline in the *New York Times* declared, "Radio Listeners in Panic, Taking War Drama as Fact." 35 The *Times* article claimed that people had fled their homes and that police stations had been swamped with calls. This version of events persisted, and the legend became that Welles's broadcast had as many as twelve million people 36 who feared that Martians had invaded Earth.

Recently, however, scholars have questioned the accuracy of this legend, suggesting the degree of public hysteria has been grossly exaggerated. The authors of an article published in October 2013 go 37 so far to assign blame for the distortion to the newspaper industry.

34

(A) NO CHANGE
B) headline in the *New York Times*, declared
C) headline, in the *New York Times* declared,
D) headline, in the *New York Times*, declared

35

The writer wants to add a supporting detail to indicate that the story was widely reported. Which choice best accomplishes this goal?

A) NO CHANGE
(B) Other newspapers also ran stories claiming that the broadcast had incited mass hysteria.
C) In 2013, many newspapers and magazines featured articles about the seventy-fifth anniversary of the broadcast.
D) The *Times* was then and is now one of the United States' most popular news sources.

doesn't

Indicates that the anniversary was widely reported.

36

A) NO CHANGE
B) that feared
(C) fearing
D) to fear

with "had" indicate that they were physically possessed by the broadcast.

with "had" indicates the broadcast made them afraid

Not idiomatic

37 Word choice

A) NO CHANGE
B) as far
C) as far and
(D) so far as

Not idiomatic

Idiomatic expression

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

2

38 At this time, Jefferson Pooley and Michael Socolow, both professors of communication studies, argue that the newspaper industry sought to discredit the newly emerging technology of radio, which was cutting into newspapers' 39 profits. The newspaper industry tried to do this by portraying the new medium as irresponsible.

[1] Proof of ulterior motives is scarce, 40 consequently weakening Pooley and Socolow's argument. [2] For instance, the C. E. Hooper ratings indicate that a mere 2 percent of households had tuned in to the broadcast. [3] Pooley and Socolow also call into question the validity of an oft-cited report that was based on a survey conducted six weeks after the broadcast. [4] Just because some people found the broadcast unsettling, the authors contend, doesn't mean they believed it and reacted with real terror. [5] According to this report, one million people indicated that they had been "frightened" by the broadcast. [6] Ratings, however, reveal that 41 far fewer than a million people had been

38

A) NO CHANGE
B) On one hand,
C) In the article, ← Provides a link to the article mentioned in the previous sentence and identifies this information as coming from it.
D) Next,

39

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

A) profits, which is what the newspaper industry tried to do when it portrayed
B) profits, by which the newspaper industry portrayed } Unnecessarily wordy.
C) profits and tried to do this by portraying
D) profits, by portraying ← Unnecessary and confusing

40

Which choice best establishes the main idea of the paragraph?

A) NO CHANGE
B) but evidence does suggest that reports of panic have been overblown. ← Makes more sense with the next sentence than the others. 3 examples follow that supports this claim.
C) yet Pooley and Socolow maintain that the newspaper industry intentionally distorted the story.
D) making it difficult to determine what really happened in 1938.

41

A) NO CHANGE
B) many less than
C) much less then
D) much fewer then

- Fewer: use when it's something that could be counted (people, popsicle sticks, etc)
- Less: use when it can't be counted (milk, happiness, etc)
- Than: Makes a comparison
- Then: indicates what occurred next

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

2

listening to the broadcast. [7] Furthermore, Pooley and Socolow note that this survey "conflated being 'frightened,' 'disturbed,' or 'excited' by the program with being 'panicked.'" 42

Pooley and Socolow describe a more likely scenario: most people who heard the broadcast understood they were listening to a piece of fiction, but 43 some being influenced by the sensationalized news coverage afterward, later "remembered" being more afraid than they had been. The researchers also suggest that, 44 not unlike people who got caught up in the excitement of the story when reading about it in the newspaper, the American public may have been willing to embrace the legend because of its appeal to the imagination.

42

To make this paragraph most logical, sentence 4 should be placed

A) where it is now.
B) after sentence 2.
C) after sentence 5.
D) after sentence 7.

Sentence 4 offers further explanation to sentence 7.

43

A) NO CHANGE
B) some, they were
C) some,
D) some

creates a complete sentence in the middle of a sentence without a conjunction

turns "being influenced by... afterward" into a modifier (unnecessary info) that describes "some"

Need a comma to separate unnecessary info

44

Which choice most effectively signals the comparison the writer is making between the two groups mentioned?

A) NO CHANGE
B) unlike
C) not like
D) different from

Double negative, means "like"

Mean "not like"

Only different option.

STOP

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

Unauthorized copying or reuse of any part of this page is illegal.

Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

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

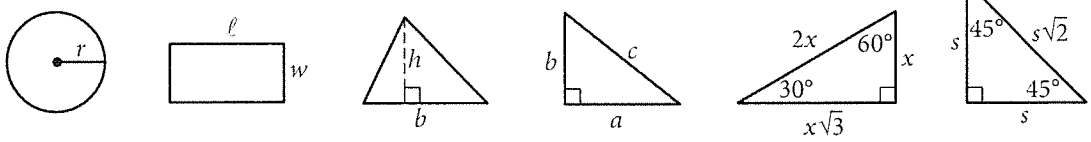
DIRECTIONS

For questions 1-15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 16-20**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTES

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

REFERENCE



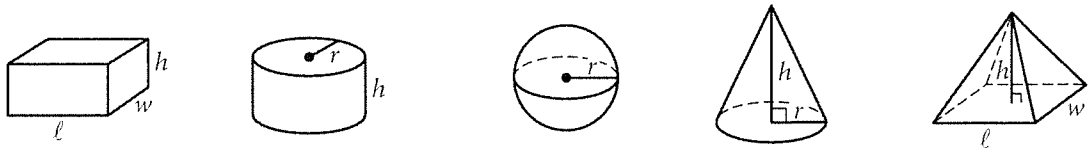
$A = \pi r^2$
$C = 2\pi r$

$A = \ell w$

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

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

Special Right Triangles



$V = \ell wh$

$V = \pi r^2 h$

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

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

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

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

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

1

running biking
$x + y = 75$ ← running and biking

The equation above relates the number of minutes, x, Maria spends running each day and the number of minutes, y, she spends biking each day. In the equation, what does the number 75 represent?

A) The number of minutes spent running each day
B) The number of minutes spent biking each day
C) The total number of minutes spent running and biking each day
D) The number of minutes spent biking for each minute spent running

2

Which of the following is equivalent to $3(x+5)-6$?

A) $3x-3$
B) $3x-1$
C) $3x+9$
D) $15x-6$

$3(x+5)-6$
$=3x+15-6$
$=\boxed{3x+9}$

3

Plug ordered pairs into the equations until an answer works for both.
A: $x = y - 3$
B: $\frac{x}{2} + 2y = 6$

Which ordered pair (x, y) satisfies the system of equations shown above?

	x y	A	B
A)	$(-3, 0)$	$-3 = 0-3$ ✓	$\frac{-3}{2} + 2(0) = 6$ ✗
B)	$(0, 3)$	$0 = 3-3$ ✓	$\frac{0}{2} + 2(3) = 6$ ✓
C)	$(6, -3)$	$6 = -3-3$ ✗	
D)	$(36, -6)$	$36 = -6-3$ ✗	

4

Which of the following complex numbers is equal to $(5+12i)-(9i^2-6i)$, for $i=\sqrt{-1}$?

A) $-14-18i$
B) $-4-6i$
C) $4+6i$
D) $14+18i$

Distribute
$5+12i-(9i^2-6i) = 5+12i-9i^2+6i$
$=5+18i-9i^2$
$i^2=-1$
$=5+18i-9(-1)$
$=5+18i+9$
$=\boxed{14+18i}$

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

3

5

If $f(x) = \frac{x^2 - 6x + 3}{x - 1}$, what is $f(-1)$?

(A) −5
B) −2
C) 2
D) 5

↖ Plug in for x

$\frac{x^2-6x+3}{x-1} = \frac{(-1)^2-6(-1)+3}{(-1)-1}$

$= \frac{1+6+3}{-2}$

$= \frac{10}{-2} = \boxed{-5}$

6

A company that makes wildlife videos purchases camera equipment for $32,400. The equipment depreciates in value at a constant rate for 12 years, after which it is considered to have no monetary value. How much is the camera equipment worth 4 years after it is purchased?

A) $10,800
B) $16,200
(C) $21,600
D) $29,700

The equipment loses $32,400 of value over 12 years, so it loses

$\frac{\$32,400}{12}$ every year

$= 2,700$ After 4 years, it will lose $4 \cdot 2,700$ or $10,800.

Thus it will be worth

$\$32,400 - 10,800 = \boxed{\$21,600}$

7

$x^2 + 6x + 4$

Which of the following is equivalent to the expression above? FOIL answers

A) $(x+3)^2 + 5 = (x+3)(x+3) + 5 = x^2+3x+3x+9+5 = x^2+6x+14$
(B) $(x+3)^2 - 5 = x^2+3x+3x+9-5 = x^2+6x+4$ ✓
C) $(x-3)^2 + 5$
D) $(x-3)^2 - 5$

8

Ken is working this summer as part of a crew on a farm. He earned $8 per hour for the first 10 hours he worked this week. Because of his performance, his crew leader raised his salary to $10 per hour for the rest of the week. Ken saves 90% of his earnings from each week. What is the least number of hours he must work the rest of the week to save at least $270 for the week?

A) 38
B) 33
(C) 22
D) 16

Ken earned $80 in the first 10 hours. since he earns $10/hour thereafter, he will earn $80+10h$.

He saves 90%, so

$0.9(80+10h) = 270$ (×10 ÷10 ÷10)

Make easier by factoring out 10

$9(8+h) = 270$

$8 + h = 30$

$\boxed{h = 22}$

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

9

Marisa needs to hire at least 10 staff members for an upcoming project. The staff members will be made up of junior directors, who will be paid \$640 per week, and senior directors, who will be paid \$880 per week. Her budget for paying the staff members is no more than \$9,700 per week. She must hire at least 3 junior directors and at least 1 senior director. Which of the following systems of inequalities represents the conditions described if x is the number of junior directors and y is the number of senior directors?

A) $640x + 880y \geq 9{,}700$
✗ $x + y \leq 10$ At most 10 staff members
✓ $x \geq 3$ At least 3 junior directors
✓ $y \geq 1$ " " 1 senior director

(B) $640x + 880y \leq 9{,}700$
✓ $x + y \geq 10$ At least 10 staff members
✓ $x \geq 3$
✓ $y \geq 1$

C) $640x + 880y \geq 9{,}700$
$x + y \geq 10$
✗ $x \leq 3$ At most 3 junior directors
✗ $y \leq 1$

D) $640x + 880y \leq 9{,}700$
$x + y \leq 10$
✗ $x \leq 3$
✗ $y \leq 1$

Start with easiest constraints:
At least 3 junior directors, at least 1 senior director.
Eliminate C) and D) which do these incorrectly. Move to "needs to hire at least 10 staff members." A) does this incorrectly, so only [B] is left. Check this final inequality to be thorough:

$640x + 880y \leq 9{,}700$ ← It works.

The salaries paid ↑ at most ↑ budget

10

$$ax^3 + bx^2 + cx + d = 0$$

In the equation above, a, b, c, and d are constants. If the equation has roots -1, -3, and 5, which of the following is a factor of $ax^3 + bx^2 + cx + d$?

A) $x - 1$
(B) $x + 1$
C) $x - 3$
D) $x + 5$

Roots	Factors
-1	$(x+1)$
-3	$(x+3)$
5	$(x-5)$

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

11

The expression $\dfrac{x^{-2}y^{\frac{1}{2}}}{x^{\frac{1}{3}}y^{-1}}$, where $x > 1$ and $y > 1$, is

equivalent to which of the following?

A) $\dfrac{\sqrt{y}}{\sqrt[3]{x^2}}$

B) $\dfrac{y\sqrt{y}}{\sqrt[3]{x^2}}$

C) $\dfrac{y\sqrt{y}}{x\sqrt{x}}$

(D) $\dfrac{y\sqrt{y}}{x^2\sqrt[3]{x}}$

$x^{-a} = \frac{1}{x^a}$

$x^{\frac{a}{b}} = \sqrt[b]{x^a}$

Quick trick: in a fraction, a negative exponent flips whatever its attached to from the top to the bottom or vice-versa.

$$\frac{x^{-2}y^{\frac{1}{2}}}{x^{\frac{1}{3}}y^{-1}} = \frac{x^{-2}\sqrt{y}}{\sqrt[3]{x}\,y^{-1}}$$

Now flip the negative powers:

$$= \frac{\sqrt{y}y^1}{x^2\sqrt[3]{x}} = \boxed{\frac{y\sqrt{y}}{x^2\sqrt[3]{x}}}$$

12

The function f is defined by $f(x) = (x+3)(x+1)$. The graph of f in the xy-plane is a parabola. Which of the following intervals contains the x-coordinate of the vertex of the graph of f ?

A) $-4 < x < -3$

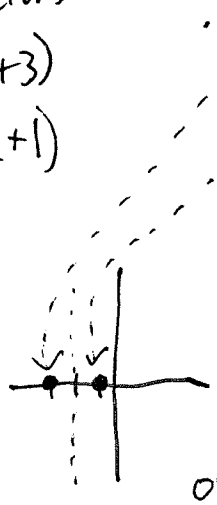
(B) $-3 < x < 1$

C) $1 < x < 3$

D) $3 < x < 4$

Factors: $(x+3)$, $(x+1)$

Roots/zeros: -3, -1



The vertex is halfway between the roots, on the vertical line, so the x-coordinate of the vertex is -2, occurs in the interval $\boxed{-3 < x < 1}$

13

Which of the following expressions is equivalent to $\frac{x^2-2x-5}{x-3}$?

Use synthetic or polynomial long division or P+C.

A) $x-5-\frac{20}{x-3}$ ← $2-5-\frac{20}{2-3} \neq 5$

P+C: Let $x=2$ → $\frac{(2)^2-2(2)-5}{2-3}=\frac{4-4-5}{-1}=\frac{-5}{-1}=5$

B) $x-5-\frac{10}{x-3}$ ← $2-5-\frac{10}{2-3} \neq 5$

C) $x+1-\frac{8}{x-3}$ ← $2+1-\frac{8}{2-3} \neq 5$

D) $x+1-\frac{2}{x-3}$ → $2+1-\frac{2}{2-1}$

$=3-\frac{2}{-1}=3+2$

$=5$

14

A shipping service restricts the dimensions of the boxes it will ship for a certain type of service. The restriction states that for boxes shaped like rectangular prisms, the sum of the perimeter of the base of the box and the height of the box cannot exceed 130 inches. The perimeter of the base is determined using the width and length of the box. If a box has a height of 60 inches and its length is 2.5 times the width, which inequality shows the allowable width x, in inches, of the box?

A) $0 < x \leq 10$

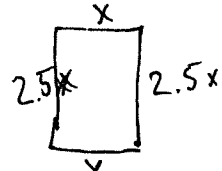
B) $0 < x \leq 11\frac{2}{3}$

C) $0 < x \leq 17\frac{1}{2}$

D) $0 < x \leq 20$

perimeter + height ≤ 130

60



perimeter $= 2.5x+x+2.5x+x$

$= 7x$

$7x+60 \leq 130$

$7x \leq 70$

$x \leq 10$ ← and, of course, $x > 0$

15

The expression $\frac{1}{3}x^2-2$ can be rewritten as $\frac{1}{3}(x-k)(x+k)$, where k is a positive constant.

What is the value of k?

A) 2

B) 6

C) $\sqrt{2}$

D) $\sqrt{6}$

FOIL

Shortcut: None of this matters

$\frac{1}{3}(x^2+kx-kx-k^2)$

$=\frac{1}{3}(x^2-k^2)$

$=\frac{1}{3}x^2-\frac{1}{3}k^2$

$=-2$

$-\frac{1}{3}k^2=-2$

$k^2=6$

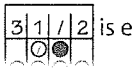
$k=\sqrt{6}$

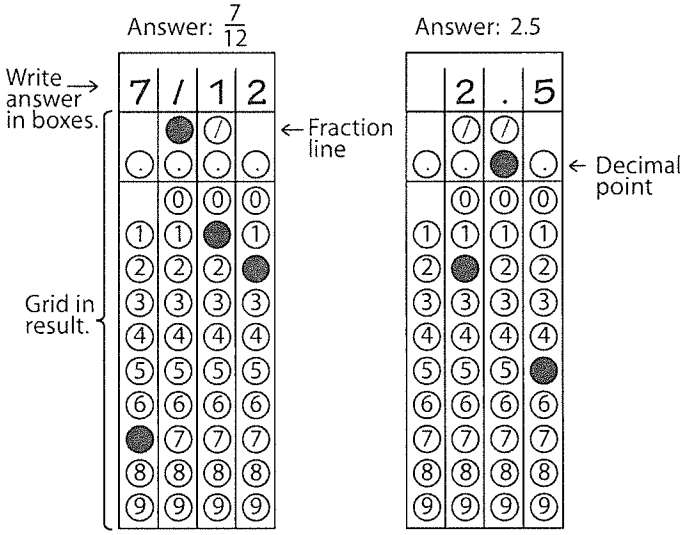
Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

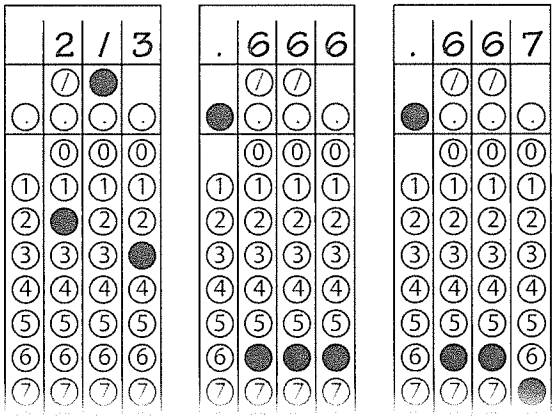
DIRECTIONS

For questions 16-20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

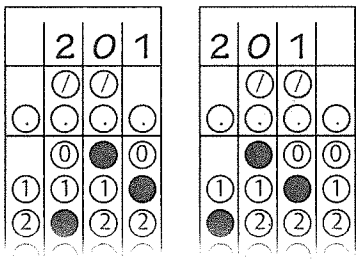
1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
2. Mark no more than one circle in any column.
3. No question has a negative answer.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



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



Answer: 201 – either position is correct



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

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

16

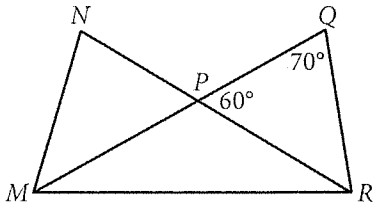
If $2x + 8 = 16$, what is the value of $x + 4$?

Shortcut: $2x+8=16$

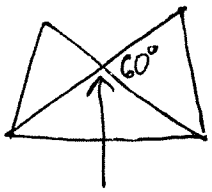
$2(x+4)=16$

$\boxed{x+4=8}$

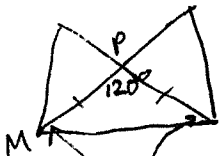
17



In the figure above, $\overline{MQ}$ and $\overline{NR}$ intersect at point P, $NP = QP$, and $MP = PR$. What is the measure, in degrees, of $\angle QMR$? (Disregard the degree symbol when gridding your answer.)



120° → supplementary angle with 60°



Given that $MP = PR$, $\triangle MPR$ is isoceles, so these angles are congruent. Call each $x°$.

$120 + x + x = 180$ ($180°$ in a $\triangle$)

$2x + 120 = 180$

$2x = 60$

$x = \boxed{30}$

18

The number of radians in a 720-degree angle can be written as $a\pi$, where a is a constant. What is the value of a ?

A circle contains 2π radians. Since there are $360°$ in a circle, $720°$ is twice around the circle ($360 \cdot 2 = 720$).

Once around the circle is 2π, so twice around the circle is 4π.

$a\pi = 4\pi$

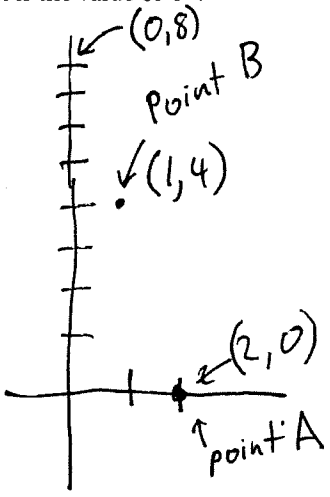
$a = \boxed{4}$

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

19

The graph of a line in the xy-plane passes through the point $(1, 4)$ and crosses the x-axis at the point $(2, 0)$. The line crosses the y-axis at the point $(0, b)$. What is the value of b ?



To go from point A to point B, move left 1 and up 4. Moving left 1 and up 4 from point B puts us at (0,8),

so $b = \boxed{8}$

20

$$(7532 + 100y^2) + 10(10y^2 - 110)$$

The expression above can be written in the form $ay^2 + b$, where a and b are constants. What is the value of $a + b$?

$(7532 + 100y^2) + 10(10y^2 - 110)$

$= 7,532 + 100y^2 + 100y^2 - 1100$

$= 6,432 + 200y^2$

or

$200y^2 + 6,432$

$a = 200$ $b = 6,432$

$a + b = 200 + 6,432$

$= \boxed{6,632}$

STOP

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

Unauthorized copying or reuse of any part of this page is illegal.

No Test Material On This Page

Math Test – Calculator

55 MINUTES, 38 QUESTIONS

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

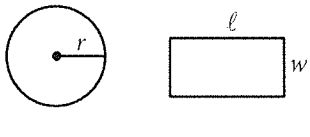
DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding circle on your answer sheet. **For questions 31-38**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 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

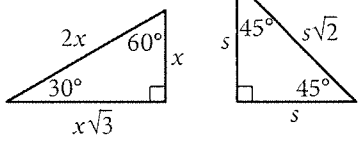


$A = \pi r^2$
$C = 2\pi r$

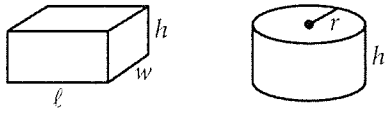
$A = \ell w$

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

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



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 2π.
The sum of the measures in degrees of the angles of a triangle is 180.

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

1

Feeding Information for Boarded Pets

	Fed only dry food	Fed both wet and dry food	Total
Cats	5	11	16
Dogs	2	23	25
Total	7	34	41

The table above shows the kinds of foods that are fed to the cats and dogs currently boarded at a pet care facility. What fraction of the dogs are fed only dry food?

A) $\frac{2}{41}$

B) $\frac{2}{25}$

C) $\frac{7}{41}$

D) $\frac{2}{7}$

Dogs Fed only dry / Total dogs $= \frac{2}{25}$

2

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

Which of the following expressions is equivalent to the one above?

A) $4x^2 - 8$

B) $4x^2 - 2$

C) $-2x^2 - 8$

D) $-2x^2 - 2$

$(x^2-3)-(-3x^2+5)$ ↑ distribute

$= x^2 - 3 + 3x^2 - 5$

$= \boxed{4x^2 - 8}$

3

A certain package requires 3 centimeters of tape to be closed securely. What is the maximum number of packages of this type that can be secured with 6 meters of tape? (1 meter = 100 cm)

A) 100

B) 150

C) 200

D) 300

$6 \text{ meters} \times \frac{100 \text{ cm}}{\text{mete}} = 600 \text{cm}$

$\frac{600 \text{ cm of tape}}{3 \text{ cm of tape per package}}$

$= \boxed{200}$ packages

4

A market researcher selected 200 people at random from a group of people who indicated that they liked a certain book. The 200 people were shown a movie based on the book and then asked whether they liked or disliked the movie. Of those surveyed, 95% said they disliked the movie. Which of the following inferences can appropriately be drawn from this survey result?

A) At least 95% of people who go see movies will dislike this movie.

B) At least 95% of people who read books will dislike this movie.

C) Most people who dislike this book will like this movie.

D) Most people who like this book will dislike this movie.

↑ This is the only kind of person included in the survey.

5

Which of the following ordered pairs (x, y) satisfies the inequality $5x - 3y < 4$?

I. $(1,1)$ $5(1)-3(1)=5-3=2$ which is less than 4 ✓

II. $(2,5)$ $5(2)-3(5)=10-15=-5$, which is less than 4 ✓

III. $(3,2)$ $5(3)-3(2)=$ $15-6=9$ which is not less than 4. ✗

A) I only

B) II only

C) I and II only

D) I and III only

Plug in and see

6

In the equation $(ax+3)^2 = 36$, a is a constant. If $x = -3$ is one solution to the equation, what is a possible value of a ?

A) -11

B) -5

C) -1

D) 0

$(ax+3)^2 = 36$

$(-3a+3)^2 = 36$

Take the square root of each side:

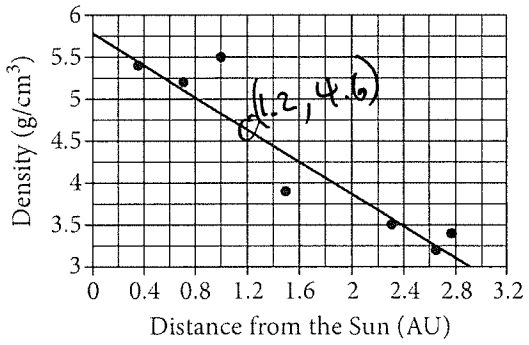
$-3a+3 = 6$ ← technically ± 6, it doesn't matter here

$-3a = 3$

$a = -1$

Questions 7 and 8 refer to the following information.

Distance and Density of Planetoids in the Inner Solar System



The scatterplot above shows the densities of 7 planetoids, in grams per cubic centimeter, with respect to their average distances from the Sun in astronomical units (AU). The line of best fit is also shown.

7

According to the scatterplot, which of the following statements is true about the relationship between a planetoid's average distance from the Sun and its density?

A) Planetoids that are more distant from the Sun tend to have lesser densities. ← Moving right on the graph, moving down on the graph

B) Planetoids that are more distant from the Sun tend to have greater densities.

C) The density of a planetoid that is twice as far from the Sun as another planetoid is half the density of that other planetoid.

D) The distance from a planetoid to the Sun is unrelated to its density.

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

8

An astronomer has discovered a new planetoid about 1.2 AU from the Sun. According to the line of best fit, which of the following best approximates the density of the planetoid, in grams per cubic centimeter?

A) 3.6
B) 4.1
C) 4.6
D) 5.5

See graph

9

$$9ax + 9b - 6 = 21$$

Based on the equation above, what is the value of $ax + b$?

A) 3
B) 6
C) 8
D) 12

Isolate $ax+b$

$9ax+9b-6=21$

$9ax+9b=27$ ← $\div 9$

$ax+b=3$

10

Lani spent 15% of her 8-hour workday in meetings. How many minutes of her workday did she spend in meetings?

A) 1.2
B) 15
C) 48
D) 72

8 hours × $\frac{60 \text{ minutes}}{\text{hour}}$

= 480 minutes in a workday

15% of 480

$= 0.15 \cdot 480 = 72$

11

A software company is selling a new game in a standard edition and a collector's edition. The box for the standard edition has a volume of 20 cubic inches, and the box for the collector's edition has a volume of 30 cubic inches. The company receives an order for 75 copies of the game, and the total volume of the order to be shipped is 1,870 cubic inches. Which of the following systems of equations can be used to determine the number of standard edition games, s, and collector's edition games, c, that were ordered?

A) $75 - s = c$
$20s + 30c = 1{,}870$

B) $75 - s = c$
$30s + 20c = 1{,}870$

C) $s - c = 75$
$25(s + c) = 1{,}870$

D) $s - c = 75$
$30s + 20c = 1{,}870$

$c+s=75$

$c=75-s$

or

$75-s=c$

$\frac{20 \text{ inches}^3}{\text{standard copy}} \times$ number of standard copies = Volume of all standard copies

$\frac{30 \text{ inches}^3}{\text{collector's copy}} \times$ number of collectors copies = Volume of all collector's copies

$20s+30c=1{,}870$ ← Volume of all copies

12

A customer paid $53.00 for a jacket after a 6 percent sales tax was added. What was the price of the jacket before the sales tax was added?

A) $47.60
(B) $50.00
C) $52.60
D) $52.84

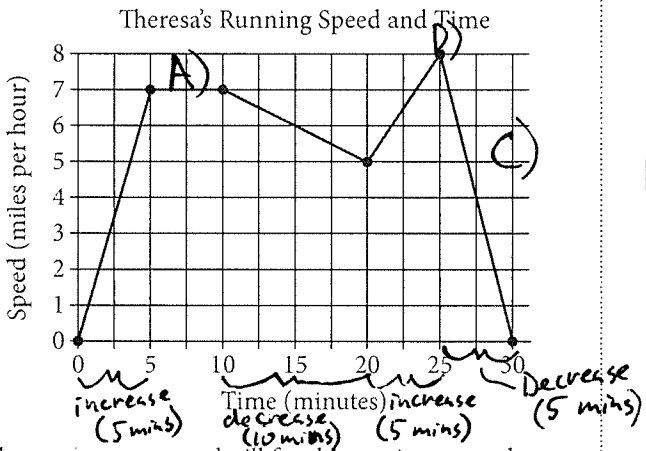
After tax, the jacket is 106% as much as the original price, p.

So,

$1.06p = 53.00$ ← divide by 1.06

$p = 50$

13



Theresa ran on a treadmill for thirty minutes, and her time and speed are shown on the graph above. According to the graph, which of the following statements is NOT true concerning Theresa's run?

5-10 mins on graph

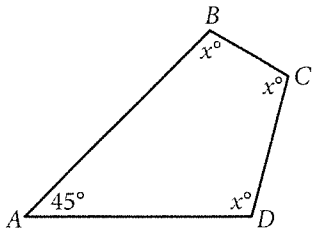
A) Theresa ran at a constant speed for five minutes.
(B) Theresa's speed was increasing for a longer period of time than it was decreasing.
C) Theresa's speed decreased at a constant rate during the last five minutes. 25-30 mins
D) Theresa's speed reached its maximum during the last ten minutes. at minute 25

read "to" not "minus"

False: increased 0-5 and 20-25, for a total of 10 mins

decreased 10-20 and 25-30 for a total of 15 mins.

14



In the figure above, what is the value of x ?

A) 45
B) 90
C) 100
(D) 105

A quadrilateral contains 360° (think of a square: $4 \times 90° = 360°$).

Therefore $45 + 3x = 360$

$3x = 315$

$x = 105$

15

If 50 one-cent coins were stacked on top of each other in a column, the column would be approximately $3\frac{7}{8}$ inches tall. At this rate, which of the following is closest to the number of one-cent coins it would take to make an 8-inch-tall column?

A) 75
(B) 100
C) 200
D) 390

Shortcut: $3\frac{7}{8}$ is really close to 4. Double that to get 8 inches, so double the coins to get 100. Since 50 coins is a little less than 4 inches, it will take more than 100 coins to make 8 inches, but certainly not close to 200. B) is therefore the answer.

OR: $\frac{3\frac{7}{8} \text{ inches}}{50 \text{ coins}} = \frac{8 \text{ inches}}{x \text{ coins}}$ Cross-multiply and divide

$50 \cdot 8 \div 3\frac{7}{8} \approx 103$ coins

CONTINUE

Unauthorized copying or reuse of any part of this page is illegal.

16

If $a - b = 12$ and $\frac{b}{2} = 10$, what is the value of $a + b$?

A) 2
B) 12
C) 32
D) 52

$\frac{b}{2} = 10$; $a - b = 12$

$b = 20$ → Substitute ; $a - 20 = 12$

$a = 32$

$a + b = 32 + 20$

$= 52$

17

$$y = 19.99 + 1.50x$$

The equation above models the total cost y, in dollars, that a company charges a customer to rent a truck for one day and drive the truck x miles. The total cost consists of a flat fee plus a charge per mile driven. When the equation is graphed in the xy-plane, what does the y-intercept of the graph represent in terms of the model?

A) A flat fee of $19.99
B) A charge per mile of $1.50
C) A charge per mile of $19.99
D) Total daily charges of $21.49

slope ↓ ; y-intercept ↓

$y = mx + b$

$y = 19.99 + 1.50x$

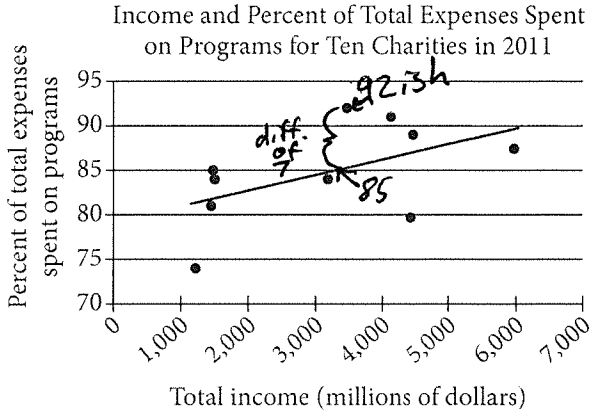
OR

$y = 1.50x + 19.99$

m = slope ; b = y-intercept

The y-intercept is typically the starting value in real-world application. Here, that is the flat fee.

18



The scatterplot above shows data for ten charities along with the line of best fit. For the charity with the greatest percent of total expenses spent on programs, which of the following is closest to the difference of the actual percent and the percent predicted by the line of best fit?

A) 10%
B) 7%
C) 4%
D) 1%

See graph

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

Questions 19 and 20 refer to the following information.

Mosteller's formula: $A = \frac{\sqrt{hw}}{60}$

Current's formula: $A = \frac{4 + w}{30}$

The formulas above are used in medicine to estimate the body surface area A, in square meters, of infants and children whose weight w ranges between 3 and 30 kilograms and whose height h is measured in centimeters.

19

Based on Current's formula, what is w in terms of A ?

(A) $w = 30A - 4$

B) $w = 30A + 4$

C) $w = 30(A - 4)$

D) $w = 30(A + 4)$

$A = \frac{4+w}{30}$

$30A = 4 + w$

$30A - 4 = w$

20

If Mosteller's and Current's formulas give the same estimate for A, which of the following expressions is equivalent to $\sqrt{hw}$?

A) $\frac{4 + w}{2}$

B) $\frac{4 + w}{1{,}800}$

(C) $2(4 + w)$

D) $\frac{(4 + w)^2}{2}$

Mosteller's: $A = \frac{\sqrt{hw}}{60}$

$60A = \sqrt{hw}$

Current's: $A = \frac{4 + w}{30}$

$30A = 4 + w$ multiply by 2

Substitute $\rightarrow 60A = 2(4 + w)$

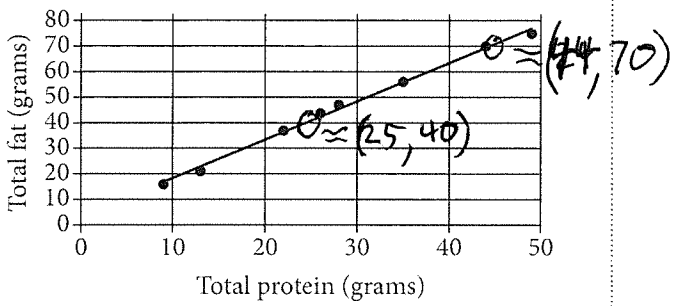
$\sqrt{hw} = 2(4 + w)$

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

21

Total Protein and Total Fat for Eight Sandwiches



The scatterplot above shows the numbers of grams of both total protein and total fat for eight sandwiches on a restaurant menu. The line of best fit for the data is also shown. According to the line of best fit, which of the following is closest to the predicted increase in total fat, in grams, for every increase of 1 gram in total protein?

A) 2.5
B) 2.0
C) 1.5
D) 1.0

Find two points on the line of best fit with easily seen or estimated values.

Take (25, 40) and (44, 70) (see graph). (protein, fat) (protein, fat)

As fat increases by 30 grams (40 to 70), protein increases by 19 (25 to 44).

If protein were to increase by 1 gram, fat would increase by $\frac{30}{19} \approx 1.58$ grams, which is closest to 1.5 of all the answers.

22

Percent of Residents Who Earned a Bachelor's Degree or Higher

State	Percent of residents	Rank
State A	21.9%	6
State B	27.9%	4
State C	25.9%	5
State D	19.5%	7
State E	30.1%	3
State F	36.4%	1
State G	35.5%	2

A survey was given to residents of all 50 states asking if they had earned a bachelor's degree or higher. The results from 7 of the states are given in the table above. The median percent of residents who earned a bachelor's degree or higher for all 50 states was 26.95%. What is the difference between the median percent of residents who earned a bachelor's degree or higher for these 7 states and the median for all 50 states?

A) 0.05%
B) 0.95%
C) 1.22%
D) 7.45%

Of 7, 4 is the middle position (1 2 3 4 5 6 7)
↑ Three on either side)

So State B has the median value, 27.9%. The difference between this and the national median is

27.9% − 26.95%
= 0.95%

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

23

A cylindrical can containing pieces of fruit is filled to the top with syrup before being sealed. The base of the can has an area of 75 cm^2, and the height of the can is 10 cm. If 110 cm^3 of syrup is needed to fill the can to the top, which of the following is closest to the total volume of the pieces of fruit in the can?

A) 7.5 cm^3
B) 185 cm^3
C) 640 cm^3
D) 750 cm^3

Base area x height = Volume
$75 \cdot 10 = 750$
Total Volume − Volume of Syrup = Volume of fruit
$750 - 110 = \boxed{640}$

24

$$h(t) = -16t^2 + 110t + 72$$

The function above models the height h, in feet, of an object above ground t seconds after being launched straight up in the air. What does the number 72 represent in the function?

A) The initial height, in feet, of the object
B) The maximum height, in feet, of the object
C) The initial speed, in feet per second, of the object
D) The maximum speed, in feet per second, of the object

as proof, plug in 0 for t:
$h(0) = -16(0)^2 + 110(0) + 72$
Height at time 0 (just before launch) $\boxed{\text{height} = 72}$

Questions 25 and 26 refer to the following information.

Energy per Gram of Typical Macronutrients

Macronutrient	Food calories	Kilojoules
Protein	4.0	16.7
Fat	9.0	37.7
Carbohydrate	4.0	16.7

The table above gives the typical amounts of energy per gram, expressed in both food calories and kilojoules, of the three macronutrients in food.

25

If x food calories is equivalent to k kilojoules, of the following, which best represents the relationship between x and k ?

A) $k = 0.24x$
B) $k = 4.2x$
C) $x = 4.2k$
D) $xk = 4.2$

Plug values from table into the answer options. Try the values for protein first:

A) $k = 0.24x$ $16.7 \approx 0.24(4.0)$ FALSE
B) $k = 4.2x$ $16.7 \approx 4.2(4.0)$ TRUE
$= 16.8$
C) $x = 4.2k$ $4.0 \approx 4.2(16.7)$ False
D) $xk = 4.2$ $(4.0)(16.7) \approx 4.2$ False

Only [B] gives a decent approximation.

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

26

If the 180 food calories in a granola bar come entirely from p grams of protein, f grams of fat, and c grams of carbohydrate, which of the following expresses f in terms of p and c?

A) $f = 20 + \frac{4}{9}(p + c)$

B) $f = 20 - \frac{4}{9}(p + c)$

C) $f = 20 - \frac{4}{9}(p - c)$

D) $f = 20 + \frac{9}{4}(p + c)$

4 calories/gram of protein
4 cals/gram of fat
4 cals/gram of carbs

Total calories: $180 = 4p + 9f + 4c$

$180 - 4p - 4c = 9f$

$180 - 4(p+c) = 9f$ ← ÷9

$20 - \frac{4}{9}(p+c) = f$

or

$f = 20 - \frac{4}{9}(p+c)$

27

The world's population has grown at an average rate of 1.9 percent per year since 1945. There were approximately 4 billion people in the world in 1975. Which of the following functions represents the world's population P, in billions of people, t years since 1975? (1 billion = 1,000,000,000)

A) $P(t) = 4(1.019)^t$

B) $P(t) = 4(1.9)^t$

C) $P(t) = 1.19t + 4$

D) $P(t) = 1.019t + 4$

Standard exponential growth function:

$y = a(1+r)^t$ ← number of t periods since the start

rate of growth

a: starting value

y: ending value at time t

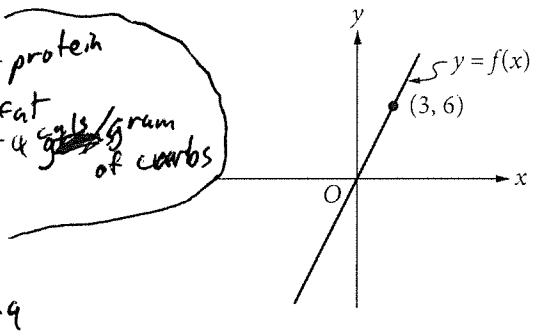
$P(t) = 4(1+0.19)^t$

$P(t) = 4(1.019)^t$

OR find a value you know and see which equation it works for.

After 1 year, the population will be 1.9% more than 4 billion, or $1.019 \cdot 4 = 4.076$ billion. Plugging in 1 for t in A) yields 4.076, which is not the case for any other answer.

28



In the xy-plane above, a point (not shown) with coordinates (s, t) lies on the graph of the linear function f. If s and t are positive integers, what is the ratio of t to s?

A) 1 to 3

B) 1 to 2

C) 2 to 1

D) 3 to 1

$(s, t) = (3, 6)$

ratio of t to s =

6 to 3

divide both by 3 = 2 to 1

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

29

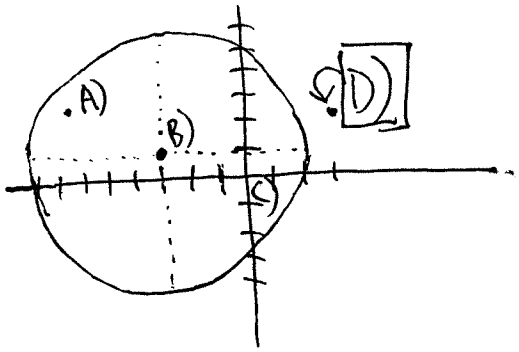
A circle in the xy-plane has equation $(x+3)^2 + (y-1)^2 = 25$. Which of the following points does NOT lie in the interior of the circle?

A) $(-7, 3)$
B) $(-3, 1)$
C) $(0, 0)$
D) $(3, 2)$

$(x-h)^2 + (y-k)^2 = r^2$

Equation of a circle with center (h, k) and radius r.

center of this circle: $(-3, 1)$
radius $= \sqrt{25} = 5$



30

Year	Subscriptions sold
2012	5,600
2013	5,880

The manager of an online news service received the report above on the number of subscriptions sold by the service. The manager estimated that the percent increase from 2012 to 2013 would be double the percent increase from 2013 to 2014. How many subscriptions did the manager expect would be sold in 2014?

A) 6,020
B) 6,027
C) 6,440
D) 6,468

% increase $=$

$$\frac{\text{Ending value} - \text{Starting value}}{\text{Starting Value}}$$

$$= \frac{5{,}880 - 5{,}600}{5{,}600} = 0.05$$

$= 5\%$

This is expected to be double the growth of 2013 to 2014, so the growth from 2013 to 2014 will be half of it.

$\frac{1}{2}$ of $5\% = 2.5\%$

2013 to 2014 subscriptions are expected to be

$1.025(5{,}880) = \boxed{6{,}027}$

Unauthorized copying or reuse of any part of this page is illegal.

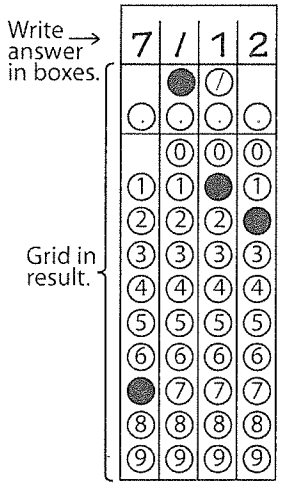
CONTINUE

DIRECTIONS

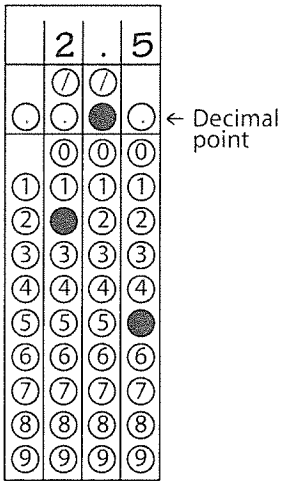
For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

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

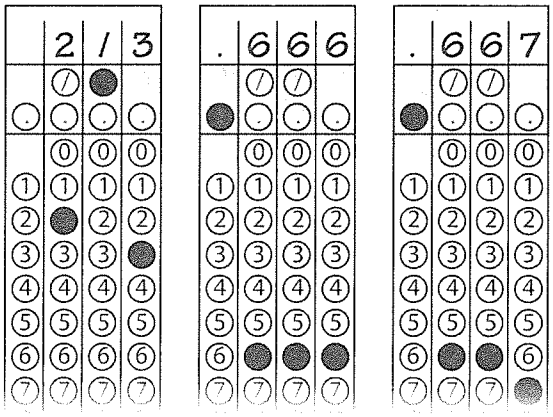
Answer: $\frac{7}{12}$



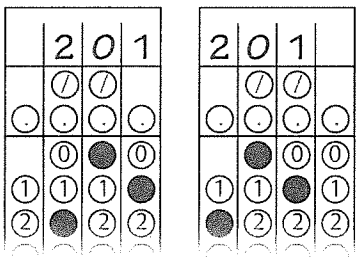
Answer: 2.5



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



Answer: 201 – either position is correct



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

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

31

In 1854, during the California gold rush, each ounce of gold was worth $20, and the largest known mass of gold found in California was worth $62,400 in that year. What was the weight, in pounds, of this mass of gold? (16 ounces = 1 pound)

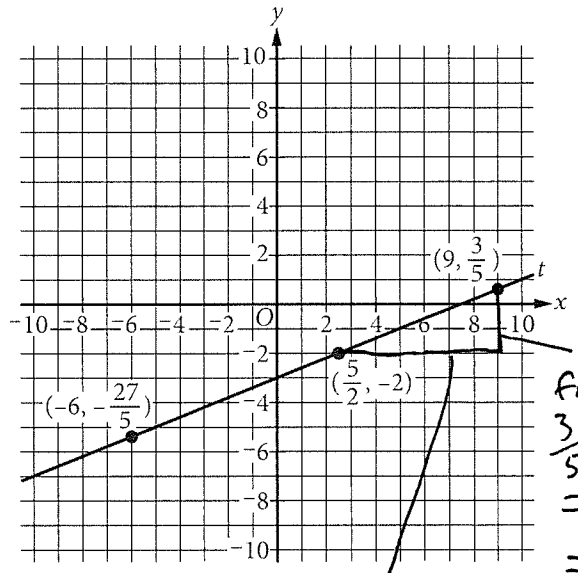
$\frac{62,400}{20} = 3,120$ ounces in the largest known mass.

$3,120 \text{ ounces} \cdot \frac{1 \text{ pound}}{16 \text{ ounces}}$

$= \boxed{195}$ pounds

32

Line t is shown in the xy-plane below.



What is the slope of line t ?

distance from -2 to $\frac{3}{5}$ = rise

$= \frac{3}{5} - (-2)$

$= 0.6 + 2$

$= 2.6$

distance from $\frac{5}{2}$ to 9 = run

$= 9 - \frac{5}{2} = 9 - 2.5$

$= 6.5$

$\text{slope} = \frac{\text{rise}}{\text{run}} = \frac{2.6}{6.5}$

$= \boxed{0.4}$

or $\frac{2}{5}$

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

33

The score on a trivia game is obtained by subtracting the number of incorrect answers from twice the number of correct answers. If a player answered 40 questions and obtained a score of 50, how many questions did the player answer correctly?

Let x = the number of correct answers

Let y = the number of incorrect answers

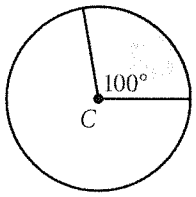
A: $x + y = 40$ ← total questions answered

B: $2x - y = 50$ ← total score

A+B: $3x = 90$

$x = \boxed{30}$

34



Point C is the center of the circle above. What fraction of the area of the circle is the area of the shaded region?

There are 360° in a circle, so the shaded region is $\frac{100}{360} = \frac{10}{36} = \boxed{\frac{5}{18}}$

or .277

or .278

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

35

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

If the ordered pair (x, y) satisfies the system of equations above, what is one possible value of x ?

Substitute

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

$4 - x = x^2 - 4x + 4$

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

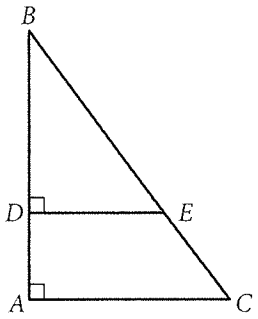
$0 = x^2 - 3x$

factor

$0 = x(x - 3)$

Solutions: $x =$ 0 or 3

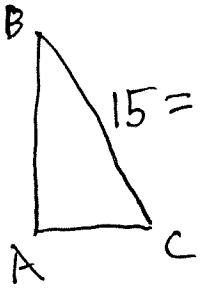
36



In the figure above, $\tan B = \frac{3}{4}$. If $BC = 15$ and $DA = 4$, what is the length of $\overline{DE}$?

$\tan = \frac{\text{opposite}}{\text{adjacent}} = \frac{3}{4}$

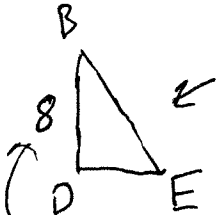
Since the ratio of the legs of each triangle is 3 to 4, they are 3-4-5 triangles.



$15 = 3 \cdot 5$, so $AC = 3 \cdot 3 = 9$ and $AB = 3 \cdot 4 = 12$

Since $AB = 12$ and $DA = 4$,

$BD = 12 - 4 = 8$



3-4-5 triangle

$= 2 \cdot 4$ so $DE = 2 \cdot 3 =$ 6

Unauthorized copying or reuse of any part of this page is illegal.

CONTINUE

Questions 37 and 38 refer to the following information.

Number of Contestants by Score and Day

	5 out of 5	4 out of 5	3 out of 5	2 out of 5	1 out of 5	0 out of 5	Total
Day 1	2	3	4	6	2	3	20
Day 2	2	3	5	5	4	1	20
Day 3	3	3	4	5	3	2	20
Total	7	9	13	16	9	6	60

The same 20 contestants, on each of 3 days, answered 5 questions in order to win a prize. Each contestant received 1 point for each correct answer. The number of contestants receiving a given score on each day is shown in the table above.

37

What was the mean score of the contestants on Day 1?

2 contestants scored 5

$$\text{Mean} = \frac{2(5) + 3(4) + 4(3) + 6(2) + 2(1) + 3(0)}{\text{Total number of contestants} \rightarrow 20}$$

$$= \frac{10 + 12 + 12 + 12 + 2 + 0}{20}$$

$$= \frac{48}{20} = \boxed{2.4}$$

38

No contestant received the same score on two different days. If a contestant is selected at random, what is the probability that the selected contestant received a score of 5 on Day 2 or Day 3, given that the contestant received a score of 5 on one of the three days?

True of 7 contestants

$$\frac{\text{Desired outcome}}{\text{all possible outcomes}}$$

$$= \frac{\text{Scored 5 on day 2} + \text{Scored 5 on day 3}}{\text{Scored 5 on any day}}$$

$$= \frac{2 + 3}{7} = \boxed{\frac{5}{7}}$$

or .714

STOP

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

Unauthorized copying or reuse of any part of this page is illegal.