Diagnostic Test

MATH

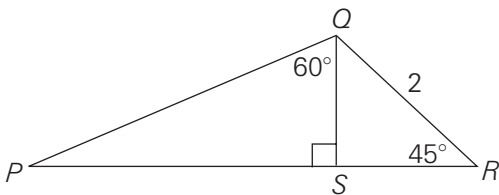## Question 1

$$y \neq 0$$

Quantity A	Quantity B
$5y^2$	$-\dfrac{y^2}{7}$

○ The quantity in Quantity A is greater.
○ The quantity in Quantity B is greater.
○ The two quantities are equal.
○ The relationship cannot be determined from the information given.

Question 2

Quantity A	Quantity B
$\sqrt{8}$	The length of line segment PR

○ The quantity in Quantity A is greater.
○ The quantity in Quantity B is greater.
○ The two quantities are equal.
○ The relationship cannot be determined from the information given.

Question 3

Quantity A	Quantity B
$35{,}043 \times 25{,}430$	$35{,}430 \times 25{,}043$

○ The quantity in Quantity A is greater.
○ The quantity in Quantity B is greater.
○ The two quantities are equal.
○ The relationship cannot be determined from the information given.

Question 4

x and y are positive numbers.

Quantity A	Quantity B
$\sqrt{x} - \sqrt{y}$	$\sqrt{x - 2\sqrt{xy} + y}$

○ The quantity in Quantity A is greater.
○ The quantity in Quantity B is greater.
○ The two quantities are equal.
○ The relationship cannot be determined from the information given.

Question 5

Quantity A	Quantity B
The least prime factor of 7^2	The least prime factor of 2^7

○ The quantity in Quantity A is greater.
○ The quantity in Quantity B is greater.
○ The two quantities are equal.
○ The relationship cannot be determined from the information given.

Question 6

The average (arithmetic mean) of a, b, c, and d is 7.

Quantity A	Quantity B
15	The average (arithmetic mean) of $4a - 5c$, $b - 24$, $8c - a$, and $3d + 2b$

○ The quantity in Quantity A is greater.
○ The quantity in Quantity B is greater.
○ The two quantities are equal.
○ The relationship cannot be determined from the information given.

Question 7

In the figure above, the width of the larger square is equal to the diagonal (not shown) of the smaller square.

Quantity A	Quantity B
The area of the smaller square	The area of the shaded region

○ The quantity in Quantity A is greater.
○ The quantity in Quantity B is greater.
○ The two quantities are equal.
○ The relationship cannot be determined from the information given.

Question 8

$$11 < y < 17$$

Quantity A	Quantity B
$\dfrac{y+17}{y}$	$\dfrac{y+11}{11}$

○ The quantity in Quantity A is greater.
○ The quantity in Quantity B is greater.
○ The two quantities are equal.
○ The relationship cannot be determined from the information given.

Question 9

The volume of a cube with edge of length 2 is how many times the volume of a cube with edge of length $\sqrt{2}$?

○ $\sqrt{2}$

○ 2

○ $2\sqrt{2}$

○ 4

○ 8

Question 10

BILLIE'S TIME SHEET FOR JULY 2

Time in:	8:57 in the morning
Time out:	5:16 in the afternoon
Time spent stacking shelves:	80% of total time spent at work

According to the time sheet above, Billie spent approximately how many hours stacking shelves on July 2 ?

○ $5\dfrac{1}{3}$

○ $6\dfrac{2}{3}$

○ $7\dfrac{1}{3}$

○ $8\dfrac{2}{3}$

○ $9\dfrac{1}{3}$

What is the probability that the sum of two different single-digit prime numbers will NOT be prime?

- $\bigcirc$ 0
- $\bigcirc$ $\dfrac{1}{2}$
- $\bigcirc$ $\dfrac{2}{3}$
- $\bigcirc$ $\dfrac{5}{6}$
- $\bigcirc$ 1

To fill a larger concert hall, a madrigal singing group consisting of sopranos, altos, and basses, in a 5:7:3 ratio, needs at least 40 singers. What is the least number of basses the group will need?

$\boxed{}$

If $mx + qy - nx - py = 0$, $p - q = 2$, and $\dfrac{y}{x} = -\dfrac{1}{3}$, then which of the following is true?

- $\bigcirc$ $n - m = \dfrac{2}{3}$
- $\bigcirc$ $n - m = -\dfrac{2}{3}$
- $\bigcirc$ $m + n = \dfrac{2}{3}$
- $\bigcirc$ $m + n = \dfrac{3}{2}$
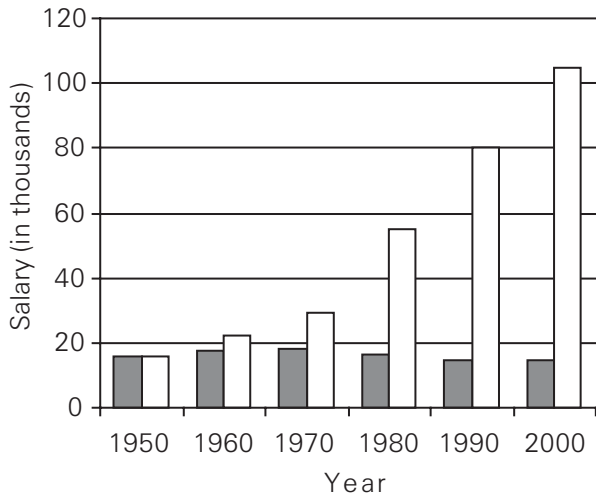- $\bigcirc$ $m + n = -\dfrac{3}{2}$

The "hash" of a three-digit integer with three distinct integers is defined as the result of interchanging its units and hundreds digits. The absolute value of the difference between a three-digit integer and its hash must be divisible by

- $\bigcirc$ 9
- $\bigcirc$ 7
- $\bigcirc$ 5
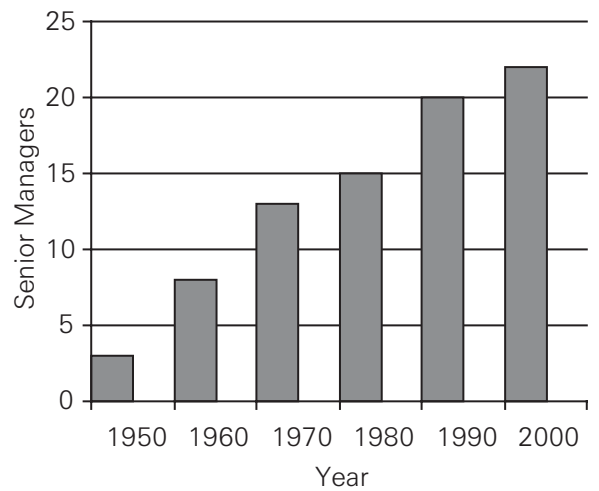- $\bigcirc$ 4
- $\bigcirc$ 2

Questions 15-16 refer to the following graphs.

SENIOR MANAGEMENT OF COMPANY *Y*

Average Salaries of Senior Managers at Company *Y*

Number of Senior Managers at Company *Y*

- ▣ in 1950 dollars
- ☐ in actual-year dollars

Question 15

If from 1980 to 2007, the number of senior managers increased by 60 percent, then what was the increase in the number of senior managers from 2000 through 2007, inclusive?

- ○   2
- ○   4
- ○   6
- ○   9
- ○   12

Question 16

Which of the following statements can be inferred from the charts above?

Indicate all such statements.

- ☐   From 1990 to 2000, the average salary, in actual-year dollars, increased by more than 10%.
- ☐   In 1960, there were fewer than 5 senior managers.
- ☐   For the decades shown, the number of senior managers increased by the greatest percentage between 1980 and 1990.

Question 17

The positive sequence $s_1, s_2, s_3 \ldots s_n \ldots$ is defined by $s_n = s_{n-1} + 5$ for $n \geq 2$. If $s_1 = 7$, then the nth term in the sequence is
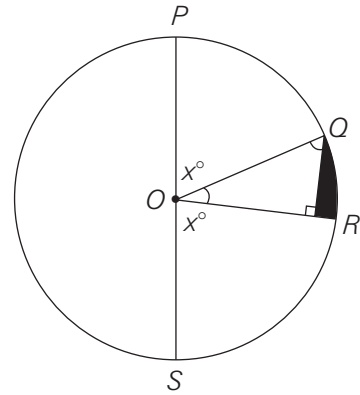
- ○ $5n - 5$
- ○ $5n - 2$
- ○ $5n$
- ○ $5n + 2$
- ○ $5n + 7$

Question 18

Rachel and Rob live 190 miles apart. They both drive in a straight line toward each other to meet for tea. If Rachel drives at 50 mph and Rob drives at 70 mph, then how many miles apart will they be exactly 45 minutes before they meet?

- ○ 50
- ○ 60
- ○ 70
- ○ 90
- ○ 100

Question 19

In the circle with center O above, $PS = 8$. If $x = 75$, then what is the perimeter of the shaded region?

- ○ $6 - 2\sqrt{3}$
- ○ $\dfrac{2\pi}{3}$
- ○ $\dfrac{2\pi}{3} + 8$
- ○ $\dfrac{2\pi}{3} - 2\sqrt{3} + 6$
- ○ $\dfrac{2\pi}{3} + 2\sqrt{3} + 6$

Question 20

If $x = 3^2$, then what is the value of x^x?

- ○ 3^4
- ○ 3^8
- ○ 3^9
- ○ 3^{12}
- ○ 3^{18}

VERBAL

Question 1

British modernists used the literary tropes of fragmentation and failure to explore the impending (i)_____ of British colonialism; illustrating the imminent (ii)_____ of the empire through their literature.

Blank (i)	Blank (ii)
avarice	sunset
castigation	rise
dissolution	wealth

Question 2

Contemporary authors are much more at liberty to be candid than were authors of previous centuries, but modern writers nevertheless often find themselves _____ portions of their works.

- ☐ emancipating
- ☐ censoring
- ☐ refuting
- ☐ censuring
- ☐ ameliorating
- ☐ expurgating

Question 3

The development of hydrogen-powered cars will always be (i)_____ by the physical fact that hydrogen, while containing more energy per gallon than does gasoline, is much less dense than gasoline; hydrogen thus carries less energy per pound, making it (ii)_____ for any vehicle to carry enough hydrogen on board for long trips.

Blank (i)	Blank (ii)
enhanced	convenient
hindered	austere
parodied	ungainly

Question 4

One of the rarest of celestial events, the total solar eclipse only happens when the Moon, in its orbit around the Earth, fully (i)_____ the view of the sun from a particular location on Earth. Because the Moon is relatively small, in celestial terms, and its umbra, the central part of the Moon's shadow caused by its blocking the sun, only traces a narrow path on the Earth, total eclipses are such (ii)_____ occurrences that they have been known to draw hundreds of thousands of onlookers.

Blank (i)	Blank (ii)
secularizes	atypical
epitomizes	desultory
occludes	momentous

Question 5

To (i)_____ people accurately, census workers must be (ii)_____: because there are often residents of a household with the same name, or people whose names have unusual spellings, workers who are anything less than (iii)_____ in following correct procedures and reviewing cases may result in the same resident getting counted multiple times, or even not at all.

Blank (i)	Blank (ii)	Blank (iii)
rectify	derivative	meticulous
tally	fastidious	perfunctory
impute	industrious	inexact

Question 6

The journalist was (i)_____ in his pursuit of the scandal he suspected: despite a lack of support from his editors, he was determined to investigate day and night, follow every lead, and write until dawn to get the story first and finally (ii)_____ the big news agencies.

Blank (i)	Blank (ii)
decorous	scoop
digressive	forestall
indefatigable	deprecate

Question 7

Over the last several decades, the demand for Country Y's automobiles increased in Country X but demand for Country X's automobiles in Country Y has remained stagnant. Initially, this disparity was plausibly due to Y's manufacturers having superior technology, which has yielded more fuel efficient cars with cheaper maintenance. However, now Country X's cars are comparable—if not slightly superior—in these respects. What Country X's manufacturers fail to acknowledge is that Country Y's drivers drive on the left side of the road. Clearly, to help lessen this trade imbalance, Country X manufacturers should produce more cars with right-side steering wheels.

Which of the following is an assumption made by the argument?

○ Reversing the trade imbalance requires making right-side steering wheels.
○ If Country X makes automobiles with right-side steering wheels, most consumers from Country Y will chose to purchase a car from Country X.
○ If consumers from Country Y drive on the left side of the road, these consumers are less inclined to buy steering wheels found on the left-side of the car.
○ Cars from Country X will continue to improve their fuel efficiency and reduce their maintenance costs.
○ The government of Country Y requires all its citizens to purchase cars with right-side steering wheels.

Questions 8-11 refer to the following passage.

Comparative historian Marc Ferro claims that the largest discrepancy in knowledge between what academic historians and what the average citizen knows about history is found in the United States. How has this situation come about? Certainly the problem does not lie with the secondary literature. Whereas in the past, American historians were handicapped by secondary literature that was clearly biased towards a European viewpoint, since the civil rights movement of the 1950s and 60s, the secondary literature in American history has become far more comprehensive. And it cannot be simply a matter of space constraints; the average high school history textbook is well over a thousand pages in length.

One theory holds that American history textbooks are simply the socializing instruments of a controlling elite. The stratification of American society is preserved, according to this theory, by the creation of what Marx termed "false consciousness." The theory holds that the way people think about their society and their history is crucial to maintaining the status quo. If the power elites come to believe that their success is the deserved product of their hard work and ingenuity, then there will be no desire to change the system. Similarly, if the lower classes are taught that their plight is solely due to their failings, they will be more likely to accept their fate and less likely to rise up in revolution. Griffin and Marciano contend that history textbooks promote nothing more than hegemony.

Many educational theorists share this viewpoint, which in their discipline is often known as critical theory. Proponents of this view, including Kozol, Freire, and Giroux, argue that the dominant classes would never create or foster an educational system that taught subordinate classes how to critically evaluate society and the injustices it contains. As long as schools serve to transmit culture, the power elite will never allow any real reform in the system.

It is all too easy to blame citizens' poor understanding of American history on some shadowy coterie of cultural aristocracy. But critical theory and other theories that lay the blame for American ignorance of history on the doorstep of the elites cannot explain their own success. Is it not a paradox that critical theory scholarship dominates its field? If the titans of society had as much power as the critical theorists contend, they would surely censor or marginalize the works of social scientists in this field. Furthermore, graduates of "elite" preparatory schools are exposed to alternative interpretations of history, subversive teachers, and unfiltered primary source materials more frequently than are students at public institutions. This would seem to indicate that the powerbrokers have little control over what happens at their very own schools, let alone far flung rural schools or schools deep in urban territory. The real culprit may be something not as insidious as a vast upper class conspiracy, but more along the lines of pernicious forces working at a highly local level. Almost half of the states have textbook adoption boards consisting of members of the community. These boards review and recommend what books are taught in neighborhood schools. And because textbook publishers are first and foremost seeking to maximize profit, it is these local boards that they must appease.

Question 8

Consider each of the following answer choices separately and select all that apply.

According to the passage, proponents of the critical theory believe which of the following?

☐ The creation of a false consciousness is a significant element in maintaining the stratification of American society.

☐ It is not in the interests of the powerful classes of society to engender critical reflection among the majority of citizens.

☐ Alternative interpretations of history may be taught to members of the upper classes, but not to members of the subordinate classes.

Question 9

It can be inferred from the passage that

○ Marx was an early proponent of critical theory

○ textbooks are not solely designed as teaching instruments

○ the secondary literature on American history is no longer biased

○ textbook publishers do not take the views of the power elite into account

○ under the current system, real education reform is impossible

Question 10

Consider each of the following answer choices separately and select all that apply.

Which of the following statements about critical theory can be supported by the passage?

☐ It is simply another means by which the power elite preserves the stratification of American society.

☐ It does not contain any of the same biases which had appeared in the secondary literature prior to the civil rights movement.

☐ It is not unique in its attempts to attribute Americans' poor knowledge of history to the machinations of a particular class of individuals.

Question 11

Select the sentence in the first paragraph that explains why a problem is less severe for current American historians now than it was a century ago.

Question 12

Not only did the exhibit clearly show the health benefits of a vegetarian diet, it showed how those benefits often translate into a greater sense of _____.

- ☐ vitality
- ☐ mendacity
- ☐ remorse
- ☐ vigor
- ☐ contrition
- ☐ persecution

Question 13

While the author clearly identifies the importance of Victorian culture to twentieth-century technological advances, he _____ the importance of British Regency to the development of the social factors that influenced Victorian culture.

- ☐ intimates
- ☐ corroborates
- ☐ neglects
- ☐ placates
- ☐ trumpets
- ☐ omits

Question 14

The speaker, though well-read and articulate, had a tendency to be _____.

- ☐ eloquent
- ☐ elegant
- ☐ bombastic
- ☐ gregarious
- ☐ pompous
- ☐ affable

Question 15

Given that conditions were quite amenable to fruit trees during the growing season this year, the _____ of apples this fall is surprising.

- ☐ dearth
- ☐ countenance
- ☐ surfeit
- ☐ spate
- ☐ amalgamation
- ☐ paucity

Questions 16-17 refer to the following passage.

Critics of Mark Twain's novel, *Huckleberry Finn*, view the protagonist's proclamation "All right, then, I'll go to hell" in chapter 31 as the story's climax. Twain's novel lent itself to such radical interpretations because it was the first major American work to depart from traditional European novelistic structures, thus providing critics with an unfamiliar framework. The remaining twelve chapters act as a counterpoint, commenting on, if not reversing, the first part in which a morality play receives greater confirmation. Huck's journey down the Mississippi represents a rite of passage, in which the character's personal notions of right and wrong come into constant conflict with his socially constructed conscience by the various people and situations the protagonist encounters.

The novel's cyclical structure encourages critics to see the novel's disparate parts as interlinked; the novel begins and ends with the boys playing games. Granted, this need not argue to an authorial awareness of novelistic construction; however, it does facilitate attempts to view the novel as a unified whole. Nevertheless, any interpretation that seeks to unite the last few chapters with the remaining book is bound to be tenuous. This is not because such an interpretation is unnecessarily rigid, but because *Huckleberry Finn* encompasses individual scenes of the protagonist's self-recognition that are difficult to accommodate in an all-encompassing interpretation. In this respect, the protagonist can best be likened to the Greek tragic figure, Oedipus.

Question 16

The author most probably mentions the "novel's cyclical structure" in order to

- ○ demonstrate that Twain was keenly aware of novelistic construction
- ○ show that the remaining twelve chapters have little connection to the rest of the novel
- ○ support the critic's position that Twain was unaware of novelistic construction
- ○ provide support for a particular critical interpretation of Twain's work
- ○ argue that Twain's protagonist has much in common with Oedipus

Question 17

Which of the following best expresses the main idea of the passage?

- ○ In order to understand Twain's novel, critics must compare its protagonist to Oedipus.
- ○ Twain's novel contains some chapters that resist easy inclusion into a unified interpretation.
- ○ The unconventional structure of *Huckleberry Finn* indicates a lack of authorial awareness.
- ○ Twain's novel was the first major American novel to discard traditional European structures.
- ○ The protagonist of *Huckleberry Finn* is considered a modern day Oedipus by critics.

Questions 18-19 refer to the following passage.

One of the most noxious wind-borne allergens is ragweed (*Ambrosia*), as evidenced by an estimated 30 million sufferers in the U.S. alone and a societal cost of over $3 billion. Each plant is able to produce more than a billion grains of pollen over the course of a season, and the plant is the prime cause of most cases of hay fever in North America. Although the plant produces more pollen in wet years, humidity rates above seventy percent tend to depress the spread of pollen by causing the grains to clump.

Ragweed spreads rapidly by colonizing recently disturbed soil, such as that engendered by roads, subdivisions, and cultivation and has adapted to a multitude of climatic conditions, including desert and high mountain areas. Complete elimination is virtually impossible. Physical removal is undone by even one seed or one bit of root left behind. Ragweed regenerates in about two weeks from only a half-inch of stem, usually with additional branching and flowering, so mowing can actually be counterproductive. Ragweed is susceptible to only the most aggressive herbicides, and because ragweed tends to cover large areas, control would mean widespread use of highly toxic chemicals. Control by natural predators? No known mammal browses on ragweed. Some species of *Lepidoptera* (butterflies, skippers, and moths) larvae feed on ragweed, but this arena of control is not well funded, and consequently not well-researched. Given the health issues and costs occasioned by ragweed, government funding for natural control research is warranted.

Question 18

Consider each of the following answer choices separately and select all that apply.

Which of the following can be inferred about the spread of ragweed pollen?

☐ Ragweed plants adapted to desert and mountain climes tend to spread fewer grains of pollen than do plants in other locations.

☐ Some attempts to control it may exacerbate the problem.

☐ The clumping of pollen grains caused by high humidity levels affects the ability of the wind to carry the grains.

Question 19

The author most probably mentions some species of *Lepidoptera* in order to

○ detail a species that may be more effective at controlling ragweed than are the most aggressive herbicides

○ suggest a potential research avenue to the problem of controlling ragweed that is at present poorly explored

○ discuss a type of mammal that feeds on ragweed plants and may be successful at controlling the spread of ragweed

○ plead with the government to spend more money and put more research efforts into finding a natural control for ragweed

○ argue that complete elimination of the ragweed plant will only be possible if the government funds research into natural controls of ragweed

Question 20 refers to the following passage.

Friedrich Nietzsche's *Twilight of the Idols* expanded on the problem of the preponderance of reason in ancient Greek society, an issue he first broached in *The Birth of Tragedy.* The radical idea that Socrates was symptomatic of a decline Greek society based on the deification of rationality was almost unique among Enlightenment thinkers. Reaction to the idea in *The Birth of Tragedy,* in fact, was so negative among German academics that Nietzsche himself vacillated in his support, referring to the work as "impossible" and "embarrassing" in a preface to the second edition before returning to the notion in his later works. The antipathy of his peers is not surprising given that he took aim at such pillars of Western thinking as Plato, Socrates, even Christianity. Though originally widely refuted at the time of writing, themes related to the conflict between the rationality on one hand and the power of the senses on the other, were revisited time and time again by his successors.

Question 20

According to the author, proponents of Nietzsche's work would most likely agree that

○ human reason is infallible whereas the senses decay along with the body and are therefore subservient to the mind

○ there is a conflict between Socrates and traditional Christian thought

○ Nietzsche had little influence on later thinkers

○ privileging reason over the senses had a deleterious effect on Greek society at the time of Socrates

○ Nietzsche found Plato to be embarrassing