



SAT[®] Practice Test #1

IMPORTANT REMINDERS

1

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

2

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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 Nathaniel Hawthorne, *The Minister's Black Veil*, originally published in 1836.

Line With this gloomy shade before him, good Mr.
Hooper walked onward, at a slow and quiet pace,
stopping somewhat and looking on the ground, as is
5 customary with abstracted men, yet nodding kindly
to those of his parishioners who still waited on the
meeting-house steps. But so wonder-struck were they,
that his greeting hardly met with a return.

"I can't really feel as if good Mr. Hooper's face was
behind that piece of crape," said the sexton.

10 "Our parson has gone mad!" cried Goodman Gray,
following him across the threshold.

A rumor of some unaccountable phenomenon had
preceded Mr. Hooper into the meetinghouse and set all
the congregation astir. Few could refrain from twisting
15 their heads toward the door; many stood upright
and turned directly about; while several little boys
clambered upon the seats, and came down again with
a terrible racket. There was a general bustle, a rustling
of the women's gowns and shuffling of the men's feet,
20 greatly at variance with that hushed repose which
should attend the entrance of the minister. But Mr.
Hooper appeared not to notice the perturbation of his
people. He entered with an almost noiseless step, bent
his head mildly to the pews on each side and bowed
25 as he passed his oldest parishioner, a white-haired
great-grandsire, who occupied an armchair in the
centre of the aisle. It was strange to observe how slowly
this venerable man became conscious of something

singular in the appearance of his pastor. He seemed
30 not fully to partake of the prevailing wonder till Mr.
Hooper had ascended the stairs and showed himself
in the pulpit, face to face with his congregation except
for the black veil. That mysterious emblem was never
once withdrawn. It shook with his measured breath as
35 he gave out the psalm, it threw its obscurity between
him and the holy page as he read the Scriptures, and
while he prayed the veil lay heavily on his uplifted
countenance. Did he seek to hide it from the dread
Being whom he was addressing?

40 Perhaps the pale-faced congregation was almost as
fearful a sight to the minister as his black veil to them.

Mr. Hooper had the reputation of a good preacher,
but not an energetic one: he strove to win his people
heavenward by mild, persuasive influences rather than
45 to drive them thither by the thunders of the word. The
sermon which he now delivered was marked by the
same characteristics of style and manner as the general
series of his pulpit oratory, but there was something
either in the sentiment of the discourse itself or in the
50 imagination of the auditors which made it greatly the
most powerful effort that they had ever heard from
their pastor's lips. It was tinged rather more darkly
than usual with the gentle gloom of Mr. Hooper's
temperament. The subject had reference to secret
55 sin and those sad mysteries which we hide from our
nearest and dearest, and would fain conceal from our
own consciousness, even forgetting that the Omniscient
can detect them. A subtle power was breathed into his
words. Each member of the congregation, the most
60 innocent girl and the man of hardened breast, felt as
if the preacher had crept upon them behind his awful

veil and discovered their hoarded iniquity of deed or thought. Many spread their clasped hands on their bosoms. There was nothing terrible in what Mr. Hooper
 65 said—at least, no violence; and yet with every tremor of his melancholy voice the hearers quaked. An unsought pathos came hand in hand with awe. So sensible were the audience of some unwonted attribute in their minister that they longed for a breath of wind to blow
 70 aside the veil, almost believing that a stranger’s visage would be discovered, though the form, gesture, and voice were those of Mr. Hooper.

1

Which choice best summarizes the passage?

- A) Parishioners believe Mr. Hooper has fallen ill and fear for the future of their church.
- B) Mr. Hooper’s wearing of a black veil creates feelings of unease and guilt among his parishioners.
- C) During his sermon, Mr. Hooper wears a black veil to coerce his followers into confessing their worst sins in church.
- D) Parishioners believe a stranger in a veil has taken over the pulpit and worry about what has become of Mr. Hooper.

2

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

- A) Lines 12-14 (“A...astir”)
- B) Lines 34-38 (“It...countenance”)
- C) Lines 45-52 (“The...lips”)
- D) Lines 59-63 (“Each...thought”)

3

Over the course of the passage, the parishioners’ attitudes shift from

- A) apathetic to agitated.
- B) confused to inquisitive.
- C) fearful to indignant.
- D) inquisitive to concerned.

4

In line 21, the word “attend” most nearly means

- A) visit.
- B) manage.
- C) assist.
- D) accompany.

5

Which choice best describes the parishioners?

- A) unnerved.
- B) skeptical.
- C) distrustful.
- D) hopeful.

6

The passage indicates that Mr. Hooper is typically regarded as

- A) arrogant.
- B) terrifying.
- C) histrionic.
- D) reserved.

7

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

- A) Lines 21-23 (“But...people”)
- B) Lines 40-41 (“Perhaps...them”)
- C) Lines 42-45 (“Mr. Hooper...word”)
- D) Lines 59-63 (“Each...thought”)

8

The narrator uses the phrase “tinged rather more darkly than usual” (line 52) to describe

- A) the veil worn by Mr. Hooper.
- B) Mr. Hooper’s pulpit oratory.
- C) the congregation’s reception of Mr. Hooper.
- D) the sermon as received by the congregation.

9

What function does the fifth paragraph (lines 40-41) serve in the passage as a whole?

- A) It gives the reader a brief speculation of Mr. Hooper’s feelings.
- B) It expresses Mr. Hooper’s dismay towards the congregation’s improprieties.
- C) It demonstrates Mr. Hooper’s lack of awareness towards the effect of his veil on others.
- D) It characterizes Mr. Hooper as a frightful man.

10

Which choice best describes why Mr. Hooper wears the veil?

- A) To deceive his congregation.
- B) An undisclosed reason.
- C) To impersonate a fellow pastor.
- D) Because he is ill.

Questions 11-20 are based on the following passage and supplementary material.

This passage is adapted from Rohini Ruhil, "Is Population Really a Problem?" ©2017 by Centre for Social Medicine and Community Health, Jawaharlal Nehru University, India.

In 1968, American demographer Kingsley Davis attracted the world's attention to the population situation of India and Pakistan. He argued that the decline in death rate was not followed by a decline in birth rate in these countries and posed it as a problem. After that stance, the trend of blaming India's population growth for its poverty began. The first family planning clinic of India was started in 1925, which later led to the formulation of the official family planning policy. The developed world was convinced that the increasing population growth in developing countries was a threat to survival and should be addressed through the implementation of policies and funding received from the Ford and Rockefeller Foundations. It is important to mention that the scars of the family planning program during this emergency period led to 1,774 reported deaths and about 7 million forced sterilizations involving bachelors, hospital patients, old persons, persons with no children, jail inmates, pavement dwellers, and inmates in night shelters. As a consequence, people started avoiding hospitals and health services, including vaccination, due to fear of being nabbed for sterilization.

Held in Cairo in 1994, the International Conference on Population and Development (ICPD) involved a paradigm shift discussing and promoting the reproductive rights and reproductive health of women. Article 16 of the UN Convention also talked about the rights of reproductive choice for women. In particular, the Cairo Conference discussed the right to legal abortions because the religious fundamentalists in the USA, Vatican, and conservative Islamic countries were against abortion-influenced policy decisions to support their stance.

The ICPD was revolutionary in the way the population problem was understood. The focus then shifted to women's empowerment and reproductive health. There was criticism of the 'Cairo Consensus' by some organizations that termed it an 'old wine in a new bottle' and associated it with neo-liberal globalization. National and international organizations realized that education and employment were equally important in reducing birth rate, along with modern contraception. It was also realized that the role of women could not be confined to reproduction and that increased status

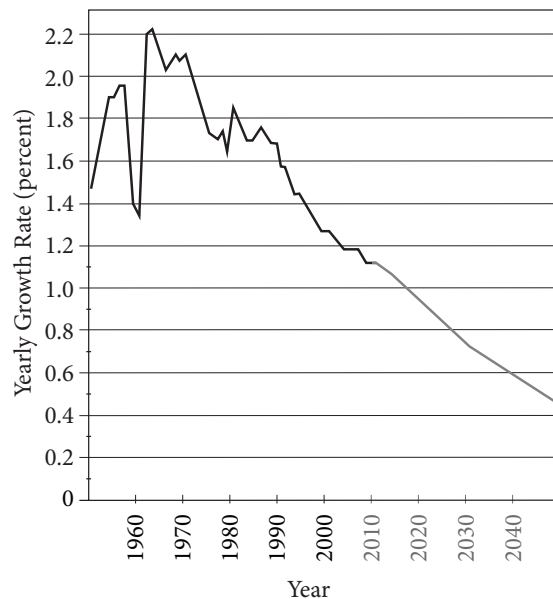
of women in society would automatically help with population stabilization.

However, opposition to the shift and the ICPD's resolutions emerged. At the time of the Cairo Conference, India had a strong anti-natalist* family planning program guided by the principle that the Net Reproductive Ratio (NRR) equals one as explained in the National Health Policy of 1983. Another committee recommended abandoning incentive programs for those who used contraceptives. The ICPD faced widespread criticism for proposing disincentives such as debarring those with more than two living children from candidacy for and voting in village councils, and for adopting a mandatory 'two children' norm for recruitment and promotion in government jobs.

Yet research kept showing a different story. One 1984 study showed that population growth has a rather positive effect on economic growth in the long run. Another argued that poverty was not a consequence of overpopulation, but rather overpopulation a consequence of poverty. Public opinion increasingly believed each couple should be responsible for planning a family, not tradition, religion, church, law, or state. In the beginning of the 21st century, India's Millennium Development Goals included investing in sexual and reproductive health. Through public policy and advocacy, the country shifted its concern from population control to reproductive health, specifically focusing on reducing maternal mortality and infant/child mortality. By 2015, policymakers formulated the Sustainable Development Goals, targeted to comprehensively eradicate hunger, poverty, maternal and child deaths, and ensuring healthy lives and well-being.

**Anti-natalism is the belief that population density should be controlled by reducing birthrate.*

The following graph details the world's population growth rate between the years 1950-2050.



11

The main purpose of the passage is to

- A) shed light on the horrors caused by early family planning measures, including the sterilization of about 7 million people.
- B) discuss the Cairo Conference's struggle to appease countries with strong anti-abortion and anti-birth control religious followings.
- C) provide support for government regulations which dictate family planning.
- D) explore the root causes of overpopulation with regards to women's empowerment and reproductive rights.

12

Over the course of the passage, the central argument for population control shifts from

- A) the rejection of the Cairo Conference to the acceptance of the ICPD's resolutions.
- B) the idea that overpopulation causes poverty to the realization that poverty causes overpopulation.
- C) the notion that poverty causes overpopulation to the acceptance that overpopulation causes poverty.
- D) Kingsley Davis' beliefs to the ICPD's resolutions.

13

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

- A) Lines 44-47 ("It...stabilization")
- B) Lines 61-63 ("One...run")
- C) Lines 64-66 ("Another...poverty")
- D) Lines 71-75 ("Through...mortality")

14

As used in line 6, "trend" most nearly means

- A) movement.
- B) tendency.
- C) development.
- D) shift.

15

It can reasonably be inferred that the author views overpopulation as

- A) dangerous.
- B) uncontrollable.
- C) misunderstood.
- D) ultimately inconsequential.

16

Data in the graph indicate that the yearly growth rate percentages are the same in which of the following years?

- A) 1950 and 1995.
- B) 1955 and 1970.
- C) 1960 and 2010.
- D) 1980 and 2000.

17

Based on the passage, Indian citizens' feelings on population control policies before the Cairo Convention can best be described as

- A) timid.
- B) fearful.
- C) incensed.
- D) shocked.

18

The main purpose of the fourth paragraph (lines 48-60) is to

- A) provide ideas contradictory to those previously discussed as the basis for eventual compromise.
- B) pit religious beliefs against scientific research in an increasingly religious society.
- C) support the findings of the previous paragraph with additional policy measures.
- D) introduce alternative viewpoints that were once potentially popular.

19

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

- A) expelling.
- B) condemning.
- C) prohibiting.
- D) refusing.

20

Which of the following statements is supported by the graph?

- A) Increased enrollment in higher education led to the pre-1960 decrease in population growth rate.
- B) The population growth rate since 1960 has consistently been trending downward.
- C) The population growth rate will most likely surge upward in 2050 as it did in 1950.
- D) The population growth rate has had an overall downward trend since 1980.

Questions 21-30 are based on the following passage and supplementary material.

This passage is adapted from Rui Li, et al., "Mercury Pollution in Vegetables, Grains, and Soils from Areas Surrounding Coal-Fired Power Plants." ©2017 by Scientific Reports.

Rapid industrial development in China is highly dependent on coal energy. This has had severe environmental consequences in China, including thick smog in Beijing and many other cities, exacerbating the greenhouse effect, and widespread heavy metal pollution in the air, water, soil, and agricultural products. Mercury is a particularly important heavy metal to consider when examining the environmental consequences of coal burning. In 1995, the total mercury emissions from coal-fired boilers in China based on mercury emission factors was 302.87 tons. In fact, between 1978 and 1995, about 2,493.8 tons of mercury were released into the environment from coal combustion. Mercury can be harmful at very low concentrations because of its high toxicity and ability to bioaccumulate. Mercury can build up and accumulate in the human body and cause severe neurological disorders in children and adults. In 1955, inhabitants of Minamata Bay, Japan who consumed mercury-contaminated fish and seafood suffered from mercury poisoning, which particularly damaged patients' nervous systems. As a result, at least 439 people died of Minamata disease. Although mercury is released into the environment from natural and anthropogenic sources, coal-fired power plants have been identified as the largest source of mercury emissions. What effects do these mercury-emitting power plants have on local food sources and their neighboring communities?

We investigated the mercury content of the edible parts of ten types of vegetable and grain crops from selected locations. The samples collected from a grocery store, which is far from any power plants (greater than 55km), were used as the uncontaminated to compare with samples from the coal-fired power plant areas. The mercury contents in 79% of vegetable samples and 67% of grain samples from the sites near coal-fired power plants exceeded the maximum allowed mercury levels defined by the Food Safety Standards in China. The highest mercury concentrations measured in the vegetable and grain samples were 8.6 and 6.3 times higher than the allowed levels, respectively. Meanwhile, none of the vegetable and grain samples purchased from a grocery store greater than 55km away from any coal-fired power plant exceeded the maximum levels

allowed.

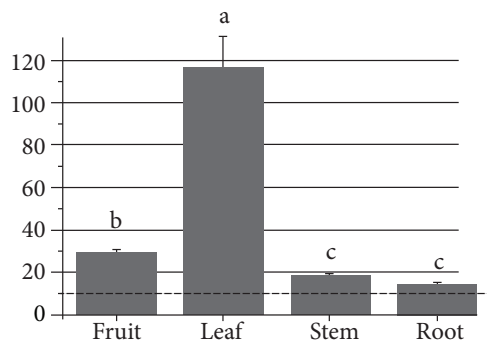
Comparing the mercury concentrations in different types of vegetables and grains, we found that the mercury contents in the edible parts of lettuce, amaranth, water spinach, tomato, eggplant, pepper, cucumber, and cowpea were 2.1, 2.9, 5.4, 7.6, 4.3, 6.2, 1.8, and 5.7 fold greater than the maximum allowed mercury levels, respectively. In addition, the mercury concentrations in the rice and maize seed samples were 3.0 and 2.1 fold higher than the maximum allowed mercury level in grains, respectively. The mercury content differed significantly among different vegetable and grain crops, and the differences in mercury concentration among different plants may be due to species-specific metal absorption and accumulation properties. This type of information can help farmers to choose crop plant species that accumulate relatively low amounts of mercury.

Mercury concentrations were much higher in leaves than in fruits, and the mercury concentrations in the aboveground organs were higher than those in roots.

Previous studies have demonstrated that plants can absorb mercury from both air and soil. When plants absorb mercury mainly from the soil, the mercury content should be higher in roots, while the mercury contents should be higher in leaves' tissues if air mercury is the main source of mercury. In our studies, the mercury contents were much greater in leaves than in roots, indicating that the source of the mercury in the plant samples collected near Power Plant A and Power Plant B should be mainly from the air.

In China, there are thousands of coal-fired power plants and most of them are located in densely populated eastern regions, particularly in suburbs where vegetables for residents in cities are produced. Thus, mercury generated from coal-fired power plants may cause potential health risks for the people living surrounding coal-fired power plants.

The following graph details the maximum acceptance levels of mercury for vegetables and the measured levels of mercury found in sample vegetables.



Dashed line: Maximum allowed mercury level in vegetable (10µg/kg FW)
(Food Safety Standard China, GB 2762-2012)
Tomato tissue samples were collected from Location B3 located 5km from
Power Plant B. The level of significance was defined at $P < 0.05$ using T-test.

21

The primary purpose of the passage is to

- A) detail the neurological effects mercury can have on people.
- B) warn against Japan's mercury-contaminated seafood industry.
- C) discuss how coal-fired power plants affect local produce.
- D) show that certain levels of mercury are acceptable in vegetation.

22

In the first paragraph, the authors' anecdote set in Minamata Bay, Japan serves to

- A) compare the effectiveness of Chinese versus Japanese regulations regarding contamination.
- B) illustrate the destructive effects of overfishing in Japan.
- C) explain the rise in Chinese vegetation production in conjunction with its declining fishing industry.
- D) provide evidence of the dangers of mercury contamination.

23

As used in line 8, "consider" most nearly means

- A) contemplate.
- B) study.
- C) judge.
- D) respect.

24

The authors' attitude toward coal-fired power plants is best described as one of

- A) understanding.
- B) disdain.
- C) apprehension.
- D) ambivalence.

25

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

- A) Lines 2-7 (This...products)
- B) Lines 9-14 (In...combustion)
- C) Lines 41-45 (Meanwhile...allowed)
- D) Lines 80-82 (Thus...plants)

26

According to the passage, which of the following is true of plants' mercury absorption?

- A) If mercury is absorbed mainly from soil, the plants' fruits will have higher concentration than their roots.
- B) If mercury is absorbed mainly from the air, the plants' roots will have higher concentration than their fruits.
- C) Cowpeas had the highest concentration of mercury contamination of the vegetables tested.
- D) Grains tended to have lower concentrations of mercury contamination than vegetables.

27

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

- A) Lines 39-41 (The...respectively)
- B) Lines 52-55 (In...respectively)
- C) Lines 63-65 (Mercury...roots)
- D) Lines 67-71 (When...mercury)

28

Which of the following statements is supported by the graph?

- A) Plants grown underground had lower measured levels of mercury contamination.
- B) Leaves have the highest maximum acceptance level of mercury contamination.
- C) Mercury contamination occurred more frequently in fruits than in roots.
- D) All sample vegetables had the same measured level of mercury contamination.

29

It can reasonably be inferred that, when choosing what to plant, farmers should

- A) research species-specific metal absorption and accumulation properties before planting.
- B) investigate the proximity of potential contaminants.
- C) plant grains instead of vegetables because mercury contamination was lower in grains.
- D) know whether the mercury concentration is higher in the air or in the soil.

30

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

- A) The mercury concentration found in the roots is at the acceptable level, according to China's Food Safety Standards.
- B) Mercury concentration in fruits is triple the roots' level of concentration.
- C) Mercury contamination in the plants tested was most likely spread through the soil.
- D) Mercury contamination in the plants tested was most likely spread through the air.

Questions 31-41 are based on the following passages.

Passage 1 is adapted from John Jay, "Concerning Dangers from Foreign Force and Influence," originally published in 1787. Passage 2 is adapted from Robert Yates, "Antifederalist Paper #17," originally published in 1788.

Passage 1

Nothing is more certain than the indispensable necessity of government, and it is equally undeniable that, whenever and however it is instituted, the people must cede to it some of their natural rights in order to vest it with requisite powers. It is well worthy of consideration therefore, whether it would conduce more to the interest of the people of America that they should, to all general purposes, be one nation, under one federal government, or that they should divide themselves into separate confederacies, and give the head of each the same kind of powers which they are advised to place in one national government.

A strong sense of the value and blessings of union induced the people, at a very early period, to institute a federal government to preserve and perpetuate it. They formed it almost as soon as they had a political existence; nay, at a time when their habitations were in flames, when many of their citizens were bleeding, and when the progress of hostility and desolation left little room for those calm and mature inquiries and reflections which must ever precede the formation of a wise and well-balanced government for a free people.

It is worthy of remark that not only the first, but every succeeding Congress, as well as the late convention, have invariably joined with the people in thinking that the prosperity of America depended on its Union. To preserve and perpetuate it was the great object of the people in forming that Constitutional convention, and is also the great object of the plan which the convention has advised them to adopt. With what propriety, therefore, or for what good purposes, are attempts at this particular period made by some men to depreciate the importance of the Union? Or why is it suggested that three or four confederacies would be better than one? They who promote the idea of substituting a number of distinct confederacies in the room of the plan of the convention, seem clearly to foresee that the rejection of it would put the continuance of the Union in the utmost jeopardy.

Passage 2

This new government is to possess absolute and uncontrollable powers, legislative, executive, and judicial, with respect to every object to which it extends, that the Congress shall have power "to make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this Constitution in the government of the United States, or in any department or office thereof." And by the sixth article, it is declared, "that this Constitution, and the laws of the United States, which shall be made in pursuance thereof, and the treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land; and the judges in every State shall be bound thereby, any thing in the Constitution or law of any State to the contrary notwithstanding."

It is as much one complete government as that of New York or Massachusetts; it has absolute and perfect powers to make and execute all laws, to appoint officers, institute courts, declare offenses, and annex penalties, with respect to every object to which it extends, as any other in the world. So far, therefore, as its powers reach, all ideas of confederation are given up and lost.

The powers of the general legislature extend to every case that is of the least importance—there is nothing valuable to human nature, nothing dear to freemen, but what is within its power. It has the authority to make laws which will affect the lives, liberty, and property of every man in the United States; nor can the Constitution or laws of any State, in any way prevent or impede the full and complete execution of every power given.

This clause invested with the power of making all laws, proper and necessary, for carrying all these into execution; and they may so exercise this power as entirely to annihilate all the State governments, and reduce this country to one single government. And if they may do it, it is pretty certain they will; for it will be found that the power retained by individual States, small as it is, will be a clog upon the wheels of the government of the United States; the latter, therefore, will be naturally inclined to remove it out of the way.

31

As used in line 5, “vest” most nearly means

- A) furnish.
- B) entrust.
- C) invest.
- D) dress.

32

The author of Passage 1 would most likely agree that

- A) confederacies are more vulnerable to foreign influence.
- B) leaders should govern their regions separately from others.
- C) a strong, centralized government will best preserve the Union.
- D) the people must give the government complete authority to construct and enforce laws.

33

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

- A) Lines 1-5 (“Nothing...powers”)
- B) Lines 16-22 (“They...people”)
- C) Lines 27-30 (“To...adopt”)
- D) Lines 35-39 (“They...jeopardy”)

34

As used in line 74, “exercise” most nearly means

- A) train.
- B) employ.
- C) rehearse.
- D) observe.

35

The central claim of Passage 2 is that

- A) A centralized government will eventually cast states’ rights aside in favor of its own power.
- B) The country’s strength depends on the strength of each confederate state.
- C) A country of separate confederacies is more susceptible to attacks.
- D) Other states should regard New York and Massachusetts as model confederacies.

36

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

- A) Lines 40-48 (“This...thereof”)
- B) Lines 61-62 (“So...lost”)
- C) Lines 66-71 (“It...given”)
- D) Lines 76-81 (“And...way”)

37

In lines 43-48, the author of Passage 2 quotes Article Six of the US Constitution primarily to

- A) express support for the Constitution as it was written then.
- B) show the centralized government’s power to enter into any treaty.
- C) expose the states’ lack of control with respect to the federal government’s absolute authority.
- D) demonstrate the hypocrisy of taxation without representation in the new country.

38

Which statement best describes the relationship between the passages?

- A) Passage 2 refutes the central claim advanced in Passage 1.
- B) Passage 2 draws alternative conclusions from the evidence presented in Passage 1.
- C) Passage 2 elaborates on the proposal presented in Passage 1.
- D) Passage 2 validates some conclusions in Passage 1 but opposes others.

39

On which of the following points would the authors of both passages most likely agree?

- A) No freedom should ever be yielded for any cause.
- B) Citizens should be actively involved in the governance of a country.
- C) Freedoms should be infringed upon for the purpose of security.
- D) Each state should enforce laws specific to its needs, regardless of its adherence to federal law.

40

The author of Passage 1 would most likely respond to the discussion of the dangers of a centralized government's authority in lines 63-81, Passage 2, by countering that

- A) the new country's success will depend on its ability to pacify each state in the laws passed by the federal government.
- B) each state must prove its merit before the federal government will consider protecting it.
- C) a centralized way of thinking about law and society will enrich the shared culture amongst the states.
- D) a centralized government that streamlines important decision-making more effectively balances the needs of the entire country, making it better equipped to preserve the Union.

41

The main purpose of each passage is to

- A) determine what a government's power should be in the new country.
- B) propose further amendments to a new constitution.
- C) argue for more transparency in government operations and decision-making.
- D) describe the government's responsibilities to its citizens.

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

This passage is adapted from Manoj Kumar Behera, "Assessment of the State of Millet Farming in India." ©2017 by MedCrave Online Journal Ecology & Environmental Science, Odisha, India.

Millets are among the oldest cultivated crops in India and the rest of the world. Nearly 60 million acres of land in India are under millet cultivation.

Line India is the largest producer of sorghum and millet,
5 accounting for over 80% of Asia's production. In the last few decades, India has evinced a sharp decline in the area under millet cultivation due to several factors. However, in India and other parts of the world, a growing number of farmers are switching to millet
10 cultivation. The Consultative Group on International Agricultural Research (CGIAR) has estimated that the global production of wheat, rice, and maize could decrease by 13 to 20 percent in the coming decades because of climate change. Global agricultural
15 production will have to battle against this loss, even as production needs to rise by an estimated 70 percent in order to feed 9 billion people by 2050. Millet may be the answer to this dire need.

The father of the Green Revolution in India has
20 opined that state policies related to crop loan, subsidies, favorable conditions for commercial agriculture, and the supply of food items like rice, wheat, maida, and rava at a reasonable cost through the public distribution system (PDS), have shaped the minds of people to
25 neglect minor millet. The food policies pursued over the years have pushed many people away from millet despite it being more nutritious than rice and wheat. The approach of selective utilization of crops and varieties have reportedly threatened agro-biodiversity
30 leading to rapid erosion of natural resources and consequently affecting the nutritional security of people. Though generally unrecognized, millet's impact on climate change has received fair recognition. Global bodies are pushing millet farming with the idea that it
35 reduces agriculture's carbon footprint while ensuring food and nutritional security.

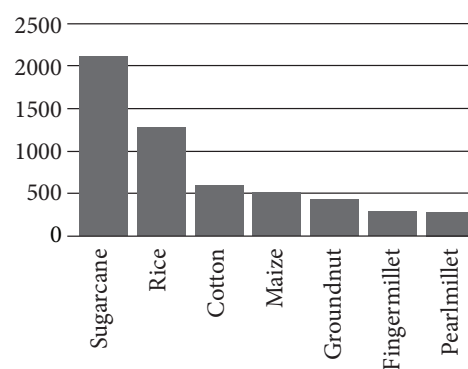
As India's agriculture suffers hugely from the vagaries of monsoons, millets, which are also known as "famine reserves" for their prolonged and easy
40 storability under ordinary circumstances, are of great relevance. They are most suitable for mixed and intercropping, thus offering sustainable resource use, food, and livelihood stability to farmers. Additionally, given the fact that millets are very good sources of

45 nutrients, developing countries like India which report dramatic rates of malnutrition (about one fifth of the population), particularly among children and women, promotion of millet farming can help fight malnutrition.

50 The 2014 National Council of Applied Economic Research (NCAER) report has revealed the exponential drop in the consumption of hardy millet from 32.9 kg in 1960 to 4.2 kg in 2010 since urbanization made Indians switch to wheat and rice. Yet from a farming
55 perspective, millets probably provide the best option for achieving the triple objective of farming: profitability, adaptability, and sustainability. Millets are highly tolerant of increased temperatures, droughts, and floods. Millets can be cultivated well in dry zones
60 and rain-fed areas under marginal conditions of soil fertility and moisture. Storage life is comparatively high (two years or beyond) and millet farming requires low investment. From a human nutrition perspective, millets are a rich source of nutrients. Millets are richer
65 in calcium, iron, and beta-carotene than are rice and wheat. Millets are also rich in dietary fiber, which is negligible in rice, improve the digestive system, reduce cancer risk, and strengthen the immune system. It seems that millet could be the answer to fighting
70 climate change, poverty, and malnutrition.

The following figure details the amount of water required for the cultivation of different crops.

Water Requirement of Different Crops (mm)



42

The primary purpose of the passage is to

- A) point to millet as an underutilized solution to climate, agricultural, and population issues.
- B) expose the shortcomings of cultivating wheat, rice, and grains.
- C) understand why India's legislative policies on food have neglected millet.
- D) detail the nutritional value of millet as compared to other grains.

43

As used in line 32, "impact" most nearly means

- A) collision.
- B) significance.
- C) authority.
- D) effect.

44

According to the second paragraph (lines 19-36), the author most likely believes India's food policies promoting wheat production are

- A) astonishing.
- B) ambitious.
- C) neglectful.
- D) productive.

45

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

- A) Lines 14-17 ("Global...2050")
- B) Lines 25-27 ("The...wheat")
- C) Lines 28-32 ("The...people")
- D) Lines 32-33 ("Though...recognition")

46

Based on information in the passage, it can reasonably be inferred that millet

- A) is perceived by farmers as one-dimensional and less cost-efficient than other grains.
- B) farmers prioritize profitability over adaptability and sustainability.
- C) became an underutilized resource after state policies caused consumers to favor rice and wheat, among other grains.
- D) is now widely viewed as the resource which will help solve malnutrition and food shortage issues.

47

With which of the following statements about grain production would the author most likely agree?

- A) Farmers will rally behind the NCAER's 2014 report to influence others to advocate for increased millet cultivation.
- B) The CGIAR will endorse millet cultivation as a solution for an impending food crisis.
- C) The impact of climate change should lead countries to seek alternative grains to wheat, rice, and maize.
- D) Neighboring Asian countries will follow India's lead to compel farmers to cease the production of any grain but millet.

48

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

- A) Lines 10-14 ("The...change")
- B) Lines 14-17 ("Global...2050")
- C) Lines 43-49 ("Additionally...malnutrition")
- D) Lines 50-54 ("The...rice")

49

As used in line 40, “ordinary” is closest in meaning to

- A) plain.
- B) pedestrian.
- C) typical.
- D) customary.

50

Data in the graph indicate that finger millet and pearl millet require about

- A) 475mm of water
- B) 600mm of water
- C) 350mm of water
- D) 200mm of water

51

Which of the following statements is supported by the graph?

- A) Compared to other grains, at least two types of millet can be considered less demanding resources.
- B) Sugarcane may use more water than other crops, but are much more monetarily valuable to farmers.
- C) Groundnut requires the same amount of water as pearl and finger millet.
- D) Rice should be grown in favor of cotton and millet due to its durability.

52

Based on the passage and the graph, which of the following is the most logical next step for India’s agriculture industry?

- A) India should implement a family planning policy limiting the number of children born to counteract resource deprivation.
- B) India should use current research on grain sustainability and resourcefulness to justify implementing more millet-friendly farming policies.
- C) India should seek the help of other Asian nations to be as productive as their higher volumes to help the economy and the environment.
- D) India should continue its trend of growing more wheat, rice, and maize in order to contribute to the rapidly increasing population of 9 billion people by 2050.

STOP

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

Writing and Language Test

35 MINUTES, 44 QUESTIONS

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

DIRECTIONS

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

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

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

The Lowell Mill Girls’ Place in the History of the Industrial Revolution

When people imagine the face of a typical factory worker during the Industrial Revolution, that of a 12-year-old farmer’s daughter rarely comes to mind. But it is just these kinds of people—**1** women and girls, as young as twelve, in Lowell, Massachusetts in the 1830s and ‘40s who left farms to become textile workers—who would serve at the vanguard of the world’s most transformative structural change since the advent of agriculture.

1

- A) NO CHANGE
- B) women and girls as young as twelve who left farms to become textile workers in Lowell, Massachusetts in the 1830s and ‘40s
- C) women, and girls who left farms as young as twelve to become textile workers, in the 1830s and ‘40s in Lowell, Massachusetts
- D) women as young as twelve and girls who became textile workers after farms in the 1830s and ‘40s in Lowell, Massachusetts

2 Born in Newbury, Massachusetts to John Lowell II and Susanna Cabot, Francis Cabot Lowell realized that the path toward American economic independence lay in manufacturing. After a trip to Scotland convinced him that the textile trade would be the most lucrative industry to introduce to his native New England, Lowell and his partners established the Boston Manufacturing Company, which built 3 its first mill beside the Charles River.

Lowell died before the industrial town named after him was created, but it is for this town, its factories, and the system of labor that he is best known. 4 The Lowell System is notable not only for the wage-factory model it created 5 but it also employed women and girls who left life on the farm to become factory workers. Some of the

2

Which of the following provides the most logical introduction to the sentence?

- A) NO CHANGE
- B) Having used his father's inheritance, upon his death, to purchase merchant ships,
- C) Already an established merchant by the time of the Embargo of 1807 that disrupted trade between the United States and Europe,
- D) A first-hand witness to the grisly turns taken by the French Revolution,

3

- A) NO CHANGE
- B) his
- C) there
- D) one's

4

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

- A) Deleted, because it introduces unnecessary information into the passage.
- B) Deleted, because it provides an illogical transition from the previous paragraph.
- C) Kept, because it provides a relevant transition from paragraphs two to three.
- D) Kept, because it provides autobiographical information that corrects a misconception described elsewhere in the passage.

5

- A) NO CHANGE
- B) but also its employees, whom were women and girls
- C) employing namely women and girls
- D) but also for who it employed, namely women and girls

first women in the history of the U.S. to work outside the home, “Mill Girls” came to Lowell for a variety of reasons, and though life included **6** murderous hours and highly regimented days even outside the **7** factory all at half the pay of male workers; many women saw it as an opportunity for more independence than **8** she could have otherwise found. One Mill Girl, Harriet Farley, wrote in a newsletter published by mill employees that despite working 11-13 hours a day, she felt a sense of freedom to “read, think, and write without restraint.”

The Mill Girls experienced both the conflicts **9** who would catalyze labor movements half a century later and the gender discrimination that would give birth

6

Which choice best maintains the tone established in the essay?

- A) NO CHANGE
- B) back-breaking
- C) grueling
- D) annoying

7

- A) NO CHANGE
- B) factory all at half the pay of male workers,
- C) factory; all at half the pay of male workers,
- D) factory—all at half the pay of male workers—

8

- A) NO CHANGE
- B) they could have otherwise found.
- C) she could otherwise find.
- D) they could otherwise found.

9

- A) NO CHANGE
- B) they
- C) which
- D) that

to the struggle for women's rights in the late Nineteenth century and beyond. When confronted with these injustices, they did not fail to act. Mill Girls organized strikes in both 1834 and 1836 when management threatened to cut **10** wages. **11** However their actions were largely unsuccessful in their time, these women were pioneers in the fields of workers' and women's rights who would help to change the face the American workforce for centuries to come.

10

The writer is considering revising the underlined portion of the sentence to read:

wages and they created the first union of working women in U.S. history—the Lowell Female Labor Reform Association—to press for a 10-hour work day.

Should the writer make this addition here?

- A) Yes, because it provides an additional example of the Mill Girls' activism.
- B) Yes, because it provides a logical transition to the ideas in the final sentence of the essay.
- C) No, because it should be placed earlier in the paragraph.
- D) No, because this information has already been conveyed elsewhere in the passage .

11

- A) However
- B) Since
- C) Though
- D) Insomuch as

The Sleepy Teenage Brain at School

Research on circadian rhythms—those invisible clocks that regulate so many of the **12** bodies most important functions—has proven what anyone who has lived through their teens can attest: **13** sleeping late is a right of passage. This trend is pervasive across cultures and even across mammalian species, making it impossible that social factors alone can account for it. In addition, scientists have found proof that the period of secondary sex development we call puberty coincides with a delay in the melatonin secretion that **14** allows animals to fall asleep. Put more simply, adolescent mammals **15** stay up later and sleep later than either their younger or older counterparts.

12

- A) NO CHANGE
- B) bodies' most important function's
- C) body's most important functions
- D) body's most important functions'

13

Which choice provides the most appropriate introduction to the passage?

- A) NO CHANGE
- B) adolescents want to sleep late.
- C) sleep is more about attitude than biology.
- D) teenagers' sleep patterns are culturally regulated.

14

- A) NO CHANGE
- B) allow
- C) have allowed
- D) is allowing

15

- A) NO CHANGE
- B) stay up later, and sleep later, than do either
- C) stay up later and sleep later than either does
- D) stay up later, and they sleep later than either

16 This tendency is one of biology rather than attitude.

However, it seems that our social structures have yet to catch up to the science. Most misguided of all, perhaps, is our resistance to delay the start of school for high school students. Scientists agree that the most natural time for an adolescent to wake up lies somewhere between 8-9am. However, most high schools in the United States start by 8:30 or earlier, nearly guaranteeing that the entire student body of a given high school will arrive both chronically sleep-deprived 17 in a habitual way.

18 Through the effects of sleep on human health, here too the science is conclusive. Sleep deprivation can have serious negative consequences on humans both physically and mentally. 19 Regardless, it can also lead to decreased academic performance. It is also linked to a host of other personal and social ills. Studies have shown that sleep

16

Which choice most effectively combines the underlined sentences?

- A) That this tendency is one of biology rather than attitude is fact, but it seems that our social structures have yet to catch up to the science.
- B) This is a tendency that is not attitude but rather factual biology, so it seems, and our social structures have yet to catch up to the science.
- C) Social structures have yet to catch up, but the science of biology rather than attitude is fact regarding this tendency.
- D) Biology, not attitude, is the science; however, this tendency is a fact that social structures have yet to catch up to.

17

- A) NO CHANGE
- B) habitually.
- C) over the long-term.
- D) DELETE the underlined portion and end the sentence with a period.

18

- A) NO CHANGE
- B) On
- C) With
- D) DELETE the underlined portion.

19

- A) NO CHANGE
- B) Finally,
- C) Obviously,
- D) Alternatively,

deprivation in teenagers can exacerbate depression, lead to higher rates of drug abuse, and cause automobile accidents. This last correlation is so direct that a district in Wyoming that adopted a later start time for its high schools in 2013 saw **20** a significant increase in attendance over all grades in just the first year of implementation.

So why then, if the science is definitive and the potential benefit to both students and public safety so dramatic, do most schools continue to drag sleep-deprived teenagers out of their beds way too early to do them any good? Much of the problem is logistical. Despite the increasing diversity in the ways in which adults work in the 21st century, society is still very much modeled around the “9 to 5” workweek. In addition, adolescence is a relatively short period of life, **21** that means at any given moment the majority of the population is actually served quite well by the “early to rise” philosophy. **22** Yet an increasing number of schools are finding ways to make it work, much to the delight of sleep researchers, doctors, and yes...teens.

20

Which choice most specifically supports the main idea of the sentence?

- A) NO CHANGE
- B) a 70 percent decrease in the number of crashes involving teens
- C) rates of teen alcohol and cigarette use decrease by 20 percent
- D) a sharp decline in accidents involving drunk or distracted driving

21

- A) NO CHANGE
- B) they are
- C) meaning that
- D) so that

22

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

Today’s adolescents make up only 13.2% of the population, and their participation in the workforce is at an all time low.

Should the writer make this addition here?

- A) Yes, because it is quantitative data that supports the idea being presented.
- B) Yes, because it clarifies a point that was previously unclear.
- C) No, because it interrupts the flow of ideas as written.
- D) No, because it undermines the writer’s point by trivializing a problem.

Are We Engineering the Smell out of Flowers?

People have been tinkering with plants since the beginning of agriculture. Flowers, especially, have been bred and rebred across the world by botanists and hobby gardeners alike for millennia. However, due to the ways in which the global economy has changed the flower **23** industry we now must confront a difficult reality. We seem to be engineering the smell out of flowers.

[1] According to Darwinian theory, all of an organism's primary traits **24** had an evolutionary purpose. [2] The scent of flowers is no different, as it is this trait that attracts pollinators like bees. [3] However, scent has no reproductive function in cultivated flowers other than the pleasure it provides, and since any organism has finite energetic resources, flowers (or their human caretakers) must choose where to allocate those resources. [4] Without the ability to create scent, flowers in the wild are unable to reproduce—**25** that is an evolutionary death-sentence not just for an organism itself but its entire species. [5] For flower producers—**26** which now work in an international marketplace where crops must be shipped sometimes thousands of miles before being sold—traits like longevity, resistance to disease, and aesthetic perfection are more important to the success of their businesses than fragrance. [6] Thus, fragrance has become a casualty of globalization much like the flavor of a tomato has become secondary to its **27** stimulating color on a grocery store's shelf. **28**

23

- A) NO CHANGE
- B) industry, we must now confront a difficult reality: we
- C) industry we must now confront a difficult reality; we
- D) industry, we must now confront a difficult reality, we

24

- A) NO CHANGE
- B) have
- C) has
- D) would have

25

- A) NO CHANGE
- B) it is
- C) being
- D) DELETE the underlined portion.

26

- A) NO CHANGE
- B) that
- C) whom
- D) who

27

- A) NO CHANGE
- B) vibrant
- C) spirited
- D) animated

28

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 6.

Scientists are now trying to reverse the trend and put the aroma back in commercial flowers using biogenetics. By comparing two type of rose, the strongly-scented Papa Meilland and the relatively odorless Rouge Meilland, Jean-Louis Magnard and his team have been able to pinpoint the gene that “switches on” a flower’s power of scent. **29** This gene is found on Chromosome 10 and turns on an enzyme known as RhNUDX1. It acts in the cytoplasm of the cells in the petals thus creating a sweet fragrance.

Now that we understand the mechanism that drives the process, many believe we will be better positioned to harness it. This, of course, is not a solution without controversy, as it would involve genetic modification, a process that many believe to be a threat to both human health and biodiversity. Therefore, unless a solution is found that pleases everyone, we must continue to ask ourselves which sensory experience we value more in our flowers: sight or smell? We must consider whether it is worth it to be able to purchase a lily hundreds of miles from **30** its origin in the middle of winter. Already, when

29

Which choice most effectively combines the underlined sentences?

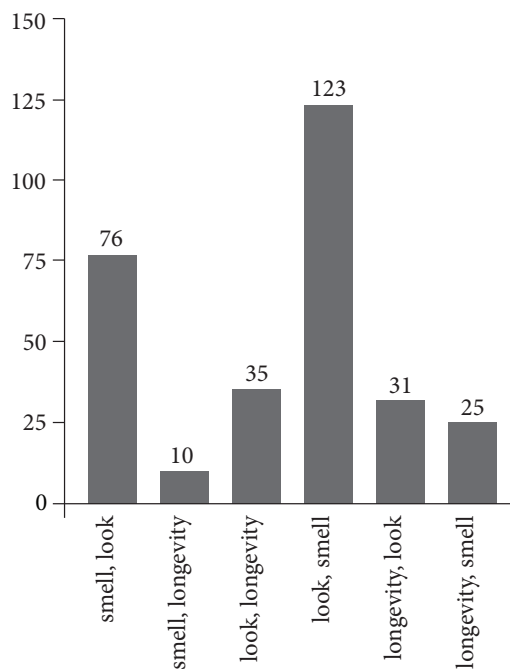
- A) This gene, found on Chromosome 10, turns on an enzyme known as RhNUDX1 which, acting in the cytoplasm of the cells in the petals, creates a sweet fragrance.
- B) This gene is found on Chromosome 10, turning on an enzyme, RhNUDX1, which acts in the cytoplasm of the cells in the petals, creating a sweet fragrance.
- C) This gene turns on RhNUDX1, an enzyme found on Chromosome 10; it acts in the cytoplasm of the cells that creates a sweet fragrance.
- D) This gene, RhNUDX1, is an enzyme that acts in the cytoplasm of the cells of the petals in Chromosome 10, which then produce the sweet fragrance-creator.

30

- A) NO CHANGE
- B) it’s
- C) their
- D) there

consumers are asked to rate certain characteristics, **31** a majority values look above all else. **32** However, science may yet make it so that we don't have to choose. **33**

Survey of 300 flower consumers asked to rank their top 3 criteria in selecting flowers.



31

Which choice offers the most accurate and relevant interpretation of the data in the graph?

- A) NO CHANGE
- B) there is much disagreement as to which traits matter most.
- C) smell is their top priority, followed by longevity.
- D) a majority of respondents cite smell as a priority.

32

The writer wants a conclusion that considers the trade-offs involved in modifying living things. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) And if so, we will have beautiful, long-lasting flowers for centuries to come.
- C) But what simple pleasures might we lose in the bargain?
- D) Unfortunately, we can't have it all.

33

Which choice, if added at an appropriate place in the passage, would best connect the information in the graph to the relationship between the flower producers and consumers?

- A) In exclusively breeding for look and longevity, producers ignore the needs of their customers.
- B) Since there is no consensus regarding what consumers want, producers must take their best guess.
- C) In relation to "longevity," flower producers and consumers may have a different level of understanding regarding what it takes to bring a flower to market.
- D) Producers are largely right to ignore aroma, as smell and longevity are consumers' least prized qualities.

Songs About Cars

From “My Merry Oldsmobile” to “Mustang Sally,” as long as cars have existed, Americans have been singing about them. These songs often say less about the cars than they do about **34** themselves, and the broader American culture, especially as it relates to the “American Dream.”

From the beginning of the 20th century through the 1920s, only wealthy consumers could afford to own an automobile, and thus car songs—and the drivers portrayed in **35** them, projected prosperity and glamor. It was an aspirational American Dream, the rags-to-riches tale of Andrew Carnegie, who worked his way from humble beginnings **36** becoming one of the richest industrialists in the world. **37** The automobile was a shining symbol of the kind of upward mobility that people believed they could achieve through American ingenuity and a bit of daring.

34

- A) NO CHANGE
- B) itself
- C) themselves
- D) ourselves

35

- A) NO CHANGE
- B) them—
- C) them;
- D) them

36

- A) NO CHANGE
- B) became
- C) to become
- D) had become

37

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

The son of a working class weaver, Carnegie would make \$480 million when he sold his Carnegie Steel Company to JP Morgan in 1901.

Should the writer make this addition here?

- A) Yes, because it provides specific details on the claim that has just been made.
- B) Yes, because it makes clear that the writer is an expert on the subject.
- C) No, because it fails to indicate how Carnegie went from “rags to riches.”
- D) No, because it provides information that is irrelevant to the paragraph.

[1] It was not until the 1950s that the American dream became democratized. [2] After **38** WWII, no longer tasked with producing war-related, supplies American Industry was free to produce consumer goods once more. [3] This consumer boom, coinciding with suburbanization, the establishment of the Interstate Highway System, and a growing middle class that now had the money to buy cars en masse, meant millions more cars on the road. [4] Cars were for everyone because the American Dream now meant not just the accumulation of massive wealth but the kind of comfortable, middle class life that was available to a larger share of the population than ever before. [5] Not surprisingly, car ownership and songs about cars reflect this shift. [6] This optimistic **39** outlook can be heard in the car songs of the day, where care-free couples grab milkshakes at the Drive-In Diner before parking somewhere more private and “Greasers” race hot rods as their pony-tailed girlfriends cheer on. **40**

41 This economic boom time would fade as the fabric of society was tested by social upheaval, war, and finally a **42** halted economy in the 1960s and ‘70s. There is perhaps no songwriter more reflective of Americans’ disappointments and increasingly conflicted relationship with the promise of the American Dream than Bruce

38

- A) NO CHANGE
- B) WWII no longer tasked, with producing war-related supplies,
- C) WWII no longer tasked with producing war-related supplies
- D) WWII, no longer tasked with producing war-related supplies,

39

- A) NO CHANGE
- B) way
- C) circumstance
- D) panorama

40

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

- A) where it is now
- B) after sentence 1
- C) after sentence 2
- D) after sentence 3

41

The writer wants to link the fourth paragraph to the central idea of the passage. Which choice best accomplishes this goal?

- A) NO CHANGE
- B) The rate of consumerism would fall
- C) Car songs would go out of fashion
- D) That optimism would take a hit

42

- A) NO CHANGE
- B) stagnating
- C) withering
- D) inactive

Springsteen. Paradoxically, Springsteen depicts the car both as evidence of the failure of that dream and as the way for his characters to escape broken towns in search of something better. As the characters in his classic “Thunder Road” “roll down the window and let the wind blow back” their hair, these no-longer-youthful dreamers **43** conveys a simultaneous **44** desire to stay together and a wish to break-up. The chips may be down, but they still have choices. One could argue that this belief lies at the very heart of The American Dream itself.

43

- A) NO CHANGE
- B) conveying
- C) convey
- D) conveyed

44

- A) NO CHANGE
- B) love of home and desperate longing to leave it.
- C) need to cling to the past and yet embrace the future.
- D) sense of futility and a wild, defiant hope.

STOP

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



Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

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

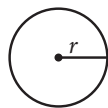
DIRECTIONS

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

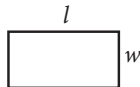
1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated,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

REFERENCE

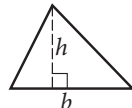


$$A = \pi r^2$$

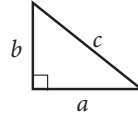
$$C = 2\pi r$$



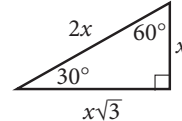
$$A = lw$$



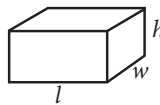
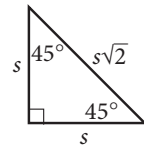
$$A = \frac{1}{2}bh$$



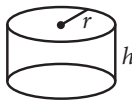
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = lwh$$



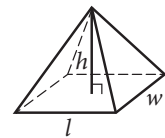
$$V = \pi r^2 h$$



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



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



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

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π .

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



1

If $3(x - 7) = t$ and $t = 9$, what is the value of x ?

- A) -10
- B) -4
- C) 3
- D) 10

2

For $i = \sqrt{-1}$, what is the value of the expression below?

$$(4 + 3i)(-5 + 7i)$$

- A) $1 + 13i$
- B) $1 - 13i$
- C) $-41 + 13i$
- D) $-41 - 13i$

3

Amy and Oscar recorded the number of miles each of them walked. Amy walked n miles each day for 12 days. Oscar walked 4 miles more each day than Amy walked each day. If Oscar walked for t days, which of the following represents the total number of miles that Oscar walked?

- A) $n + 4t$
- B) $t(n + 4)$
- C) $n(t + 4)$
- D) $4n + 16t$

4

April decorates cakes for the Sunshine Bakery. Each week she is responsible for decorating the same number of cakes. The number of cakes that she has left to decorate at the end of each day can be estimated with the equation, $C = 72 - 15d$, where C is the number of cakes left to decorate and d is the number of days she has worked that week. What is the meaning of the value 15 in this equation?

- A) April decorates the cakes at a rate of 15 per day.
- B) April decorates the cakes at a rate of 15 per hour.
- C) April has a total of 15 days to decorate all the cakes.
- D) April is responsible for decorating 15 cakes each week.

5

$$\frac{15x^2y - 3y^2 - 12xy^2}{3y}$$

Which of the following is equivalent to the expression above?

- A) $5x^2 - y - 12xy^2$
- B) $5x^2 - 4x - 1$
- C) $5x^2 - y - 4xy$
- D) $5x^2 - y - 4x$



6

$$V = 48m + 650$$

Juan uses the equation above to estimate the value, V , of his savings account, in terms of the number of months, m , after he opened the account. What does the number 650 represent in this equation?

- A) the value of the account after 1 year
- B) the value of the account after 1 month
- C) the dollar amount that the account increased by each month
- D) the dollar amount that Juan deposited in the account when he opened the account

7

$$S = \pi r l + \pi r^2$$

The formula above gives the total surface area, S , of a cone whose base has a radius of r and a slant height of l . Which of the following gives l in terms of r and s ?

- A) $l = \frac{S}{\pi r} - r$
- B) $l = \frac{S}{\pi r} + r$
- C) $l = \frac{rS}{\pi} - r^3$
- D) $l = \frac{S}{\pi} - r^2$

8

If $\frac{t}{r} = 5$ and $\frac{r}{t} + m = 9.2$ what is the value of m ?

- A) 4.2
- B) 9
- C) 9.2
- D) 14

9

$$4y - 2x = -24$$

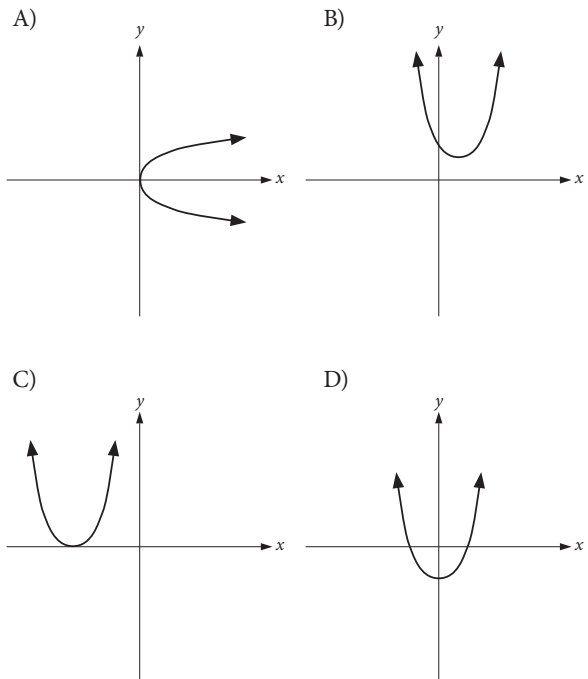
$$5x + y = 5$$

What is the solution to the system of equations above?

- A) $(0, -6)$
- B) $(1, 0)$
- C) $(2, -5)$
- D) $(3, -10)$

10

If the value of the discriminant of equation $y = ax^2 + bx + c$ is equal to 0, which of the following graphs could be the graph of the equation?





11

$$W = 3.15x + 60$$

$$B = 4.55x + 46$$

In the equations above, W and B represent the cumulative number of miles biked by William and Ben, respectively, x days after May 1. What was the total number of miles each of them had biked when they had accumulated the same number of miles?

- A) 63.15
- B) 50.55
- C) 91.5
- D) 113.7

12

Hailstones are formed when frozen raindrops are carried into the high clouds. The radius (in inches) of the hailstone varies directly with the time (in seconds) that the hailstone is in the high cloud. After a hailstone has been in a high cloud for 60 seconds, its radius is $\frac{1}{4}$ inch. Which equation gives the radius r as a function of time t ?

- A) $r = \frac{1}{240}t$
- B) $r = \frac{1}{15}t$
- C) $r = 15t$
- D) $r = 240t$

13

What is the inverse of the function $f(x) = 3x - 2$?

- A) $f^{-1}(x) = \frac{x+2}{3}$
- B) $f^{-1}(x) = \frac{x-2}{3}$
- C) $f^{-1}(x) = 2x - 3$
- D) $f^{-1}(x) = -3x + 2$

14

If $2x + 5y = 20$, what is the value of $\frac{8^x}{2^y}$?

- A) 2^5
- B) 4^3
- C) 8^2
- D) The value cannot be determined from the information given.

15

$$f(x) = (7x + 1)(2x - 5)$$

Which of the following is also an equation for function $f(x)$?

- A) $f(x) = 14x^2 + 37x + 5$
- B) $f(x) = 14x^2 - 37x - 5$
- C) $f(x) = 14x^2 + 33x + 5$
- D) $f(x) = 14x^2 - 33x - 5$

**DIRECTIONS**

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

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

Write →
answer
in boxes.

Grid in
result.

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

	7	/	1	2
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← Fraction
line

Answer: 2.5

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← Decimal
point

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

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4	4	4	4
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8	8	8	8
9	9	9	9

Answer: 201 – either position is correct

	2	0	1
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	☐	☐	☐
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8	8	8	8
9	9	9	9

2	0	1	
☐	☐	☐	☐
☐	☐	☐	☐
	☒	0	0
1	1	☒	1
☒	2	2	2
3	3	3	3
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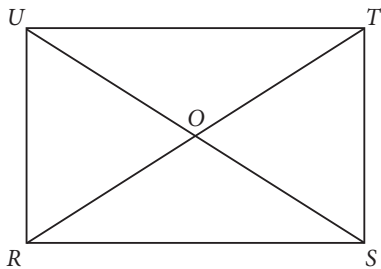
NOTE: You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.



16

If $k > 0$ and $k^2 - 36 = 0$, what is the value of k ?

17



In the diagram above, the rectangle has diagonals $\overline{RT}$ and $\overline{SU}$ which intersect at point O . If $RT = 6x + 4$ and $SO = 7x - 6$, what is the length of $\overline{SU}$?

18

$$x + y = -4$$

$$2x + y = 9$$

Using the system of equations shown above, what is the value of x ?

19

In a right triangle, the measure of one angle, in degrees, is x . If $\cos(90 - x) = \frac{7}{8}$, what is the value of $\sin(x)$?

20

If the function $h(n) = 0.5n$, what is the value of $h(2) + h(3) + h(4) + h(5) + h(6)$?



Math Test – Calculator

55 MINUTES, 38 QUESTIONS

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

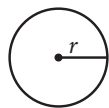
DIRECTIONS

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 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTES

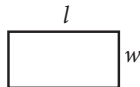
1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated,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

REFERENCE

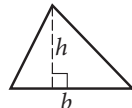


$$A = \pi r^2$$

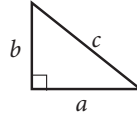
$$C = 2\pi r$$



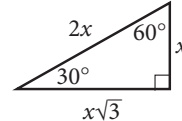
$$A = lw$$



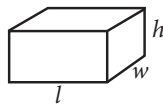
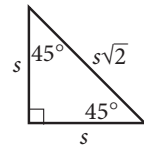
$$A = \frac{1}{2}bh$$



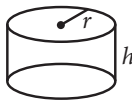
$$c^2 = a^2 + b^2$$



Special Right Triangles



$$V = lwh$$



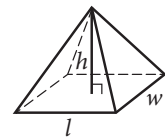
$$V = \pi r^2 h$$



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



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



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

The number of degrees of arc in a circle is 360.

The number of radians of arc in a circle is 2π .

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



1

Consider the graph of the function, $f(x) = x^2 + 6x + 4$. For which of the following intervals is function $f(x)$ always increasing?

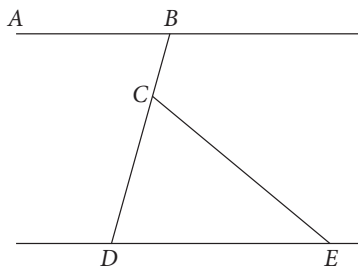
- A) $-10 \leq x \leq 0$
- B) $-7 \leq x \leq 0$
- C) $-5 \leq x \leq 0$
- D) $-3 \leq x \leq 0$

2

Given the linear function with the equation, $y = 7x - 5$, what is the y-intercept of the graph of the function?

- A) -7
- B) -5
- C) 5
- D) 7

3



In the diagram above, $\overline{AB}$ and $\overline{DE}$ are parallel, the measure of $\angle DCE$ is 70° , and the measure of $\angle CED$ is 36° . What is the measure of $\angle ABC$?

- A) 37°
- B) 53°
- C) 74°
- D) 106°

4

If $\frac{a}{2} - 3 = 11$, what is the value of a ?

- A) 14
- B) 17
- C) 25
- D) 28

5

A survey of Americans shows that 78% get to work by driving alone, 9% use a carpool, 5% use mass transportation, and 8% use other methods such as walking or biking. To make a circle graph of this data, what would be the measure, rounded to the nearest degrees, of the central angle representing the people who get to work using a carpool?

- A) 16°
- B) 32°
- C) 90°
- D) 328°

6

The warehouse building of a major food distribution company has a sidewalk near the outer edges of the building. The base of the building is a rectangle with a length of 425 meters and a width of 100 meters. The team leader for the dairy division walked the entire perimeter of the building 5 times during the week of May 1. How many kilometers did she walk that week?

- A) 1.05
- B) 2.625
- C) 5.25
- D) 5,250



7

Level of Time (minutes)	Frequency
17	3
18	7
19	7
20	4
21	6

Students in a physical education class ran 2 miles and each of their times were rounded to the nearest minute and recorded. The frequency table above gives this information. To the nearest 0.1 minute, what is the mean of this data?

- A) 19.1
- B) 19.2
- C) 19.3
- D) 19.4

8

$$\left| \frac{1}{2}p + 20 \right| = 28$$

Which list of value(s) contains all the values of p that satisfy the equation above?

- A) 16
- B) -96
- C) -16 and 96
- D) -96 and 16

Questions 9 and 10 refer to the following information.

$$d = 40.5\pi r$$

The formula above can be used to determine the distance (d), in feet, that Ben's new bicycle will travel based on the number of revolutions (r) of the pedal.

9

For this bicycle, which formula can be used to find the number of revolutions of the pedal is needed to travel a certain distance?

- A) $r = \frac{40.5\pi}{d}$
- B) $r = \frac{d}{40.5\pi}$
- C) $r = \frac{d}{40.5}$
- D) $r = \frac{\pi d}{40.5}$

10

How many revolutions of the pedal, rounded to a whole number, are needed for the rider of this bike to travel 1 mile? (1 mile = 5,280 feet)

- A) 41
- B) 100
- C) 130
- D) 409

11

$$4x + 1 \leq 7x - 14$$

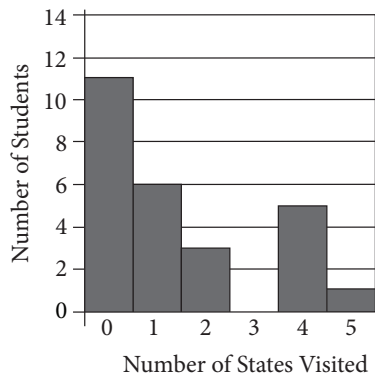
Which expression represents the set of all solutions to the above inequality?

- A) $x \leq \frac{13}{3}$
- B) $x \geq \frac{13}{3}$
- C) $x \leq 5$
- D) $x \geq 5$



12

States Visited



The histogram above displays the results of asking 26 second grade students how many states each of them had visited not including the state where they live. Based on the data in the histogram what is the median number of states visited?

- A) 0
- B) 1
- C) 1.5
- D) 2.5

13

The set of data in the table below shows the results of a survey on the number of text messages that people of different ages send on their cell phones each month.

Age Group	Number of Text Messages per Month		
	0-10	11-50	Over 50
15-22	4	37	68
23-39	6	25	87
40-60	25	47	157

If a person from this survey is selected at random, what is the probability that the person texts over 50 messages per month given that the person is between the ages of 40 and 60?

- A) $\frac{157}{229}$
- B) $\frac{157}{312}$
- C) $\frac{157}{384}$
- D) $\frac{157}{456}$

14

Juan has one more history test to take for the semester. The scores he received on the first five tests were 89, 92, 78, 83, and 83. Juan wants to have an average of 87 on all six history tests. Which equation can be used to find the score, x , that Juan will need on his last test?

- A) $\frac{425}{x} = 87$
- B) $\frac{425}{5} + x = 87$
- C) $\frac{x + 425}{5} = 87$
- D) $\frac{x + 425}{6} = 87$



Questions 15 and 16 refer to the following information.

Two hot air balloons are in the air. Balloon A is at an altitude of 900 feet and rising at a rate of 100 feet per minute. Balloon B is at an altitude of 2,300 feet and descending at a rate of 250 feet per minute.

15

Which of the following contains an equation for each balloon showing the relationship of the altitude, y , of the balloon to the number of minutes, x , that have passed?

- A) $y = 900x + 100$
 $y = 2,300x - 250$
- B) $y = 100x + 900$
 $y = -250x + 2,300$
- C) $y = 100x + 900$
 $y = 250x + 2,300$
- D) $y = -100x + 900$
 $y = 250x + 2,300$

16

Which of the following statements about the point (4, 1300) is true?

- A) After 4 minutes have passed, only balloon A will be at an altitude of 1300 feet.
- B) After 4 minutes have passed, only balloon B will be at an altitude of 1300 feet.
- C) After 4 minutes have passed, both balloons will be at an altitude of 1,300 feet.
- D) After 4 minutes have passed, neither balloon will be at an altitude of 1,300 feet.

17

What is the maximum of the function $f(x) = -2(x + 3)^2 - 7$?

- A) -7
- B) -3
- C) -2
- D) There is no maximum value.

18

$$y < -x + 5$$

$$y < x - 5$$

The point $(0, a)$ is a solution for the system of inequalities defined above. What must be true about the value of a ?

- A) $a \leq -5$
- B) $a \geq -5$
- C) $a < -5$
- D) $a > -5$

19

A toll bridge in Florida charges \$0.75 for each car and \$1.10 for each truck crossing the bridge. During a 24-hour period, a total of \$326.55 was collected for tolls. The total number of vehicles that paid a toll was 399. How many trucks crossed the bridge that day?

- A) 78
- B) 148
- C) 176
- D) 297

20

The value of a new car depreciates at a rate of 15% per year. If C represents the cost of the car when it was new, which expression represents the value of the car t years after it was purchased?

- A) $0.15Ct$
- B) $1.15Ct$
- C) $C(0.85)^t$
- D) $C(1.15)^t$

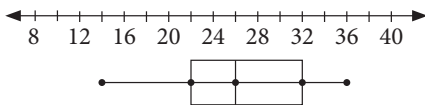


21

The student council wanted to showcase the music talent of their students by featuring two students at their next school assembly. Two drum players and three piano players volunteered. It was decided that their names would be put in a hat and drawn. One name was drawn and not replaced. Then a second name was drawn. What is the probability that the two drummers were chosen?

- A) 0.8
- B) 0.2
- C) 0.16
- D) 0.1

Questions 22 and 23 refer to the following information.



The box-and-whisker plot above summarizes data collected during a survey about the ages of a piano teacher's students.

22

What is the median age of the piano teacher's students?

- A) 32
- B) 26
- C) 25
- D) 22

23

What are the lower and upper quartiles for this data?

- A) 14 and 36
- B) 18 and 34
- C) 22 and 32
- D) 32 and 36

24

Given a circle with equation $(x - 5)^2 + (y + 2)^2 = \frac{121}{9}$. Which of the following points lies on the circle?

- A) $(\frac{26}{3}, -2)$
- B) $(\frac{11}{3}, -2)$
- C) $(5, \frac{10}{3})$
- D) $(-5, \frac{10}{3})$

25

What is the solution set for the equation $|3 - 2x| = 5$?

- A) $\{-1, 4\}$
- B) $\{1, -4\}$
- C) $\{-1\}$
- D) $\{4\}$

26

Years (x)	Value of Investment (y)
1	\$5,500
2	\$6,050
3	\$6,655
4	\$7,321

Amanda made an investment of \$5,000 in a clothing company. The table above shows the value of her investment at the end of each year for 4 years after her initial investment. What equation can be used to model this data, using x for the number of years and y for the value of the investment?

- A) $y = 1.1x^2$
- B) $y = 5000(0.1)^x$
- C) $y = 5000(1.1)^x$
- D) $y = 500x + 5000$

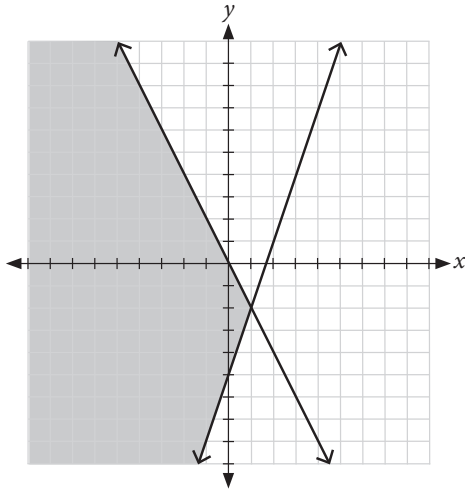


27

A right circular cone has a diameter of $10\sqrt{2}$ and a height of 12. What is the volume of the cone in terms of π ?

- A) 200π
- B) 600π
- C) 800π
- D) 2400π

28



What is the system of inequalities that is graphed above?

- A) $y > -2x$
 $y < 3x - 5$
- B) $y < -2x$
 $y < 3x - 5$
- C) $y \geq -2x$
 $y \geq 3x - 5$
- D) $y \leq -2x$
 $y \geq 3x - 5$

29

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

Use the function $p(x)$ defined above and the fact that $p(-2) = 0$, what is the factored form of $p(x)$?

- A) $p(x) = (x + 2)(x^2 - 3x + 1)$
- B) $p(x) = (x + 2)(x^2 + 3x - 1)$
- C) $p(x) = (x - 2)(x^2 - 5x + 1)$
- D) $p(x) = (x - 2)(x^2 + 5x - 1)$

30

The function $f(x) = 2x^2$ is translated 5 units to the left and 8 units down to create function $g(x)$. Which of the following is the equation for $g(x)$, in the form that reveals its x -intercepts?

- A) $g(x) = 2(x + 5)^2 - 8$
- B) $g(x) = 2(x + 3)(x + 7)$
- C) $g(x) = 2x^2 + 20x + 42$
- D) $g(x) = 2(x^2 + 10x + 21)$


DIRECTIONS

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

- Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the circles accurately. You will receive credit only if the circles are filled in correctly.
- Mark no more than one circle in any column.
- No question has a negative answer.
- Some problems may have more than one correct answer. In such cases, grid only one answer.
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- Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.

Write →
answer
in boxes.

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

Grid in result.

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

← Fraction line

Answer: 2.5

Grid in result.

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

← Decimal point

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

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

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

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

Answer: 201 – either position is correct

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

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

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



31

Evaluate the expression below for $m = -35$ and $n = -17$.

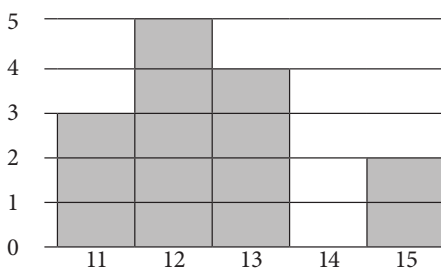
$$6mn - n^2 + 48$$

32

Addie and Lyla went to a book sale where all the books either cost x dollars or y dollars. Addie bought 5 books costing x dollars each and 3 books costing y dollars each. She spent \$21.55 for all 8 books. Lyla bought 2 books costing x dollars each and 6 books costing y dollars each for a total of \$23.74. What is the value of y ?

33

Frequency of Ages of Members of History Club



The histogram above contains data showing the number of students of each age that belong to the History Club. What is the range of the data?

34

Samar is buying a sweater that had a pricetag of \$22.00, and was on sale for 20% off. When he went to pay for the sweater, he also had a coupon for \$10 off which was applied after the sale price. Finally, 7% sales tax was added to his cost. How much did Samar pay for the sweater, rounded to the nearest cent?

(Note: disregard the \$ when gridding your answer.)

35

A central angle of a circle has a measure of $\frac{4\pi}{15}$ radians. What is the measure of the angle, in degrees?

36

What is the result of the problem shown below?

$$(10 + 3i)(10 - 3i)$$



Questions 37 and 38 refer to the following information.

A scientist has 6 cells in Lab A. The number of cells increase according to the formula shown below, where y is the number of cells and x is the number of weeks that have passed.

$$y = 6(3)^x$$

37

How many cells are in Lab A at the end of 4 weeks?

38

A second scientist has 12 cells being used in an experiment in Lab B. The number of these cells increase at the same rate as those in Lab A. How many cells are in Lab B after 6 weeks?

STOP

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