

Section 09

1. The median of 35 measurements is 18.

Quantity A

The sum of the 35 measurements

Quantity B

625

- 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.

-8, -3, 5, 8, 3, 5....

In the sequence, each term after the first two terms is the absolute value of the difference of the two preceding terms.

Quantity A

The first number to occur three times in the sequence

Quantity B

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.

3. A bowl contains jelly beans, 10 percent of which are green and the rest are blue. To this bowl n green jelly beans and $10n$ blue jelly beans will be added, where $n > 0$.

Quantity A

After the $11n$ jelly beans are added to the bowl, the percent of the jelly beans in the bowl that will be green

Quantity B

10%

- 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. The reciprocal of $x-2$ is $x+2$.

Quantity A

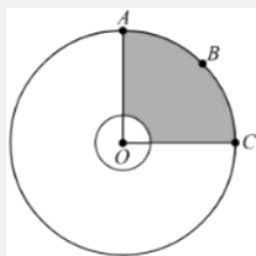
x

Quantity B

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 two circles in the figure shown have a common center at O, the area of the shaded region is 40π , and the measure of angle AOC is 90° .

Quantity A

The circumference of the smaller circle

Quantity B

The length of arc ABC

- 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. a and b are negative, and $(a+b)(a-b) < 0$.

Quantity A

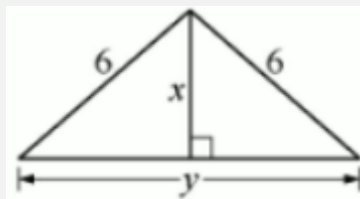
a

Quantity B

b

- 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.



Quantity A
 $4x^2 + y^2$

Quantity B
 144

- 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. On each of 3 tests Tina received a score between 0 and 100, inclusive. If her average (arithmetic mean) score on the tests was 75, what is the greatest possible difference between her highest and lowest test scores?

- A. 30
 B. 40
 C. 50
 D. 60
 E. 75

9. Which of the following statements are true for all integers a and b ?
 Indicate **all** such statements.

- A. $(-1)^{ab} = (-1)^a + (-1)^b$
 B. $(-1)^{a+b} = (-1)^a + (-1)^b$
 C. $(-1)^{a+b} = (-1)^a (-1)^b$

10.

$$(5^3)w + (5^2)x + 5y + z = 264$$

In the equation shown, w , x , y , and z are nonnegative integers and each is less than 5.
 What is the value of $w+x+y+z$?



- A. 5
- B. 6
- C. 8
- D. 10
- E. 12

11.

Color	Number of Cards	Labels
Red	3	K, S, W
Blue	3	S, W, H
Green	3	W, H, N

In a set of cards, each card is colored one of three colors and each card is labeled with one letter as indicated in the table. If one card is to be selected at random from the set, what is the probability that the selected card will be blue or labeled with the letter W?

- A. $\frac{2}{9}$
- B. $\frac{3}{9}$
- C. $\frac{4}{9}$
- D. $\frac{5}{9}$
- E. $\frac{6}{9}$

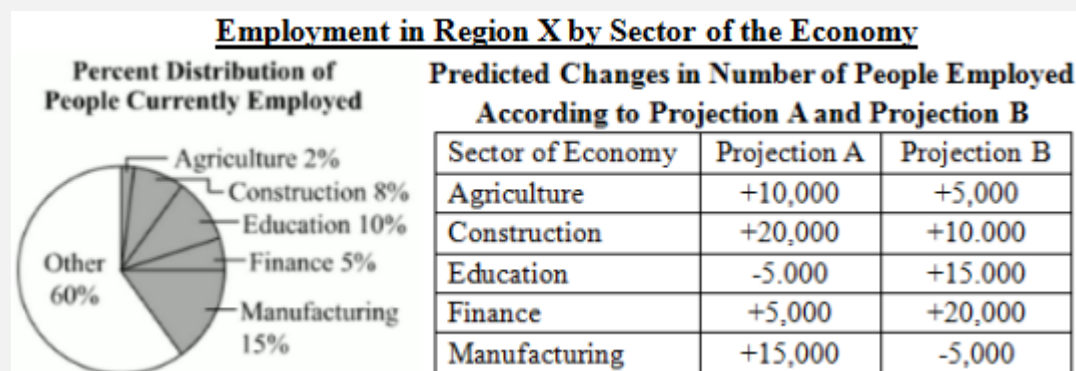
12. The area of rectangular region R is 50 percent greater than the area of rectangular region S. If the length of R is 25 percent greater than the length of S, then the width of R is what percent greater than the width of S?

- A. 20%
- B. 25%
- C. 75%
- D. 120%
- E. 125%



13. When an even integer k is rounded to the nearest 10, the result is 530. What is the greatest possible value of k ?

Questions 14 and 16 are based on the following data



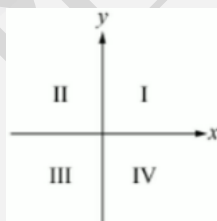
14. The number of people currently employed in agriculture is what percent of the total number of people currently employed in the five sectors shaded in the graph?
- A. 2%
B. 2.5%
C. 5%
D. 10%
E. 40%
15. If the average (arithmetic mean) annual salary of the people currently employed in agriculture is \$35,000 and if the average annual salary of the people currently employed in construction is \$45,000, what is the average annual salary of the people currently employed in agriculture and construction combined?
- A. \$37,500
B. \$40,000
C. \$40,500
D. \$42,500
E. \$43,000

16. If the predicted change, according to projection A, in the number of people employed in education is a 4 percent decrease, then the predicted change, according to projection B, in the number of people employed in finance is what percent increase?

_____ %

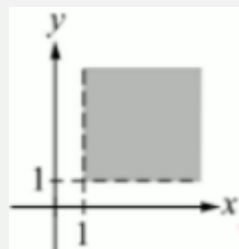
17. Michael, Kim, Glenda, and Ian all own DVDs, and no DVD is owned by two or more of them. Michael owns $\frac{1}{2}$ of the number of DVDs that Kim owns. Glenda owns $\frac{1}{3}$ of the number of DVDs that Ian owns. If Kim and Ian own the same number of DVDs, what is the ratio of the total number of DVDs that Michael and Glenda own to the total number of DVDs that Kim and Ian own? Give your answer as a fraction.

- 18.



Which of the following shaded regions represents the set of all points (a, b) in the xy -plane above such that $(a+1, b+1)$ is in quadrant I? (Note that a point on an axis is not in any quadrant.)

- A.



- B.

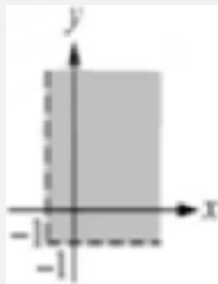


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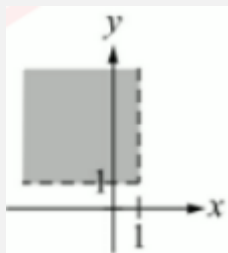
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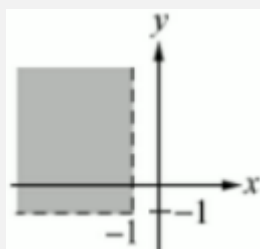




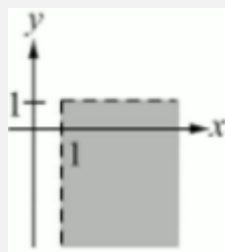
C.



D.



E.



19. A certain list has 5 entries and each entry is an integer between 55 and 70, inclusive. The median of the 5 entries is 60. If m is the average (arithmetic mean) of the 5 entries which of the following must be true?

- A. $54 \leq m \leq 60$
- B. $55 \leq m \leq 61$
- C. $56 \leq m \leq 62$
- D. $57 \leq m \leq 63$
- E. $58 \leq m \leq 64$

20. A total of 600 tickets were sold for a play. The prices of the tickets were \$5 for children \$6 for senior citizens. and \$7 for all other adults. The number of tickets sold for children was twice the number sold for adults who were not senior citizens. If the total receipts from the ticket sales were \$3,425, how many tickets were sold to senior citizens?
- A. 75
B. 150
C. 175
D. 225
E. 350



Section 11

1.

$$a > 1$$

Quantity A

$$\frac{a}{a-1}$$

Quantity B

$$\frac{a+1}{a}$$

- 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. When the positive number k is multiplied by itself, the result is $\frac{1}{2}$ of k .

Quantity A

$$k$$

Quantity B

$$\frac{1}{4}$$

- 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. In the xy -plane, line l is perpendicular to the line determined by the equation $5y+3x=1$.

Quantity A

The slope of line l

Quantity B

$$\frac{5}{3}$$

- 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.



4. a and b are consecutive positive integers and a is less than b .

$$\frac{\text{Quantity A}}{a^b}$$

$$\frac{\text{Quantity B}}{b^a}$$

- 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. n is an integer and $5n-1$ is a positive even integer.

$$\frac{\text{Quantity A}}{(-1)^{n+1}}$$

$$\frac{\text{Quantity B}}{1}$$

- 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.

6. In a department of 15 employees, the average (arithmetic mean) annual salary of the 7 lowest-paid employees is \$33,500, and the average annual salary of the 7 highest-paid employees is 38,000.

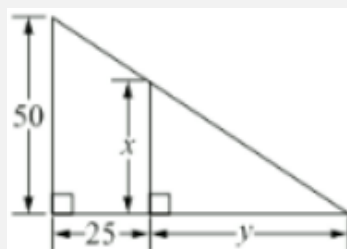
$$\frac{\text{Quantity A}}{\text{The median of the 15 annual salaries}}$$

$$\frac{\text{Quantity B}}{\$35,900}$$

- 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.



Quantity A

x

Quantity B

y

- 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 set consists of k consecutive integers, including 2. The sum of the integers in the set is -11.

Quantity A

k

Quantity B

10

- 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.

$$M = \{6, 27, 15, 8\}$$

$$P = \{-1, 0, 5, -12, 3\}$$

For sets M and P above, \overline{M} is the set of numbers obtained by adding 3 to each number in M , and \overline{P} is the set of numbers obtained by adding 7 to each number in P . How much greater is the range of the numbers in \overline{M} than the range of the numbers in \overline{P} ?

- A. 0
- B. 1
- C. 2
- D. 3

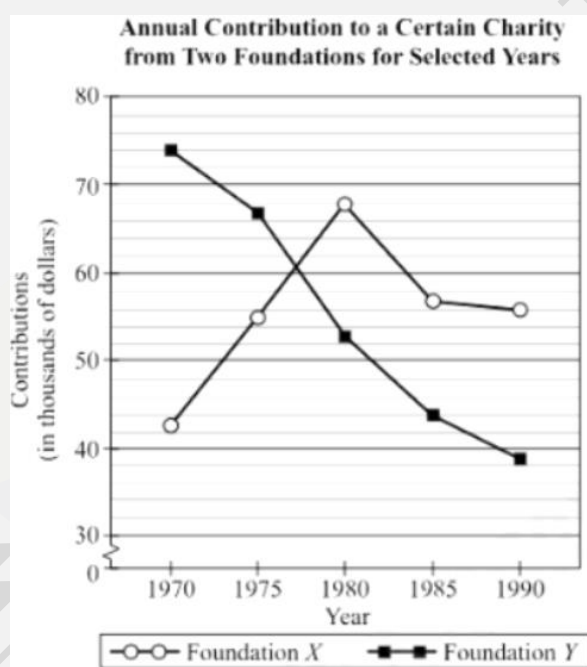
- E. 4
10. Stores A, B, C, and D sell a certain model of printer for the same retail price. The retail price of the printer is discounted by 10 percent, 20 percent, 16 percent, and 12 percent at Stores A, B, C, and D, respectively. If the retail price of the printer is at least \$100, which of the following statements about the discounted prices at the four stores must be true? Indicate all such statements.
- A. The range is at least \$10.
B. The median is at least \$90.
C. The average (arithmetic mean) is at least \$80.
11. In a certain raffle, the probability that the first ticket randomly drawn from the box will be a first-prize ticket is 0.001, and the probability that it will be a second-prize ticket is 0.005. If there are no other prizes, how many of the 1,000 tickets in the raffle box do not represent a prize?
- A. 994
B. 995
C. 996
D. 997
E. 998
12. Martha invested a total of \$10,000, part at 8 percent simple annual interest and the remainder at 10 percent simple annual interest. If these investments yielded a total of \$870 in interest for one year, what amount had Martha invested at 8 percent simple annual interest?
- A. \$4,500
B. \$5,500
C. \$6,000
D. \$6,500
E. \$7,000



13. Sam, Jan, and Kate all bought the same style of jacket. Jan paid 17 percent more for the jacket than Sam paid, and Kate paid 12 percent more for the jacket than Jan paid. The amount that Kate paid was what percent greater than the amount that Sam paid? Give your answer to the nearest whole percent.

_____ %

Questions 14 and 16 are based on the following data



14. In 1970 the annual contribution to the charity from Foundation X was closest to what percent of the annual contribution from Foundation Y?
- A. 29%
B. 31%
C. 43%
D. 58%
E. 64%

15. Which of the following is closest to the range, in dollars of the annual contributions to the charity from Foundation X for the five years shown?

- A. \$13,000
- B. \$19,000
- C. \$25,000
- D. \$31,000
- E. \$35,000

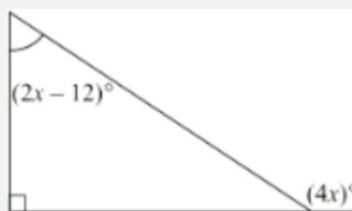
16. The ratio of the annual contribution to the charity from Foundation X to the annual contribution from Foundation Y was greatest in which of the following years?

- A. 1970
- B. 1975
- C. 1980
- D. 1985
- E. 1990

17. The sequence $a_1, a_2, a_3, \dots, a_n, \dots$ is defined by $a_1=1$ and $a_n=a_{n-1}+n$ for all integers $n \geq 2$. What is the value of a_{49} ?

$a_{49} = \underline{\hspace{2cm}}$

18.



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

- A. 13
- B. 17
- C. 31
- D. 39
- E. 51

19.

Value	Frequency
1	20
2	18
3	14
4	13
5	12
6	10
7	9
8	8
Total	104

The frequency distribution for a data set is shown above. What is the median of the distribution?

- A. 3
- B. 3.5
- C. 4
- D. 4.5
- E. 5

20. Which of the following is equivalent to $0 < x < 2$?

- A. $x=1$
- B. $|x|<1$
- C. $|x|<2$
- D. $|x+1|<1$
- E. $|x-1|<1$

Section 12

1. A certain brand of dishwashing liquid was sold in two different bottle sizes. The small bottle was sold with $\frac{2}{5}$ as many ounces of liquid as the large bottle and was sold at a price that was $\frac{1}{2}$ the price of the large bottle.

Quantity A

The price per ounce of the liquid in the small bottle

Quantity B

The price per ounce of the liquid in the large bottle

- 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 random variable Y is normally distributed with a mean of 50.0 and a standard deviation of 5.4

Quantity A

The probability that Y is between 44.6 and 48.2

Quantity B

The probability that Y is between 55.4 and 59.0

- 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.

Quantity A

$$\left(\frac{x+y}{2}\right) - \left(\frac{x-y}{2}\right)$$

Quantity B

$$y$$

- 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.

$$x > y > \sqrt{2}$$

Quantity A

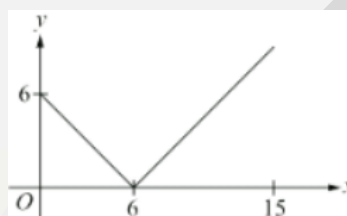
$$x+y$$

Quantity B

$$xy$$

- 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.



In the xy -plane the graph of the function $y=f(x)$ for $0 \leq x \leq 15$ consists of two line segments intersecting at the point $(6, 0)$. The slopes of the two line segments are -1 and 1 .

Quantity A

$$f(3)$$

Quantity B

$$f(9)$$

- 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.

$$x \neq 0$$

y is a negative integer.

Quantity A

$$x^y$$

Quantity B

$$0$$

- 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. When integer n is divided by 8, the remainder is 3. When integer n^2 is divided by 8, the remainder is R.

Quantity A

R

Quantity B

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.
8. One cup of a certain type of yogurt contains 9 grams of protein, which is equal to x percent of the recommended daily consumption of protein. How many grams is the recommended daily consumption of protein in terms of x ?
- A. $9x$
B. $\frac{x}{9}$
C. $\frac{100x}{9}$
D. $\frac{9}{100x}$
E. $\frac{900}{x}$
9. A stone was dropped into a still pond and produced concentric circular ripples on the surface of the water. The radius of the outermost ripple increased at a constant rate of x feet per second. If the area of the circular region enclosed by the outermost ripple was 400π square feet 10 seconds after the stone hit the water. what is the value of x ?
- A. 2
B. 4
C. 20



- D. $\sqrt{40}$
- E. $\sqrt{200}$

10. At a certain gasoline station last year, the price of gasoline on July 1 was 10 percent higher than it was on January 1, and the price of gasoline on December 31 was 30 percent higher than it was on January 1. Which of the following is closest to the percent increase in the price of gasoline at this station from July 1 to December 31 last year?

- A. 15%
- B. 18%
- C. 20%
- D. 22%
- E. 43%

11. For all positive even integers n , $n!$ represents the product of all even integers from 2 to n , inclusive. For example, $12! = 12 \times 10 \times 8 \times 6 \times 4 \times 2$. What is the greatest prime factor of $20! + 22!$?

- A. 41
- B. 23
- C. 19
- D. 17
- E. 11

12.

List A: 1, 5, 9, 13, 4

List B: 1, 5, 9, 13, 9

List C: 1, 5, 9, 13, 7

List D: 1, 5, 9, 13, 6

The standard deviation of n numerical data $x_1, x_2, x_3, \dots, x_n$ with mean \bar{x} is equal to $\sqrt{\frac{S}{n}}$,

where S is the sum of the squared differences $(x_i - \bar{x})^2$ for $1 \leq i \leq n$.



Which of the following shows lists A, B, C, and D in order from the list with the least standard deviation to the list with the greatest standard deviation?

- A. A, B, C, D
- B. A, D, B, C
- C. B, C, D, A
- D. C, B, D, A
- E. C, D, B, A

13. The integer n is greater than 1, and $S = \{5-n, 5-n^2, 5+n^2\}$. If the difference between the greatest number in S and the least number in S is 72 what is the value of n ?

$n = \underline{\hspace{2cm}}$

Questions 14 and 16 are based on the following data

Theater Revenues for Seven Movies

Movie	Number of Weeks Movie Has Been Released	Total Revenue (in millions)	Number of Theaters (first week released)	Average* Revenue per Theater (first week released)
A	2	\$32.4	2,800	\$5,250
B	3	\$53.6	3,100	\$5,060
C	1	\$13.0	2,900	\$4,480
D	8	\$61.1	1,800	\$4,450
E	5	\$38.6	1,500	\$4,150
F	3	\$28.2	1,600	\$3,840
G	10	\$86.5	900	\$3,220

*Arithmetic Mean

14. When Movie C has been released for 10 weeks, its producers expect it to have a total revenue equal to the total revenue of Movie G for the 10 weeks of its release. To meet this expectation, approximately what must be the average (arithmetic mean) revenue per week of Movie C for the next 9 weeks of its release?

- A. \$7.35 million
- B. \$7.67 million



- C. \$8.17 million
- D. \$9.19 million
- E. \$9.61 million

15. The total revenue for Movie F is approximately what percent less than the total revenue for Movie B?

- A. 25%
- B. 47%
- C. 53%
- D. 75%
- E. 60%

16. For the revenue of Movie B in the first week it was released and the revenue of Movie E in the first week it was released, approximately what was the average revenue per theater for the two movies combined?

- A. \$4,447
- B. \$4,605
- C. \$4,622
- D. \$4,654
- E. \$4,763

17.

	Department A	Department B	Department C
Number of employees	25	15	19
Average number of vacation days	12.8	10.4	x

For each of three departments of a certain business at the end of 2011 the table above shows the number of employees and the average (arithmetic mean) number of vacation days taken by the employees in 2011. The average number of vacation days taken by all of the employees in the three departments in 2011 was 10.0. If each employee worked in only one department, what is the value of x ?



$$x = \underline{\hspace{2cm}}$$

18.

$$S = \{1, 3, 5, 7, \dots, 397, 399\}$$

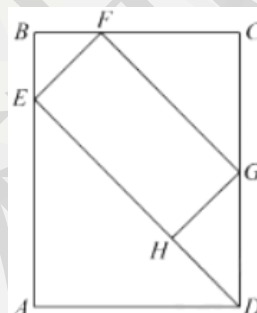
Set S consists of the odd numbers from 1 to 399, inclusive. How many different ordered pairs (p, t) can be formed, where p and t are numbers in S and $p < t$?

(Note: The sum of the integers from 1 to n, inclusive is given by the formula $\frac{n(n+1)}{2}$ for

all positive integers n.)

- A. 19,900
- B. 20,000
- C. 49,500
- D. 79,600
- E. 79,800

19.



In the figure ABCD and EFGH are rectangular regions. The length of line segment BF is 4, and the measure of angle AED is 45 degrees. If G is the midpoint of side CD, what is the area of EFGH?

- A. $32\sqrt{2}$
- B. $32\sqrt{3}$
- C. $64\sqrt{2}$
- D. 32
- E. 64

20.

$$\left(\frac{100}{x} + \frac{100}{y}\right)T = 100$$

Which of the following statements individually provide(s) sufficient additional information to determine the value of T? Indicate **all** such statements.

A. $x+y=10$

B. $\frac{x}{y} = \frac{3}{2}$

C. $\frac{xy}{x+y} = \frac{12}{5}$

