Section 07

1. Of the students in class M, 2 percent dropped the class. Of the students in class N8 percent dropped the class.

Quantity A	Quantity B
The number of students that dropped class M	The number of students that dropped class N

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

2.

$2x+1=9$

Quantity A	Quantity B
x	5

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

3.

$x>0$ and $y<0$

Quantity A	Quantity B
xy	y^2

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

4.

$$\frac{x+y}{2}=5 \text{ and } \frac{x+y+z}{3}=4$$

Quantity A	Quantity B
z	3

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

5. The random variables A and B are each normally distributed, where A has a mean of 3 and a standard deviation of 2, and B has a mean of 5 and a standard deviation of l.

Quantity A	Quantity B
The percent of the values of A that are between 4 and 6	The percent of the values of B that are between 4 and 6

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

6. Each of the lists S and T consists of 5 numbers. For each integer k from 1 to 5, the kth number in list S is 3k-1 and the kth number in list T is 2k+17.

Quantity A	Quantity B
The standard deviation of the numbers in list S	The standard deviation of the numbers in list T

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

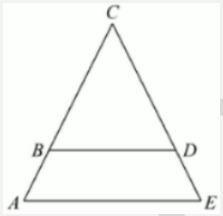
7.

$x < x^3 < x^2$

Quantity A	Quantity B
x^5	x^7

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

8.



In the figure above, triangle ACE is similar to triangle BCD. The height of ACE corresponding to the base AE is 7 and the height of BCD corresponding to the base BD is k. The area of BCD is equal to the area of trapezoid ABDE.

Quantity A	Quantity B
k	5

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

9. A list consists of six distinct positive integers less than or equal to 10. Which of the following CANNOT be the median of the six integers?

A. 3
B. 4
C. 5.5
D. 6
E. 7.5

10. When the positive integer m is divided by 5, the remainder is 2. Which of the following integers could be the remainder when m is divided by 15? Indicate **all** such integers.

A. 2
B. 5
C. 7
D. 8
E. 10
F. 12

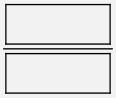
11. In a certain trivia game, each contestant answers 20 questions and earns or loses points as follows. The contestant earns 10 points for each correct answer and loses 2 points for each incorrect answer. If the contestant begins the game with 0 points, which of the following CANNOT be the total number of points that the contestant has after answering the 20 questions?

A. 80
B. 104
C. 124
D. 140
E. 152

12. In triangle ABC, the length of side AB is 13, the length of side B is 14, and the length of side AC is 15. What is the length of the altitude from vertex A to side BC?

A. 10
B. 10.5
C. 11
D. 11.5
E. 12

13. In the xy-plane, what is the x-intercept of the line 12x+3y=8?
Give your answer as a fraction.



Questions 14 and 16 are based on the following data

Population and Motor Vehicle Data for Selected States, 2001

State	Population (in thousands)	Number of Motor Vehicles per 1,000 People	Average Number of Miles Driven per Motor Vehicle	Average Number of Miles Driven per Gallon of Gasoline Used
Alaska	635	941	7,898	11.9
California	34,494	834	10,796	17.6
Florida	16,348	875	10.855	17.3
New Jersey	8,502	776	10,444	14.2
Texas	21,316	673	15,058	15.6

Notes:
(1)Populations and numbers of motor vehicles registered are for the end of 2001.
(2)Miles driven and gasoline used are for the entire year of 2001

14. At the end of 2001approximately how many more motor vehicles were registered in California than in Texas?

A. 160,000
B. 2,100,000
C. 8,900,000
D. 11,000,000
E. 14,400,000

15. At the end of 2001, which of the following states had the median number of motor vehicles registered for the five states shown?

A. Alaska
B. California
C. Florida
D. New Jersey
E. Texas

16. At the end of 2017the population of Texas was 34 percent greater than the population of Florida. Which of the following statements individually provide(s) sufficient additional information to conclude that at the end of 2017 the population of Florida was less than 21 million? Indicate **all** such statements.

A. At the end of 2017, the population of Texas exceeded the population of Florida by less than 7 million.
B. From the end of 2001 to the end of 2017, the population of Texas increased by more than 6 million.
C. From the end of 2001 to the end of 2017, the population of Texas increased by less than 8 million.

17. On January 1 Rahul deposited $1000 into a savings account that pays interest at an annual rate of 2 percent compounded annually, and $4,000 into a savings account that pays interest at an annual rate of 3 percent compounded annually. The total amount of interest paid by the two accounts at the end of the first year will be what percent of the total amount that Rahul deposited into the two accounts?

_____%

18. Three concentric circles form the boundaries of the three sections of a certain garden: an innermost circular section, a middle ring-shaped section and an outermost ring-shaped section. The area of the outermost section is 5 times the area of the middle section. If the radii of the two smaller circles are 10 meters and30 meters, what is the radius, in meters, of the largest circle?

A. 63
B. 67
C. 70
D. 75
E. 150

19. Let S be the set of integers from 1 to 10. How many subsets of S contain at least one even integer and at least one odd integer?

A. 25
B. 31
C. 62
D. 252
E. 961

20. Working alone at their respective constant rates, pumps A, B, and C, can fill a certain empty swimming pool with water in 3 hours, 4.5 hours, and 12 hours respectively. Pumps A and B began working simultaneously to fill the empty pool. Pump B stopped working at the same time that pump C started working to fill the pool. If the empty pool was filled in 2 hours in how many minutes after pump B stopped working was the pool filled?

A. 40
B. 48
C. 60
D. 66
E. 80

Section 08

1.

$k > 0$ and $m < 0$

Quantity A	Quantity B
$\lvert -k+m \rvert$	$k-m$

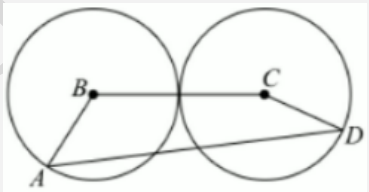
A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

2. The average (arithmetic mean) of 20 numbers is 53. When one of the numbers is discarded, the average (arithmetic mean) of the remaining numbers is 54.

Quantity A	Quantity B
The discarded number	50

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

3.



The two circles have centers at B and C, respectively, and are mutually tangent. Each circle has radius r.

Quantity A	Quantity B
The perimeter of quadrilateral ABCD	8r

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

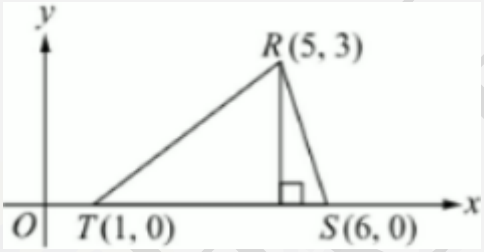
4.

$x^2 \neq 1$

Quantity A	Quantity B
$\frac{1}{x-1}-\frac{1}{x+1}$	$\frac{2}{x^2-1}$

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

5.



The figure shows triangle TRS in the xy-plane.

Quantity A	Quantity B
The length of TR	The length of TS

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

6. m is an odd integer greater than 1.

Quantity A	Quantity B
The greatest prime factor of 2m	The greatest prime factor of m^2

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

7. x is an integer greater than 3.

Quantity A	Quantity B
The number of even factors of 2x	The number of odd factors of 3x

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

8. A total of 500 tickets to a play were sold at prices ranging from $20 to $100 each. The average (arithmetic mean) price per ticket was $60.

Quantity A	Quantity B
The number of tickets sold for at most $60 each	The number of tickets sold for at least $60 each

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

9. A dog show features four breeds consisting of 3 poodles 3 German shepherds, 3 boxers, and 2 Irish setters. If the winning group will consist of one dog from each breed how many different winning groups are possible?

A. 11
B. 20
C. 44
D. 54
E. 432

10. If x is an integer and the sides of a triangle are x+3, 2x, and x+5, respectively, which of the following could NOT be the perimeter of the triangle?

A. 16
B. 20
C. 28
D. 30
E. 32

11. The cost C, in dollars, to remove p percent of a certain pollutant from a lake is estimated by using the formula $C = \frac{500,000p}{100-p}$. According to this estimate, how much more would it cost to remove 99 percent of the pollutant than it would cost to remove 90 percent?

A. $50,000
B. $500,000
C. $4,500,000
D. $45,000,000
E. $450,000,000

12. Set M consists of all the different integers n that satisfy |n-5|<3. What is the median of the numbers in set M?

A. 3.5
B. 4
C. 4.5
D. 5
E. 5.5

13. In a group of 100 adults, each owns a DVD player a CD player or both. If 60 adults own a DVD player and 70 adults own a CD player how many adults own both?

Questions 14 and 16 are based on the following data

Fifty government officials rated 12 proposals for a public works program. Each proposal received an individual rating of 1, 2, 3, 4 5, 6, or 7 from each official. For each proposal the sum of the 50 ratings and the median rating are listed in the table below.

Summary Data for Proposal Ratings

Proposal Number	Sum of 50 Ratings	Median Rating
1	164	3.0
2	125	3.0
3	311	6.0
4	229	5.0
5	252	4.5
6	232	4.0
7	303	6.0
8	95	2.0
9	130	3.0
10	236	4.0
11	204	4.0
12	263	5.5

14. Approximately what percent of the proposals have a median rating of 4.0 or less?

A. 33%
B. 42%
C. 50%
D. 58%
E. 70%

15. For proposal number 2, the average (arithmetic mean) rating is how much greater or less than the median rating?

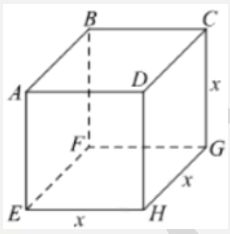
A. 0.5 greater
B. 2.5 greater
C. 0.5 less
D. 2.5 less

E. Neither greater nor less

16. How many of the proposals must have received at least one rating of 5, 6, or 7?

A. Four
B. Five
C. Six
D. Seven
E. Eight

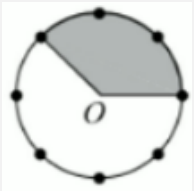
17.



The cube shown above has edges of length x where x is an integer. The length of diagonal AG (not shown) is 10.39, to the nearest 0.01. What is the value of the integer x?

x=_____

18.



The circle above has center O and circumference 16π. If the eight points indicated on the circle are equally spaced, what is the perimeter of the shaded region?

A. $8+4\pi$
B. $8+6\pi$
C. $16+4\pi$
D. $16+6\pi$
E. $16+8\pi$

19. Eugene and Penny started a job in sales on the same day. Eugene's sales for the first month were r dollars and each month after the first his sales for that month were twice his sales for the preceding month. Penny's sales for the first month were 10r dollars. and each month after the first her sales for that month were 10r dollars more than her sales for the preceding month. Which of the following statements are true? Indicate **all** such statements.

A. The dollar amount of Penny's sales for the second month was 10 times that of Eugene's sales for that month.
B. The dollar amount of Penny's sales for the fourth month was 5 times that of Eugene's sales for that month.
C. The dollar amount of Eugene's sales for the eighth month was greater than that of Penny's sales for that month.

20. $(2.82\times10^{-51})-(3.96\times10^{-49})=$

A. -3.9318×10^{-49}
B. -1.7804×10^{-51}
C. -1.14×10^{-100}
D. 1.7804×10^{-51}
E. 3.9318×10^{-49}

Section 10

1. Out of every 8 cars produced by a certain manufacturer, 3 are white.

Quantity A	Quantity B
The percent of the manufacturer's cars that are white	The percent of the manufacturer's cars that are black

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

2.

$$\frac{1}{5}=\frac{y}{3}$$

Quantity A	Quantity B
y	6

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

3.

31, -2, 79, 34, -47, 1, -25

Quantity A	Quantity B
The product of the numbers shown	The sum of the numbers shown

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

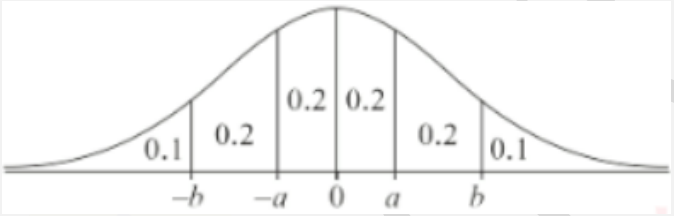
4.

mn=7 and m=3

Quantity A	Quantity B
m(2n+1)	15

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

5.



The figure shows a normal distribution with mean 0, including probabilities corresponding to the six intervals shown. The random variable X has the distribution shown, and a<t<b.

Quantity A	Quantity B
P(X<t)	0.8

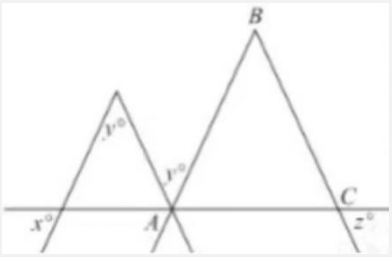
A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

6.

Quantity A	Quantity B
The median of the consecutive integers from 4 to 88, inclusive	46.5

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

7.



In the figure above, AB>BC.

Quantity A	Quantity B
x	z

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

8. $x=(8q)^n$, where q and n are integers greater than 5 and q is odd.

Quantity A	Quantity B
The ratio of the number of odd positive factors of x to the number of even positive factors of x	$\frac{1}{3n}$

A. Quantity A is greater.
B. Quantity B is greater.
C. The two quantities are equal.
D. The relationship cannot be determined from the information given.

9. If n and 1.25n are positive integers, which of the following could be the units digit of n? Indicate all such digits.

A. 0
B. 1
C. 2
D. 3
E. 4

F. 5
G. 6
H. 7
I. 8
J. 9

10. A cyclist traveled a distance of 50 miles in 5 hours. The cyclist's average speed for the first 25 miles was 10 miles per hour faster than the cyclist's average speed for the last 25 miles. Which of the following is closest to the time, in hours, that it took the cyclist to travel the last 25 miles?

A. 2.0
B. 2.5
C. 3.0
D. 3.5
E. 4.0

11. In the xy-plane, a quadrilateral has vertices at the points (1, 1), (7, 2), (5, 6), and (2, 6). What is the area of the quadrilateral?

A. 11
B. 17.5
C. 18
D. 20
E. 20.5

12. A chemist mixed a solution that is 5 percent acid, by weight, with a second solution that is 20 percent acid. by weight to produce x grams of a solution that is 12 percent acid, by weight. How many grams of the second solution did the chemist use to produce the mixture in terms of x?

A. $\frac{7}{15}x$
B. $\frac{8}{15}x$

C. $\frac{7}{12}x$

D. $\frac{3}{5}$ x

E. $\frac{2}{3}$ x

13. Kelly deposited $1,200 into a savings account that paid interest at a simple annual interest rate of4 percent. If Kelly made no additional deposits to or withdrawals from the account, how much money was in the account at the end of one year after the interest had been paid?

$_____

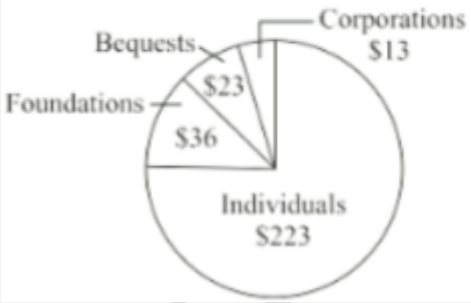
Questions 14 and 16 are based on the following data

Charitable Donations in Country C in 2017

Total:$295 million

Amount Received by Category

Amount Donated by Source (in millions)



Category	Amount Received (in millions)
Religion	$97
Education	$41
Human Services	$30
Public and Society	$21
Health	$20
Arts and Humanities	$13
Other	$73

14. If the amount donated to the Religion category by Individuals was donated by a total of 2 million people and if 82 percent of the amount received by the Religion category was donated by Individuals. approximately what was the average (arithmetic mean) amount donated to the Religion category per person for all the people who donated as Individuals?

A. $40
B. $60
C. $80

D. $100
E. $120

15. The amount donated by Corporations was approximately what percent less than the total amount donated by Bequests and Foundations?

A. 22%
B. 46%
C. 54%
D. 70%
E. 78%

16. If the amounts donated by Foundations to the 7 categories shown were in the same proportion as the total amounts donated to the 7 categories which of the following categories received more than $3 million in donations from Foundations?
Indicate **all** such categories.

A. Religion
B. Education
C. Human Services
D. Public and Society
E. Health
F. Arts and Humanities
G. Other

17. If x is positive and satisfies $\frac{4}{x} = 3 + 7x$, what is the value of x?

Give your answer as a fraction.

x= $\frac{\square}{\square}$

18. A water storage container has the shape of a right circular cone positioned so that its base is at the top and is horizontal. The interior height of the cone is 60 centimeters. Water is filling the container at a constant rate. If it takes 168 seconds for the height of the water to increase from 20 centimeters to 40 centimeters. how many seconds does it take for the height of the water to increase from 40 centimeters to 60 centimeters? (Note: The volume V of a right circular cone is given by $V = \frac{1}{3}\pi r^2 h$, where r is the radius of the base and h is the height of the cone.)

A. 168
B. 252
C. 456
D. 480
E. 567

19. The variance of n values x_1, x_2, x_3,...,x_n with mean $\bar{x}$ is equal to $\frac{S}{n}$. where S is the sum of the squared differences $\left(x_i - \bar{x}\right)^2$ for $1 \leqslant i \leqslant n$. Data set R consists of n values and data set T consists of 2n values, where n is a positive integer. The means of the values in R and T are the same, and the variances of the values in R and T are 16 and 100 respectively. What is the variance of the values in the data set that consists of the values in R and the values in T?

A. 72
B. 64
C. 58
D. 49
E. 44

20. For any subset S of a universal set U, the set $\bar{S}$ consists of all the elements in U that are not in S. Of the elements in U. 50 percent are in set A, 30 percent are in set B, and 10 percent are in the set A ∩ B. If the set A ∪ $\bar{B}$ contains 840 elements how many elements does the set $\bar{A}$ ∪ B contain?

A. 420
B. 504
C. 630
D. 1,120
E. 1,680