

大佬版《数学真题 1200 题》

Version 2.1

公众号：留学大佬 GRE

大佬从 2017 年开始搜集真题， 截止 2021.6.1 日， 共搜集 50000 多道 GRE 真题。

2017 年 真题就开始用于教学，2020 年开了 GRE 真题班。反响非常好。很多很多同学短期内（30 天内）轻松考出 330+， 335+， 考完试回来反馈，考试题就是在真题班里做过的原题。当然喽， 给大家做的题，就是你考前几天刚从考场流出来的呢。

大佬另外编了三本重磅级真题精华：《大佬版阅读高频 340 篇》浓缩 GRE 题库考的最多次的阅读真题；《大佬版填空高频 340 题》浓缩 GRE 题库中考的最多次数的填空真题；《大佬版填空真题 1000 题》汇聚 2021 年大佬实考完整套题的填空题。

本书也完全 复刻 整场 60 道数学题，原题整套编入，不做任何改动，给同学们做原滋原味的真题。专门挑选的是 Q 加试的场次，因为加试的 Q 都更难，给学有余力的同学更多的挑战，更难的题如果都会做，实战就是降维打击，轻松 170.

本书编入的真题，所有，全部，都是 2021 年的真题。

大佬急救班和真题班级群里，每天都在火热讨论真题。

Version 2.1 共 10 场 600 题

更新于 2021 年 6 月 12 日

Quantity A

$$(-3)^3$$

Quantity B

$$3^{-3}$$

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

Select one answer choice.

Nine different numbers are chosen from the integers from 1 to 100, inclusive. The average (arithmetic mean) of these 9 integers is greater than their median.

Quantity A

The average of the 9 integers

Quantity B

50

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

Select one answer choice.

In the xy -plane, $P(r, s)$ is the point on the graph of $y = 1 - x^2$ that has the greatest y -coordinate and $Q(u, v)$ is the point on the graph of $y = x^2 - 1$ that has the least y -coordinate.

Quantity A s Quantity B v

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

Select one answer choice.

Triangular region T has sides of lengths 13, 13, and 10.

Quantity A

The area of region T

Quantity B

65

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

Select one answer choice.

Age (years)	15–19	20–24	25–29	30–34	35–39
Frequency	3	15	31	28	23

The table above shows the age distribution of 100 people enrolled in a fitness club.

Quantity A

The age, in years, at the 25th percentile of the distribution

Quantity B

The range of ages, in years, of the 100 people

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

Select one answer choice.

N is a 2-digit positive integer, and x is the units digit of N .

Quantity A

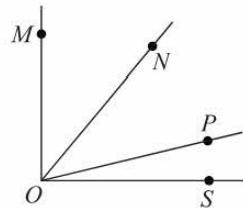
The units digit of N^3

Quantity B

The units digit of x^3

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

Select one answer choice.



The measure of angle NOS is 50° and the measure of angle POM is 70° .

Quantity A

The measure of angle MOS

Quantity B

90°

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

Select one answer choice.

$$Q_1, Q_2, Q_3, \dots, Q_n, \dots$$

The sequence shown is defined by $Q_1 = 6$ and $Q_{n+1} = 3Q_n$ for each positive integer n .

Quantity A

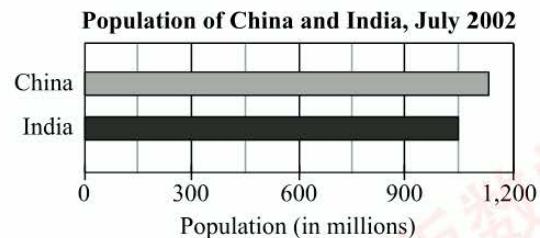
$$Q_{11}$$

Quantity B

$$\left(\frac{1}{3^{17}}\right)Q_{28}$$

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

Select one answer choice.



According to the graph, in July 2002, the population of China was approximately what percent greater than the population of India?

- 2%
- 7%
- 17%
- 22%
- 27%

Select one answer choice.

When the integer n is divided by 21, the remainder is 14. Which of the following must be a divisor of n ?

- 10
- 8
- 7
- 3
- 2

Select one answer choice.

How much more is 20 percent of x than $\frac{1}{5}$ of 1 percent of x ?

- $\frac{x}{19.8}$
- $0.18x$
- $0.192x$
- $0.198x$
- $19.8x$

Select one answer choice.

Marie jogs at an average speed of 6 miles per hour for 1.5 hours along a straight path and then turns around to jog back to her starting point. Marie had scheduled T hours to jog the total distance. If Marie is to arrive back exactly on schedule, at what average speed, in miles per hour, must she jog back to her starting point?

- $\frac{(6)(1.5)}{T - 1.5}$ $\frac{(6)(1.5)}{T - 6}$ $\frac{T - 1.5}{(1.5)(6)}$ $(T - 1.5)(1.5)(3)$ $(T - 6)(1.5)(3)$

Select one answer choice.

If c is a constant such that $3(5z + 6) + 4 = 15z + c$ for all numbers z , what is the value of c ?

$$c = \boxed{}$$

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

Section 2 of 6 | Question 14 of 20

00:34:32 Hide Time

Questions 14 to 16 are based on the following data.

ON-TIME ARRIVALS AND CONSUMER COMPLAINTS
FOR MAJOR UNITED STATES AIRLINES, OCTOBER 2002

Airline	Percent of On-Time Arrivals in October 2002	Consumer Complaints per Million Passengers	
		Number in October 2002	Percent Decrease Since October 2001
A	80.2%	3.8	50%
B	87.5%	9.0	37%
C	82.4%	7.7	75%
D	78.4%	9.5	51%
E	82.1%	8.9	45%
F	86.4%	10.9	39%
G	82.6%	3.0	17%
H	88.0%	13.2	25%
I	87.9%	6.6	57%

Which of the airlines listed had the median percent of on-time arrivals in October 2002?

 Airline A Airline C Airline E Airline F Airline G

Select one answer choice.

Section 2 of 6 | Question 15 of 20

Questions 14 to 16 are based on the following data.

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D	78.4%	9.5	51%
E	82.1%	8.9	45%
F	86.4%	10.9	39%
G	82.6%	3.0	17%
H	88.0%	13.2	25%
I	87.9%	6.6	57%

For how many of the airlines listed was the number of arrivals that were not on time less than 15 percent of the total number of arrivals in October 2002?

 One Two Three Four Five

Select one answer choice.

Section 2 of 6 | Question 16 of 20

Questions 14 to 16 are based on the following data.

ON-TIME ARRIVALS AND CONSUMER COMPLAINTS
FOR MAJOR UNITED STATES AIRLINES, OCTOBER 2002

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D	78.4%	9.5	51%
E	82.1%	8.9	45%
F	86.4%	10.9	39%
G	82.6%	3.0	17%
H	88.0%	13.2	25%
I	87.9%	6.6	57%

For Airline H, what was the number of consumer complaints per million passengers in October 2001?

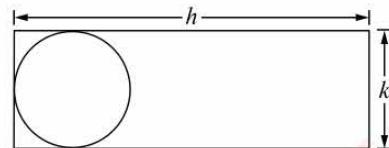
 9.9 12.5 14.2 16.5 17.6

Select one answer choice.

The cast of a certain play has 2 male characters and 2 female characters. The director of the play will select the 2 male characters from 6 male actors and the 2 female characters from 8 female actors. How many different sets of 4 actors, consisting of 2 male actors and 2 female actors, are there that can be selected by the director?

 sets

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.



A circle is tangent to three sides of a rectangle, as shown above. If the area of the rectangular region is 4 times the area of the circular region, what is the ratio of h to k ?

- $\frac{1}{\pi}$
- $\frac{2}{\pi}$
- $\frac{\pi}{4}$
- $\frac{\pi}{2}$
- π

Select one answer choice.

$$\frac{51! - 50!}{50! - 49!} =$$

- 1 $\frac{51}{49}$ $\frac{51}{50}$ $\frac{(50)(50)}{49}$ $\frac{(50)(50)}{(49)(49)}$

Select one answer choice.

Of the 29 students in a class, 15 students study French, fewer than 16 students study Spanish, and 5 students study neither French nor Spanish. Which of the following could be the number of students in the class who study both French and Spanish?

Indicate all such numbers.

- 0
- 3
- 5
- 6
- 8
- 9

Select one or more answer choices.

$$x < 0$$

Quantity A

$$1 - (x + 1)$$

Quantity B

$$(1 - x) + 1$$

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

Select one answer choice.

Quantity A

200 percent of $\frac{7}{4}$ of $\frac{8}{21}$

Quantity B

150 percent of $\frac{8}{9}$

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

Select one answer choice.

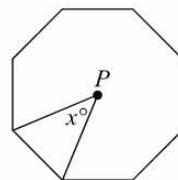
$$xy = -1 \text{ and } y - x > 0$$

Quantity A x Quantity B

0

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

Select one answer choice.



The regular octagon shown has center P .

Quantity A

x

Quantity B

45

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

Select one answer choice.

r percent of s percent of t equals 7.

Quantity A

t

Quantity B

$\frac{70,000}{rs}$

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

Select one answer choice.



In plane P , point M is on line k .

Quantity A

The number of points in plane P whose distance from line k is 1 and whose distance from point M is 100

Quantity B

3

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

Select one answer choice.

Group	At Least 140 Pounds but Less Than 150 Pounds	At Least 151 Pounds but Less Than 160 Pounds
Group 1	10	20
Group 2	20	10

The people in two groups of 30 students each were categorized based on their weight, as shown in the table.

Quantity A

The average (arithmetic mean) weight of the 30 people in group 1

Quantity B

The average (arithmetic mean) weight of the 30 people in group 2

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

Select one answer choice.

In a group of 62 children, more of the children were born on a Friday than on any other day of the week. What is the least possible number of children in the group who were born on a Friday?

- 11
- 10
- 9
- 8
- 7

Select one answer choice.

Let $a_1, a_2, a_3, \dots, a_n, \dots$ be the sequence defined by $a_1 = 1$ and $a_{n+1} = a_n + 4$ for all positive integers n . Which of the following represents the k th term in the sequence, where k is a positive integer?

- $4k - 3$
- $4k - 1$
- $4k$
- $4k + 1$
- $4k + 4$

Select one answer choice.

To purchase a new sweater, Kledia paid \$51.41, which was the sum of the selling price plus 6 percent sales tax on the selling price. How much was the sales tax?

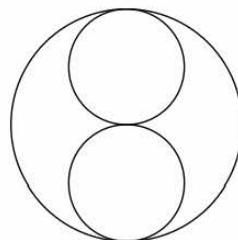
- \$1.41
- \$1.95
- \$2.41
- \$2.91
- \$3.08

Select one answer choice.

A certain tutoring center offers only one-hour sessions. The costs of the sessions are as follows. A single session costs \$50, a package of 5 sessions costs \$225, and a package of 10 sessions costs \$400. At the tutoring center, Johann purchased 3 single sessions, 1 package of 5 sessions, and 2 packages of 10 sessions. What is the average (arithmetic mean) cost, to the nearest dollar, of the sessions purchased by Johann?

- \$42
- \$43
- \$44
- \$45
- \$46

Select one answer choice.



A large circle intersects each of two small circles at one point, and the two small circles intersect at one point, which is the center of the large circle, as shown. What is the ratio of the circumference of the large circle to the sum of the circumferences of the two small circles?

- 2 to 1
- 4 to 3
- 1 to 1
- 3 to 4
- 1 to 2

Select one answer choice.

If $n > 0$, which of the following expressions is equal to $(3^n)(3^n)$?

Indicate all such expressions.

- 6^n
- 9^n
- 3^{2n}

Select one or more answer choices.

Section 4 of 6 | Question 14 of 20

Questions 14 to 16 are based on the following data.

**Selected Currency Exchange Rates
for One United States Dollar at Bank W,
January 1998 and January 1999**

Country	Currency	Currency Exchanged for \$1, January 1998	Currency Exchanged for \$1, January 1999
Britain	Pound	0.58	0.59
France	Franc	5.73	5.51
Germany	Mark	1.72	1.64
India	Rupee	33.32	36.60
Italy	Lira	1,691.00	1,626.00
Japan	Yen	121.50	105.15
Mexico	Peso	7.24	9.44
Spain	Peseta	145.29	140.00
Sweden	Krona	7.22	7.14

For how many of the nine currencies listed did the amount of that currency exchanged for \$1 decrease by more than 10 percent from January 1998 to January 1999?

- None
- One
- Two
- Three
- Four

Select one answer choice.

Section 4 of 6 | Question 15 of 20

Questions 14 to 16 are based on the following data.

**Selected Currency Exchange Rates
for One United States Dollar at Bank *W*,
January 1998 and January 1999**

Country	Currency	Currency Exchanged for \$1, January 1998	Currency Exchanged for \$1, January 1999
Britain	Pound	0.58	0.59
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Japan	Yen	121.50	105.15
Mexico	Peso	7.24	9.44
Spain	Peseta	145.29	140.00
Sweden	Krona	7.22	7.14

In January 1998, a traveler exchanged a total of \$1,000 for French francs and German marks at Bank *W*. If the number of dollars exchanged for francs was 3 times the number of dollars exchanged for marks, how many marks were received?

- 145
- 195
- 213
- 343
- 430

Select one answer choice.

Section 4 of 6 | Question 16 of 20

Questions 14 to 16 are based on the following data.

**Selected Currency Exchange Rates
for One United States Dollar at Bank *W*,
January 1998 and January 1999**

Country	Currency	Currency Exchanged for \$1, January 1998	Currency Exchanged for \$1, January 1999
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Japan	Yen	121.50	105.15
Mexico	Peso	7.24	9.44
Spain	Peseta	145.29	140.00
Sweden	Krona	7.22	7.14

Let s be the number of countries listed for which the absolute value of the difference between the currencies exchanged for \$1 in January 1998 and in January 1999 was greater than 0.1, and let t be the number of the other countries listed. What is the value of $\frac{s}{t}$?

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

If $x = \sqrt{10}$, what is the value of $(5\sqrt{10} + x)^2$?

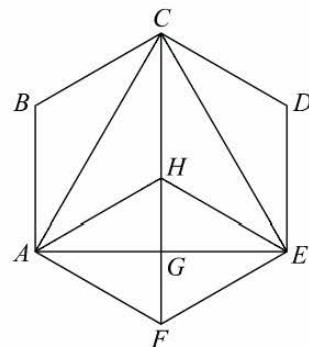
Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

A certain code used for communication consists of sequences of characters, where each character is a dot or a dash. If all possible sequences of 2 characters, 3 characters, and 4 characters are in the code, which of the following statements are true about the sequences in the code?

Indicate all such statements.

- There are 4 different sequences of 2 characters each.
- There are 8 different sequences of 3 characters each.
- There are 16 different sequences of 4 characters each.

Select one or more answer choices.



In the figure shown, $ABCDEF$ is a regular hexagon. Point H is equidistant from each vertex of $ABCDEF$ and angle EGH is a right angle. What is the ratio of the area of triangle EGH to the area of triangle ACE to the area of $ABCDEF$?

- 1 to 2 to 6
- 1 to 3 to 12
- 1 to 4 to 16
- 1 to 5 to 10
- 1 to 6 to 12

Select one answer choice.

For a positive integer n , when $2n + 3$ is divided by 11, the remainder is 3. What is the remainder when $n + 15$ is divided by 11?

- 0
- 1
- 2
- 3
- 4

Select one answer choice.

Of the total dollar value of Marcy's investments, 40 percent is invested in real estate, and 30 percent of the dollar value of her real estate investments is invested in condominiums.

Quantity A

The percent of the total dollar value of Marcy's investments that is not invested in condominiums

Quantity B

80%

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

Select one answer choice.

A sequence consists of 7 consecutive even integers listed from least to greatest.
The sum of the first 4 integers is 52.

Quantity A

The sum of the last 4 integers in the sequence

Quantity B

76

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

Select one answer choice.

Quantity A

In the xy -plane, the x -intercept of the line determined by the equation $y = x + 1$

Quantity B

0

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

Select one answer choice.

$$1 + 2x > -3$$

Quantity A x Quantity B -1.999

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

Select one answer choice.

$$x^4y^3z^2 < 0$$

Quantity A xyz Quantity B

0

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

Select one answer choice.

The area of a circular region with radius r is 5π .

Quantity A

The area of a circular region with
radius $3r$

Quantity B

45π

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

Select one answer choice.

n is a positive integer, and the remainder when 23 is divided by n is 2.

Quantity A

n

Quantity B

8

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

Select one answer choice.

A customer ordered 391 identical handbags and must choose a shipping plan. The shipper will use any combination of containers of sizes that each hold up to 20 handbags, up to 12 handbags, and up to 5 handbags. The shipping costs for these container sizes are \$3, \$2, and \$1, respectively. At most one of the containers will be shipped holding less than the maximum number of handbags for that container. For the total shipping cost, the cost of using only the containers that hold up to 5 handbags is how much greater than the least possible cost?

- \$16
- \$17
- \$18
- \$19
- \$20

Select one answer choice.

The sum of a set of n numbers is S . If each of the n numbers is increased by 3, then multiplied by 6, then decreased by 7, what is the sum of the new set of n numbers, in terms of n and S ?

- $3S + 7n$
- $6S - 4n$
- $6S + 4n$
- $6S + 11n$
- $7S - 3n$

Select one answer choice.

If x is a positive integer such that the units digit of x^3 is 3, what is the units digit of x^{15} ?

- 1
- 3
- 5
- 7
- 9

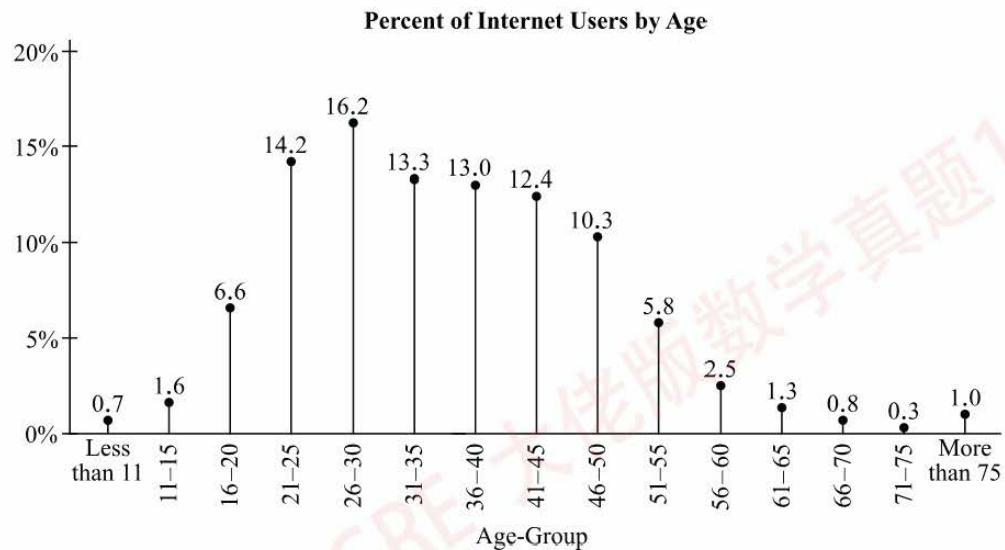
Select one answer choice.

$$N = 32^{19} - 32$$

What is the units digit of N ?

- 1
- 2
- 4
- 6
- 8

Select one answer choice.



According to the distribution shown above, which age-group contains the median age of Internet users?

 26-30 31-35 36-40 41-45 51-55

Select one answer choice.

A bag contains a total of 12 bagels consisting of 5 plain bagels, 3 garlic bagels, and 4 cinnamon raisin bagels. If 2 bagels are to be selected at random from the bag without replacement, what is the probability that both bagels will be garlic bagels?

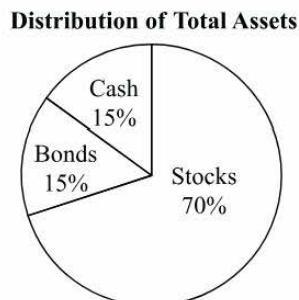
Give your answer as a fraction.

$$\frac{\boxed{}}{\boxed{}}$$

Enter your answer as a fraction, with the numerator and denominator in their respective answer boxes. Backspace to erase.

Section 6 of 6 | Question 14 of 20

Questions 14 to 16 are based on the following data.

Assets in Mutual Fund X, January 1, 2012

Total Assets: \$15 billion
(1 billion = 10^9)

Distribution of Stock Assets in Fund X

Foreign Stocks	25%
Domestic Stocks:	
Technology	15%
Finance	10%
Utilities	18%
Retail	10%
Health Care	17%
Other	5%

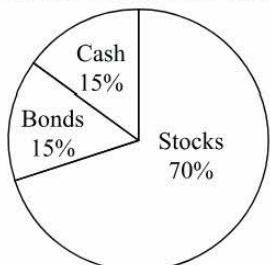
Approximately what was the amount of assets in domestic utilities stocks in Fund X?

- \$0.12 billion
- \$0.19 billion
- \$1.2 billion
- \$1.9 billion
- \$11.5 billion

Select one answer choice.

Section 6 of 6 | Question 15 of 20

Questions 14 to 16 are based on the following data.

Assets in Mutual Fund X, January 1, 2012**Distribution of Total Assets**

Total Assets: \$15 billion
(1 billion = 10^9)

Distribution of Stock Assets in Fund X

Foreign Stocks	25%
Domestic Stocks:	
Technology	15%
Finance	10%
Utilities	18%
Retail	10%
Health Care	17%
Other	5%

If the domestic health-care stock assets in Fund X consisted of 6 different stocks, approximately what was the average (arithmetic mean) amount of assets in each of these stocks?

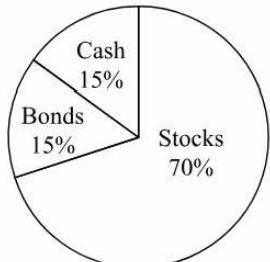
- \$200 million
- \$300 million
- \$325 million
- \$375 million
- \$400 million

Select one answer choice.

Section 6 of 6 | Question 16 of 20

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Questions 14 to 16 are based on the following data.

Assets in Mutual Fund X, January 1, 2012**Distribution of Total Assets**

Total Assets: \$15 billion

(1 billion = 10^9)**Distribution of Stock Assets in Fund X**

Foreign Stocks	25%
Domestic Stocks:	
Technology	15%
Finance	10%
Utilities	18%
Retail	10%
Health Care	17%
Other	5%

After January 1, 2012, the total assets of Fund X increased at the rate of \$150 million per month for 6 months, and the ratio of cash to bonds to stocks was maintained. By what amount did the value of the fund's bonds increase during these 6 months?

- \$135 million
- \$270 million
- \$300 million
- \$630 million
- \$900 million

Select one answer choice.

In quadrant I of the xy -plane, a triangle has vertices at (r, r) , $(4r, r)$, and $(r, 3r)$. For what value of r is the area of the triangle equal to 300 ?

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

The average (arithmetic mean) of the weights of a father and mother is twice the average of the weights of their 4 children. If the average weight of the 6 family members is 128 pounds, what is the average weight, in pounds, of the 4 children?

- 64
- 91
- 92
- 94
- 96

Select one answer choice.

A hexagon with sides of equal length and interior angles of equal measure is inscribed in a circle. If the perimeter of the hexagon is 12, what is the perimeter of an equilateral triangle inscribed in the same circle?

- 6 9 $2\sqrt{3}$ $3\sqrt{3}$ $6\sqrt{3}$

Select one answer choice.

List K consists of 9 positive integers. The median of the integers in K is 6, and the average (arithmetic mean) of the integers is 8. Which of the following could be the greatest integer in K ?

Indicate all such integers.

- 10
- 15
- 24
- 40
- 50

Select one or more answer choices.

Quantity A

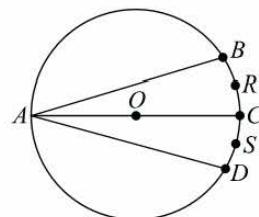
The number of multiples of 3 between 1 and 10,000

Quantity B

The number of multiples of 7 between 1 and 23,000

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

Select one answer choice.



For the circle with center O , the length of arc $BR C$ is greater than the length of arc CSD .

Quantity A

The length of line segment AB

Quantity B

The length of line segment AD

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

Select one answer choice.

0	3	0	2	2
8	10	2	9	1
9	14	10	11	15
12	13	4	7	4
17	2	13	23	22

In the table above, p percent of the numbers are less than or equal to 11, and q percent of the numbers are less than or equal to 3.

Quantity A

p

Quantity B

$100 - q$

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

Select one answer choice.

Triangle T is equilateral and has a height of 20, and triangle W is isosceles and has a height of 20.

Quantity A

The area of triangle T

Quantity B

The area of triangle W

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

Select one answer choice.

x and y are integers.

$$\frac{2^{x+y}}{2^{x-y}} = 4$$

Quantity A

y

Quantity B

1

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

Select one answer choice.

Last month in Company X , the ratio of the amount of money spent by the production department to the amount spent by the research department was 5 to 2, and the ratio of the amount of money spent by the sales department to the amount spent by the production department was 3 to 5. Last month the sales department spent s dollars.

Quantity A

The amount of money spent by the research department last month in Company X

Quantity B

$$\frac{2s}{3} \text{ dollars}$$

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

Select one answer choice.

Quantity A

The sum of the integers from 29 through 89

Quantity B

The sum of the integers from 32 through 90

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

Select one answer choice.

$$x > 0$$

$$x^2 \text{ is } \frac{1}{2} \text{ of } y^2.$$

Quantity A x Quantity B y

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

Select one answer choice.

If p is an even integer, which of the following must be an odd integer?

- $\frac{3p}{2}$
- $\frac{3p}{2} + 1$
- $\frac{3p^2}{2}$
- $\frac{3p^2}{2} + 1$
- p^3

Select one answer choice.

What is the least positive integer k such that $\frac{(4)(5)(6)(7)(8)(9) + 2k}{10}$ is an integer?

- 1
- 2
- 5
- 8
- 10

Select one answer choice.

Jack and Marie each have a collection of United States postage stamps. Of all the various United States postage stamps issued from 1900 to 2000, 60 percent are in Jack's collection and 75 percent are in Marie's collection. What is the greatest possible percent of all the various stamps issued from 1900 to 2000 that are not in either of the two collections?

- 10%
- 15%
- 25%
- 35%
- 40%

Select one answer choice.

2, 1, 4, 2, 1, 4, 2, 1, 4, 2, 1, 4, ...

In the sequence shown, the first 3 terms are 2, 1, and 4, and the numbers 2, 1, 4 repeat indefinitely. What is the sum of the 138th and 139th terms?

- 2
- 3
- 4
- 5
- 6

Select one answer choice.

A gardening store sells four different brands of grass seed priced at \$23.40, \$29.99, \$42.50, and \$31.75 per bag, respectively. What is the range of the prices per bag of the four brands of grass seed?

\$

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

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Section 2 of 6 | Question 14 of 20

Questions 14 to 16 are based on the following data.

**Selected Data for Men and Women over Age 65
Living in the United States, 1995**

Category	Men	Women
Marital Status:		
Single (never married)	4.2%	4.2%
Married	77.1%	42.5%
Widowed	13.5%	47.3%
Divorced	5.2%	6.0%
Household Status:		
Living alone	17.3%	41.8%
Living with family members	74.6%	40.6%
Living with nonfamily members	8.1%	17.6%
Below poverty level	7.2%	14.9%
In the labor force	16.8%	8.8%

Note: In 1995 there were 13.0 million men and 18.3 million women over age 65 in the United States.

How many of the four marital-status categories contained between 1.3 million and 6.5 million men over age 65?

- None
- One
- Two
- Three
- Four

Select one answer choice.

Section 2 of 6 | Question 15 of 20

Questions 14 to 16 are based on the following data.

**Selected Data for Men and Women over Age 65
Living in the United States, 1995**

Category	Men	Women
Marital Status:		
Single (never married)	4.2%	4.2%
Married	77.1%	42.5%
Widowed	13.5%	47.3%
Divorced	5.2%	6.0%
Household Status:		
Living alone	17.3%	41.8%
Living with family members	74.6%	40.6%
Living with nonfamily members	8.1%	17.6%
Below poverty level	7.2%	14.9%
In the labor force	16.8%	8.8%

Note: In 1995 there were 13.0 million men and 18.3 million women over age 65 in the United States.

Based on the information given, which of the following statements are true?

Indicate all such statements.

- There were more single women over age 65 than single men over age 65.
- The fraction of the number of men over age 65 who were living with family members was less than $\frac{3}{4}$.
- The number of women over age 65 living alone exceeded the number of men over age 65 living alone by more than 2 million.

Select one or more answer choices.

Section 2 of 6 | Question 16 of 20

Questions 14 to 16 are based on the following data.

**Selected Data for Men and Women over Age 65
Living in the United States, 1995**

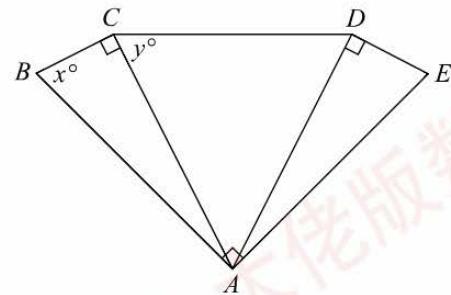
Category	Men	Women
Marital Status:		
Single (never married)	4.2%	4.2%
Married	77.1%	42.5%
Widowed	13.5%	47.3%
Divorced	5.2%	6.0%
Household Status:		
Living alone	17.3%	41.8%
Living with family members	74.6%	40.6%
Living with nonfamily members	8.1%	17.6%
Below poverty level	7.2%	14.9%
In the labor force	16.8%	8.8%

Note: In 1995 there were 13.0 million men and 18.3 million women over age 65 in the United States.

If 3.5 percent of the women over age 65 in the labor force were unemployed, which of the following is closest to the percent of all women over age 65 who were employed?

- 5.3%
- 6.5%
- 7.8%
- 8.2%
- 8.5%

Select one answer choice.



Triangles ABC and AED are congruent, where $BC = DE$. If $y = 63$, what is the value of x ?

$$x = \boxed{\quad}$$

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

The price of n nails is d dollars. At this rate, what is the price of $n + 600$ nails, in dollars?

$\frac{600n + n^2}{d}$

$\frac{600nd + d}{n}$

$\frac{600d + nd}{n}$

$\frac{nd + d}{600n}$

$\frac{600d + n}{d}$

Select one answer choice.

A rectangular playing field with a perimeter of $140t + 10$ feet has length $40t$ feet, where $10 \leq t \leq 12$. Which of the following values could be the width, in feet, of the field?

Indicate all such values.

- 300
- 325
- 340
- 370
- 375

Select one or more answer choices.

If an integer greater than 100 and less than 1,000 is to be selected at random, what is the probability that the integer selected will be a multiple of 7?

- $\frac{142}{999}$
- $\frac{142}{900}$
- $\frac{142}{899}$
- $\frac{128}{900}$
- $\frac{128}{899}$

Select one answer choice.

$$x + y = 10$$

$$x > 6$$

Quantity A y Quantity B

4

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

Select one answer choice.

On the number line, the points P , Q , R , and S have coordinates -3 , -2 , 4 , and 6 , respectively.

Quantity A

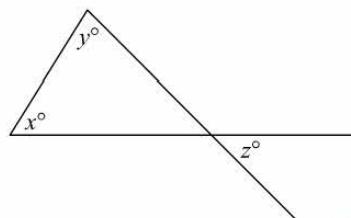
The coordinate of the midpoint of line segment PS

Quantity B

The coordinate of the midpoint of line segment QR

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

Select one answer choice.



In the figure above, $y + z = 122$.

Quantity A

x

Quantity B

60

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

Select one answer choice.

The operation \diamond is defined for all positive two-digit integers m and p as follows. $m \diamond p$ is the sum of m and the integer obtained by interchanging the units digit and the tens digit of p . For example, $12 \diamond 53 = 12 + 35 = 47$.

Quantity A

$$(17 \diamond 36) \diamond 36$$

Quantity B

$$140$$

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

Select one answer choice.

$$a > \frac{1}{3}$$

Quantity A

$$3(-a)$$

Quantity B

$$-1$$

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

Select one answer choice.

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 $1 \leq i \leq n$.

Each book that a bookstore sold last year was either new or used. The bookstore sold new books for \$80 each and used books for \$40 each. The standard deviation of the prices of the books sold last year was \$16.

Quantity A

The fraction of the books sold last year that were new

Quantity B

$\frac{1}{2}$

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

Select one answer choice.

r is an 8-digit positive integer.
 s is an r -digit positive integer.
 t is an s -digit positive integer.

Quantity A

rs

Quantity B

t

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

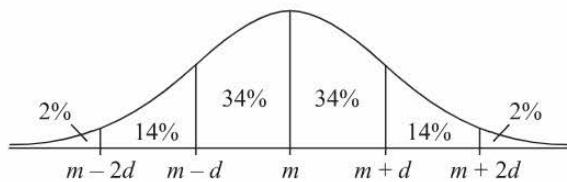
Select one answer choice.

In a group of 50 students, 15 students enjoy board games and 20 students enjoy video games. Which of the following could be the number of students who enjoy both board games and video games?

Indicate all such numbers.

- 0
- 5
- 10
- 15
- 20
- 25
- 30
- 35

Select one or more answer choices.



The figure shows a normal distribution with mean m and standard deviation d , including approximate percents of the distribution corresponding to the six regions shown.

The distribution of the scores of 1,000 students on a final exam, including Angelique's score, is approximately normal with mean 60 and standard deviation 13.5. If Angelique's score on the exam was 87, which of the following is the best estimate of the number of students who had a score that was less than Angelique's score?

- 600
- 670
- 840
- 870
- 980

Select one answer choice.

Each weekday, oil is bought and sold in a market. Each morning, there is an opening price per barrel of oil, and the price changes during the day. When the market closes, the closing price, rounded to the nearest \$0.01, becomes the opening price the next day. The opening price last Monday was \$50.02, and the closing price that day was 3 percent greater than the opening price. On each of Tuesday and Wednesday, the closing price was also 3 percent greater than the opening price. On each of Thursday and Friday, the closing price was 2 percent less than the opening price. Approximately what was the closing price on Friday?

- \$50.00
- \$50.50
- \$51.50
- \$52.00
- \$52.50

Select one answer choice.

Cleaner	Charge for Initial Time	Charge for Subsequent Time
<i>J</i>	\$40 per hour for first 4-hour period	\$25 per hour
<i>K</i>	\$50 per hour for first 3-hour period	\$20 per hour

Two cleaning services, *J* and *K*, have different charging structures for cleaning houses based on the time spent cleaning, as shown in the table. The two services provided the following estimates for a certain cleaning job: *J* provided an estimate of 10 hours and *K* provided an estimate of 12 hours. Which of the following changes to one of the estimates would make the total charge for each estimate the same?

- J* changes its estimate from 10 hours to 9 hours.
- J* changes its estimate from 10 hours to 11 hours.
- J* changes its estimate from 10 hours to 12 hours.
- K* changes its estimate from 12 hours to 10 hours.
- K* changes its estimate from 12 hours to 11 hours.

Select one answer choice.

In the xy -plane, the parabola $y = -x^2 + 6$ and the line $y = x + 4$ intersect at two points. What is the midpoint of the line segment connecting the two points of intersection?

- $\left(-\frac{1}{2}, \frac{7}{2}\right)$
- $\left(-\frac{1}{2}, \frac{11}{2}\right)$
- $\left(\frac{1}{2}, \frac{9}{2}\right)$
- $\left(\frac{1}{2}, \frac{11}{2}\right)$
- $\left(\frac{1}{2}, \frac{13}{2}\right)$

Select one answer choice.

In the xy -plane, the vertices of an equilateral triangle are $(0, 1)$, $(4, 3)$, and (a, b) .

Which of the following statements individually provide(s) sufficient additional information to determine the vertex (a, b) ?

Indicate all such statements.

- $2b - a > 2$
- $a < 2$
- $a^2 + (b - 1)^2 = 20$

Select one or more answer choices.

Section 4 of 6 | Question 14 of 20

Questions 14 to 16 are based on the following data.

**Selected Currency Exchange Rates
for One United States Dollar at Bank *W*,
January 1998 and January 1999**

Country	Currency	Currency Exchanged for \$1, January 1998	Currency Exchanged for \$1, January 1999
Britain	Pound	0.58	0.59
France	Franc	5.73	5.51
Germany	Mark	1.72	1.64
India	Rupee	33.32	36.60
Italy	Lira	1,691.00	1,626.00
Japan	Yen	121.50	105.15
Mexico	Peso	7.24	9.44
Spain	Peseta	145.29	140.00
Sweden	Krona	7.22	7.14

In January 1998, the number of Spanish pesetas exchanged for \$350 is closest to which of the following fractions of the number of Italian lire exchanged for \$450 ?

 $\frac{1}{15}$
 $\frac{2}{25}$
 $\frac{2}{3}$
 $\frac{3}{4}$
 $\frac{7}{9}$

Select one answer choice.

Section 4 of 6 | Question 15 of 20

Questions 14 to 16 are based on the following data.

**Selected Currency Exchange Rates
for One United States Dollar at Bank *W*,
January 1998 and January 1999**

Country	Currency	Currency Exchanged for \$1, January 1998	Currency Exchanged for \$1, January 1999
Britain	Pound	0.58	0.59
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Japan	Yen	121.50	105.15
Mexico	Peso	7.24	9.44
Spain	Peseta	145.29	140.00
Sweden	Krona	7.22	7.14

In January 1999, the number of Indian rupees exchanged for \$150 was approximately what percent greater than the number of Mexican pesos exchanged for \$100 ?

- 30%
- 50%
- 80%
- 300%
- 500%

Select one answer choice.

Section 4 of 6 | Question 16 of 20

Questions 14 to 16 are based on the following data.

**Selected Currency Exchange Rates
for One United States Dollar at Bank *W*,
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Country	Currency	Currency Exchanged for \$1, January 1998	Currency Exchanged for \$1, January 1999
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India	Rupee	33.32	36.60
Italy	Lira	1,691.00	1,626.00
Japan	Yen	121.50	105.15
Mexico	Peso	7.24	9.44
Spain	Peseta	145.29	140.00
Sweden	Krona	7.22	7.14

For which of the currencies shown was 100 units of the currency exchanged for an amount between \$10 and \$100 in January 1998 ?

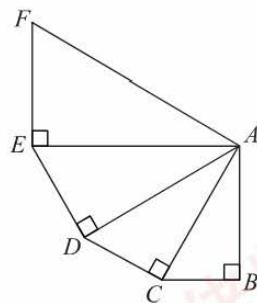
Indicate all such currencies.

- Pound
- Franc
- Mark
- Rupee
- Lira
- Yen
- Peso
- Peseta
- Krona

Select one or more answer choices.

If $x = 6\sqrt{5}$, what is the value of $(4\sqrt{5} + x)^2$?

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.



In the figure shown, the measure of angle BAC is 30 degrees. Triangles ABC , ACD , ADE , and AEF are similar. The area of triangle AEF is how many times the area of triangle ABC ?

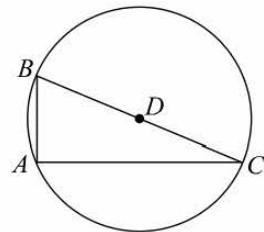
- $\frac{16}{9}$
- $\frac{64}{27}$
- $\frac{27}{8}$
- $2\sqrt{3}$
- $3\sqrt{3}$

Select one answer choice.

What is the number of positive integers n such that $n < 165$ and when 6^n is divided by 100, the remainder is 36?

- 27
- 32
- 33
- 40
- 41

Select one answer choice.



In the figure shown, D is the center of the circle whose area is 169π . If the area of triangle ABC is 120, what is the perimeter of ABC ?

- 45
- 50
- 52
- 58
- 60

Select one answer choice.

The terms a_n of a certain sequence are defined by $a_n = \frac{3}{n(n+1)}$ for all integers $n \geq 1$.

Quantity A

The sum of the first 100,000 terms of the sequence

Quantity B

3

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

Select one answer choice.

Number of defective computer chips per box	0	1	2	3	4 or more
Frequency	24	14	10	40	12

During a quality-control check, 100 boxes of computer chips were examined. The number of defective computer chips per box and the corresponding frequencies are summarized in the table.

Quantity A

The median number of defective computer chips per box for the 100 boxes

Quantity B

3

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

Select one answer choice.

Set S consists of the consecutive even integers from 2 to 30, inclusive.

Quantity A

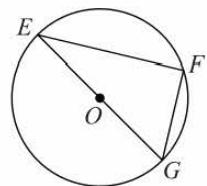
The number of prime numbers in set S

Quantity B

1

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

Select one answer choice.



Triangle EFG is inscribed in the circle with center O and radius 4.

Quantity A

The area of triangular region EFG

Quantity B

12

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

Select one answer choice.

x and y are integers and $x > y$.

$$x^2 + y^2 = 25$$

Quantity A

x

Quantity B

4

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

Select one answer choice.

k is randomly selected from the set of integers from 1 to 100, inclusive.

Quantity A

The probability that
 $(k)(k+1)(k+2)(k+3)(k+4)$ is divisible
by 20

Quantity B

1

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

Select one answer choice.

For all positive integers n , the function f is defined by the equation $f(n) = \frac{n(n+1)}{2}$.
 m is a positive integer.

Quantity A

$$(-1)^{f(4m+1)}$$

Quantity B

$$(-1)^{f(4m+2)}$$

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

Select one answer choice.

Of the students at a certain university, 40 percent are graduate students, and the rest are undergraduate students. If 15 percent of the graduate students and 30 percent of the undergraduate students are pursuing an engineering degree, what percent of the students pursuing an engineering degree are graduate students?

- 6% $16\frac{2}{3}\%$ 20% 25% $33\frac{1}{3}\%$

Select one answer choice.

A certain type of material has a mass of 2.5 grams per cubic centimeter. A bar of this material in the shape of a rectangular solid has a mass of 800 grams. If the bar is 3 centimeters wide and is 3 times as long as it is high, approximately how many centimeters high is the bar?

- 6
- 9
- 18
- 27
- 35

Select one answer choice.

Which of the following values of x satisfy the inequality $6x^2 + 5x < 4$?

Indicate all such values.

- $-\frac{5}{3}$
- $-\frac{1}{3}$
- $\frac{2}{3}$
- $\frac{5}{3}$

Select one or more answer choices.



Points A , B , C , and D are equally spaced on line segment AD , as shown. If $\frac{1}{3}$ of segment AB , all of segment BC , and $\frac{2}{5}$ of segment CD were removed, what fraction of segment AD would remain?

- $\frac{4}{15}$ $\frac{7}{15}$ $\frac{16}{45}$ $\frac{19}{45}$ $\frac{26}{45}$

Select one answer choice.

Professor Lopez is teaching three different courses with an average (arithmetic mean) enrollment of 32 students per course. If 5 students are taking two of these courses, 3 other students are taking all three courses, and all of the others are taking only one of the courses, what is the total number of different students enrolled in the three courses?

- 77
- 80
- 83
- 85
- 88

Select one answer choice.

If $\frac{1}{x} + \frac{1}{y} = 4.2$ and $\frac{1}{x} - \frac{1}{y} = 3.5$, what is the value of $\frac{1}{x^2} - \frac{1}{y^2}$?

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

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Section 6 of 6 | Question 14 of 20

00:34:30 ⏹ Hide Time

Questions 14– 16 are based on the following data.



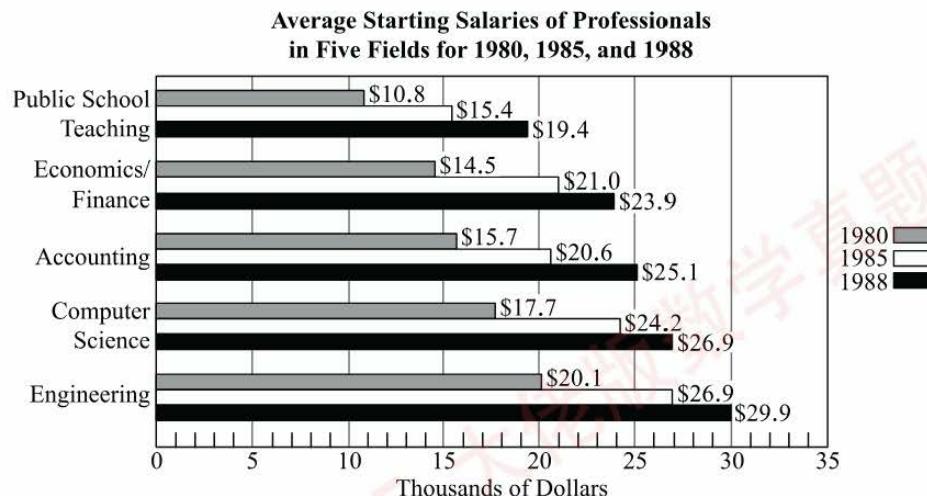
In which of the five fields did the average starting salary for professionals increase by more than 25 percent from 1985 to 1988 ?

 Public school teaching Economics/finance Accounting Computer science Engineering

Select one answer choice.

Section 6 of 6 | Question 15 of 20

Questions 14– 16 are based on the following data.



If the average starting salary of economics/finance professionals was approximately 40 percent greater in 1980 than it was in 1975, what was the approximate starting salary for this profession in 1975?

- \$8,700 \$10,400 \$12,000 \$14,100 \$20,300

Select one answer choice.

Section 6 of 6 | Question 16 of 20

00:34:25 ⏹ Hide Time

Questions 14– 16 are based on the following data.



In 1988 the ratio of the average starting salary of computer science professionals in Company X to the average for all starting computer science professionals was $4 : 3$. What was the approximate average starting salary of computer science professionals in Company X that year?

- \$20,000 \$22,500 \$32,000 \$33,500 \$36,000

Select one answer choice.

The 25 students in an English class took a literature test. Jovan, one of the 25 students, originally received a score on the test that was 6.2 points above the average (arithmetic mean) score for the 25 students. Each student was then given an opportunity to earn 10 additional points on the test by completing an extra project, and the average was then recalculated. If Jovan earned the 10 additional points and no other student earned additional points, Jovan's new score was how many points above the recalculated average score?

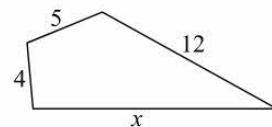
 points

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

If n is an integer, what is the least possible value of $3^n + (3)(3^{-n})$?

- 1
- 2
- 3
- $3\frac{1}{3}$
- 4

Select one answer choice.



For the convex polygon above, which of the following intervals contains all possible values of x ?

- $1 < x < 17$
- $3 < x < 21$
- $4 < x < 12$
- $4 < x < 21$
- $7 < x < 21$

Select one answer choice.

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

- $x = 1$
- $|x| < 1$
- $|x| < 2$
- $|x + 1| < 1$
- $|x - 1| < 1$

Select one answer choice.

$$x < y < z$$

On the number line, the three points X , Y , and Z have coordinates x , y , and z , respectively. The distance between points X and Y is equal to the distance between points Y and Z .

Quantity A

$$\frac{z-x}{2} + x$$

Quantity B

$$y$$

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

Select one answer choice.

$$\begin{aligned}x &\geq 0 \\y &\geq 0\end{aligned}$$

Quantity A

$$\sqrt{2x} \left(\sqrt{2y} \right)$$

Quantity B

$$2\sqrt{xy}$$

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

Select one answer choice.

x is a positive integer.

$$g > 0$$

Quantity A

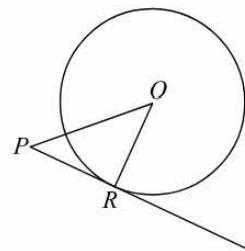
$$g^x + g^{-x}$$

Quantity B

1

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

Select one answer choice.



The circle with center O is intersected by PR only at point R .

Quantity A

The measure of angle POR

Quantity B

The measure of angle OPR

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

Select one answer choice.

For all integers a and b greater than 1, the operation $a \odot b$ is defined as follows.

$$a \odot b = a! + b!$$

Quantity A

$$(2 \odot 3) \odot 4$$

Quantity B

$$2 \odot (3 \odot 4)$$

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

Select one answer choice.

$$\begin{aligned}3 < x^2 < 27 \\6 < y^2 < 69\end{aligned}$$

Quantity A

The least possible value of the product xy ,
where x and y are integers satisfying the
inequalities

Quantity B

-40

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

Select one answer choice.

In the distribution of measurements of the variable x , the mean is 56 and the measurement r lies between the 65th and 70th percentiles. In the distribution of measurements of the variable y , the mean is 56 and the measurement t lies between the 75th and 80th percentiles.

Quantity A

r

Quantity B

t

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

Select one answer choice.

For a sale, a store reduced the price of each coat by 40 percent and reduced the price of each suit by 20 percent.

Quantity A

The percent reduction of the total price of
2 coats and 1 suit

Quantity B

30%

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

Select one answer choice.

A rectangular garden has a perimeter of 28 meters and an area of 48 square meters. What is the ratio of the length of the shorter side of the rectangle to the length of the longer side of the rectangle?

- 2 to 3
- 3 to 4
- 4 to 5
- 5 to 6
- 6 to 7

Select one answer choice.

If $0 < a < b < c < d$, which of the following lists of numbers has the greatest standard deviation?

- a, b, c, d
- $a + 3, b + 3, c + 3, d + 3$
- $a + 6, b + 6, c + 6, d + 6$
- $3a, 3b, 3c, 3d$
- $\frac{a}{2}, \frac{b}{2}, \frac{c}{2}, \frac{d}{2}$

Select one answer choice.

If $xz \neq 0$, then $\frac{3w}{2x} - \frac{y}{4z} =$

- $\frac{6wz - xy}{4xz}$ $\frac{6w - xy}{4xz}$ $\frac{3w - xy}{4xz}$ $\frac{12wz - y}{8xz}$ $\frac{3w - y}{8xz}$

Select one answer choice.

The length of the hypotenuse of a certain right triangle is $2x + 1$, and the lengths of the other sides are x and $x + 2$. What is the value of x ?

- 1
- $\frac{\sqrt{2}}{2}$
- $\frac{\sqrt{3}}{3}$
- $\sqrt{\frac{2}{3}}$
- $\sqrt{\frac{3}{2}}$

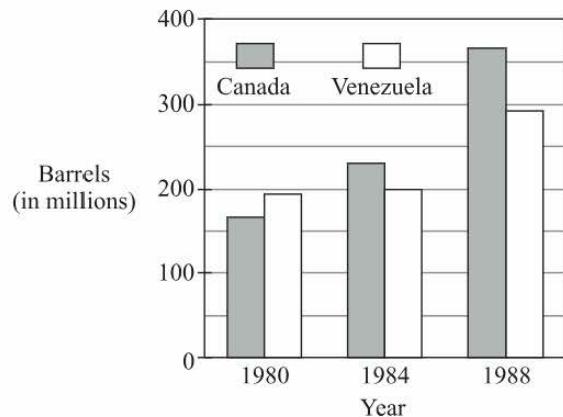
Select one answer choice.

Machine X assembles toys at a constant rate of 1 toy every $\frac{25}{4}$ minutes, and machine Y assembles toys at a constant rate of 10 toys every 50 minutes. If machines X and Y work simultaneously and independently at their respective constant rates, what is the total number of toys they assemble in 100 minutes?

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

Section 2 of 6 | Question 14 of 20

Questions 14 to 16 are based on the following data.

Petroleum Exports for Canada and Venezuela in 1980, 1984, and 1988

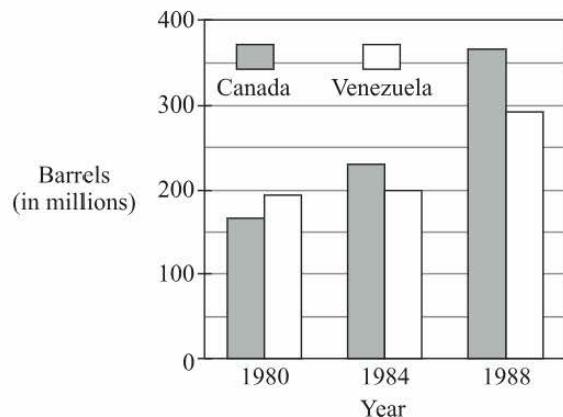
For the three years shown, total Canadian petroleum exports exceeded total Venezuelan petroleum exports by approximately how many million barrels?

- 25
- 85
- 130
- 180
- 260

Select one answer choice.

Section 2 of 6 | Question 15 of 20

Questions 14 to 16 are based on the following data.

Petroleum Exports for Canada and Venezuela in 1980, 1984, and 1988

1 barrel = 42 gallons

1 billion = 1,000 million

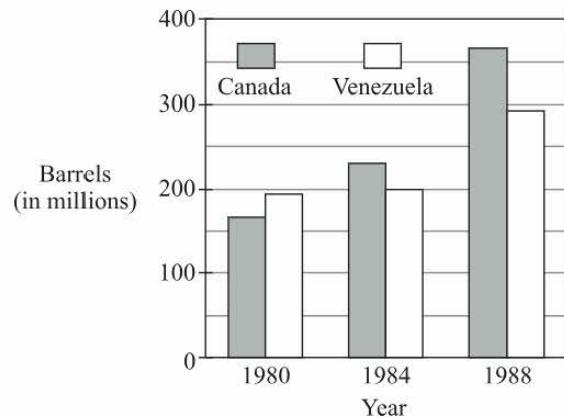
Which of the following is closest to Canada's petroleum exports in 1980, in billions of gallons?

- 7
- 5
- 4
- 0.7
- 0.4

Select one answer choice.

Section 2 of 6 | Question 16 of 20

Questions 14 to 16 are based on the following data.

Petroleum Exports for Canada and Venezuela in 1980, 1984, and 1988

Canada and Venezuela increased their combined petroleum exports by approximately what percent from 1984 to 1988?

- 50%
- 70%
- 80%
- 100%
- 150%

Select one answer choice.

How many five-digit positive integers can be formed by using the digits 1, 2, and 4 if the digit 1 is used once and each of the digits 2 and 4 are used twice?

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

How many of the 900 positive 3-digit integers have a units digit of 2 and are the square of an integer?

- 0
- 6
- 12
- 15
- 30

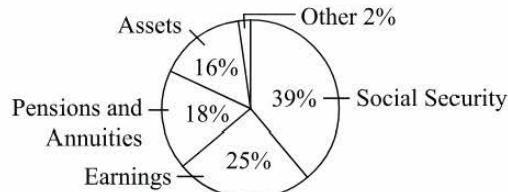
Select one answer choice.

A certain computer program generates a sequence of numbers $P_1, P_2, P_3, \dots, P_n, \dots$ according to the rules

$P_1 = 1$, $P_2 = 2$, and for each integer $n > 2$, $P_n = \left(\frac{P_{n-1}}{P_{n-2}}\right)^2$. What is the value of P_5 ?

- $\frac{1}{256}$
- $\frac{1}{16}$
- 1
- 2
- 4

Select one answer choice.



Greg's income last year was \$45,000. The graph above shows the distribution of his income, by income source. Based on the information given, which of the following statements about his income last year are true?

Indicate all such statements.

- His income from earnings was \$11,250.
- More than $\frac{2}{5}$ of his income was from assets and earnings combined.
- His income from social security was 56 percent greater than his income from earnings.

Select one or more answer choices.

The weight of a collection of n coins is 300 ounces. Each of the coins has the same weight, and the weight of each coin is $\frac{1}{60}$ of the weight of the collection.

Quantity A

n

Quantity B

50

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

Select one answer choice.

Quantity A

The average (arithmetic mean) of the numbers
 $3m$, $-3m$, and $|3m|$

Quantity B $|m|$

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

Select one answer choice.

$$y > |x| \text{ and } xy < 0$$

Quantity A

$$x + y$$

Quantity B

$$0$$

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

Select one answer choice.

x and y are positive integers, and $x = 10y + 2$.

Quantity A

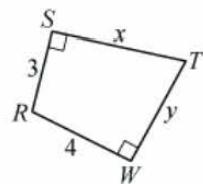
The value of the tens digit of x

Quantity B

The value of the units digit of y

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

Select one answer choice.

Quantity A

$$x^2$$

Quantity B

$$y^2 + 7$$

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

Select one answer choice.

When the positive integer t is divided by 5, the remainder is 3, and when t is divided by 6, the remainder is 2.

Quantity A

t

Quantity B

38

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

Select one answer choice.

k is a two-digit prime number.

Quantity A

The greatest prime factor of $40k$

Quantity B

The greatest prime factor of $39k$

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

Select one answer choice.

For each of the last 5 years, the population of a colony of beetles increased by 8 percent of the preceding year's population. If P represents the current population of the colony, which of the following best represents the population 5 years ago, in terms of P ?

- (5)(1.08 P^{-1})
- (1.08) $^{-5}P^{-1}$
- (1.08 P) $^{-5}$
- (1.08) ^{-5}P
- (1.08) $^{-5}P^5$

Select one answer choice.

It costs d dollars to buy n nails. At this rate, what is the cost of $n + 1,850$ nails, in dollars?

$\frac{1,850nd + d}{n}$

$\frac{nd + d}{1,850n}$

$\frac{1,850d + n}{d}$

$\frac{1,850n + n^2}{d}$

$\frac{1,850d + nd}{n}$

Select one answer choice.

If a triangle and a square have exactly n points in common, which of the following CANNOT be the value of n ?

- 2
- 4
- 5
- 6
- 8

Select one answer choice.

Time Spent (in weeks)	Number of Members
1	x
2	9
3	8
4	5

Each member of a team spent some time working on project Q . The table summarizes the time, in weeks, that the members of the team spent working on project Q , where x represents the number of members who spent 1 week working on project Q . If the average (arithmetic mean) time spent per member was 2 weeks, what is the value of x ?

- 2
- 8
- 12
- 15
- 18

Select one answer choice.

Which of the following is equal to $\frac{1}{5}(30^7)$?

- 6^5 6^7 $5(30)^6$ $6(30)^6$ $6(30)^7$

Select one answer choice.

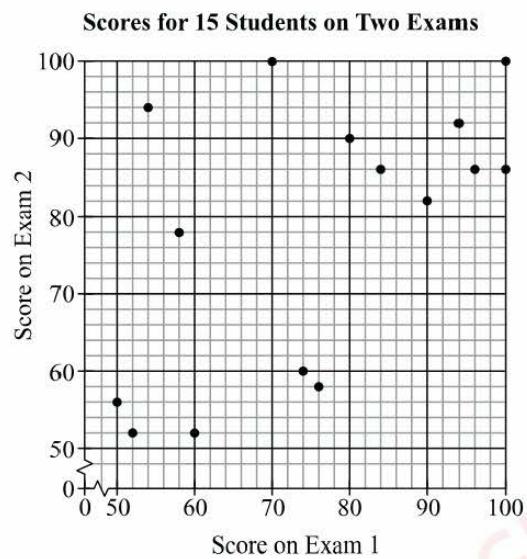
The probability is 0.4 that none of the 3 college courses that Louise wants to take will be available at registration. What is the probability that at least one of the courses that Louise wants to take will be available at registration?

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

Section 4 of 6 | Question 14 of 20

00:34:25 ⏳ Hide Time

Questions 14 to 16 are based on the following data.



Note: The two coordinates of each dot on the graph represent the two exam scores of a student, where each score is a whole number.

The median of the scores on exam 1 was how much higher or lower than the median of the scores on exam 2?

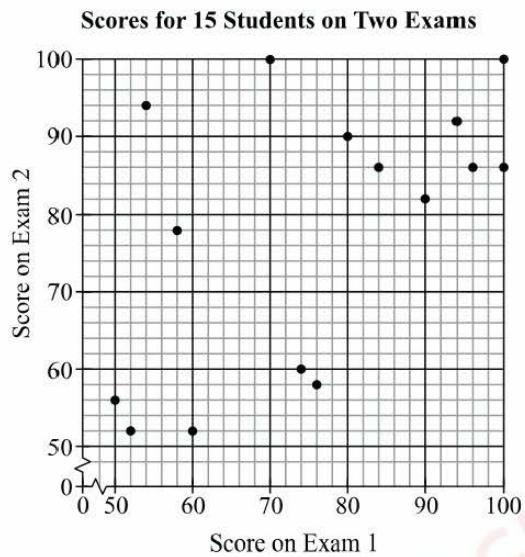
- 10 lower
- 6 lower
- 2 higher
- 4 higher
- 8 higher

Select one answer choice.

Section 4 of 6 | Question 15 of 20

00:34:23 ⏳ Hide Time

Questions 14 to 16 are based on the following data.



Note: The two coordinates of each dot on the graph represent the two exam scores of a student, where each score is a whole number.

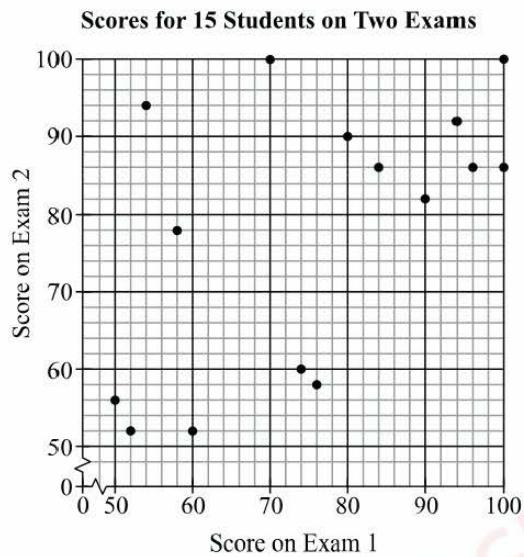
One of the 15 students had a total score of 182 on the two exams. What is the weighted mean of that student's two scores if the score on exam 1 has a weight of 40 percent and the score on exam 2 has a weight of 60 percent?

- 89
- 90
- 91
- 92
- 93

Select one answer choice.

Section 4 of 6 | Question 16 of 20

Questions 14 to 16 are based on the following data.



Note: The two coordinates of each dot on the graph represent the two exam scores of a student, where each score is a whole number.

A pair of students is to be chosen to write a certain report, and each of the chosen students must have a total score of 170 or higher on the two exams. How many different pairs of students meet this requirement?

- 6
- 8
- 16
- 21
- 28

Select one answer choice.

If the degree measures of the three angles of a triangle are consecutive even integers, what is the measure of the smallest angle of the triangle?

 degrees

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

The function h is defined by $h(x) = 10^{x+1}$ for all integers x . Which of the following is equal to $\frac{h(x+1) - h(x)}{3}$ for all integers x ?

- $h(x)$ $3h(x)$ $\frac{h(x)}{3}$ $\frac{10}{3}$ $\frac{100}{3}$

Select one answer choice.

Section 4 of 6 | Question 19 of 20

00:34:13 Hide Time

Which of the following is equivalent to $\left(\frac{1}{3}\right)^{-2} + \left(\frac{1}{4}\right)^{-2}$?

$\left(\frac{1}{12}\right)^{-2}$

$\left(\frac{1}{7}\right)^{-2}$

$\left(\frac{1}{5}\right)^{-2}$

$\left(\frac{2}{7}\right)^{-2}$

$\left(\frac{1}{2}\right)^{-2}$

Select one answer choice.

In a list of 25 different numbers, the average (arithmetic mean) of all the numbers greater than the median is 200, and the average of all the numbers less than the median is 100. If the average of the 25 numbers is an integer, which of the following could be the value of the median?

Indicate all such values.

- 120
- 125
- 140
- 145
- 160
- 175
- 180

Select one or more answer choices.

Quantity A

$$\frac{10^{56}}{10^{60} + 10^{110}}$$

Quantity B

$$\frac{10^{60}}{10^{56} + 10^{110}}$$

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

Select one answer choice.

$$x < -1$$

Quantity A

$$3^{2x}$$

Quantity B

$$3^{3x}$$

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

Select one answer choice.

Company X has a total of 100 employees. The average (arithmetic mean) annual salary of the employees who have at least 10 years of experience is \$40,000, and the average annual salary of the employees who have less than 10 years of experience is \$35,000.

Quantity A

The average annual salary of the
100 employees at Company X

Quantity B

\$37,500

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

Select one answer choice.

Quantity A

$$16\frac{2}{3} \text{ percent of } \frac{17}{10}$$

Quantity B

$$170 \text{ percent of } \frac{1}{6}$$

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

Select one answer choice.

The lengths of two of the three sides of a right triangle are 4 and 5.

Quantity A

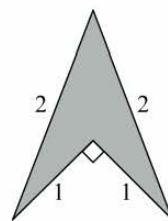
The area of the triangle

Quantity B

8

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

Select one answer choice.

Quantity A

The area of the shaded region

Quantity B

1

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

Select one answer choice.

$$|a + b| < c$$

Quantity A

$$|a + b + c|$$

Quantity B

$$2c$$

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

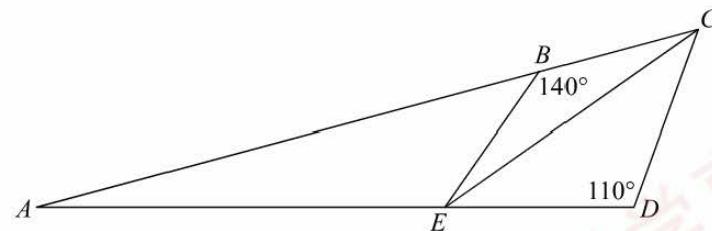
Select one answer choice.

If $x^2 + x - 20 = 0$, which of the following could be the value of x ?

Indicate all such values.

- 4
- 1
- 5

Select one or more answer choices.



In triangle ACD shown, $BC = BE$ and $DC = DE$. What is the measure of angle A ?

- 10°
- 15°
- 20°
- 25°
- 30°

Select one answer choice.

A figure consists of a semicircle and the diameter that connects the endpoints of the semicircle. If r is the radius of the semicircle and S is the perimeter of the figure, what is the value of $\frac{S}{r}$?

- $\pi + 2$ $\pi + 1$ π $\frac{\pi}{2} + 1$ $\frac{\pi}{2} + 2$

Select one answer choice.

If n is an integer greater than 1 and $n + 96$ is a prime number, what is the least possible value of n ?

- 2
- 3
- 4
- 5
- 7

Select one answer choice.

The lengths of 5 toothpicks produced on an assembly line were measured. These 5 measurements have a median of 1.35 inches as well as a range of 0.40 inch. Which of the following could be the 5 measurements, in inches?

- 1.20, 1.20, 1.20, 1.30, 1.60
- 1.20, 1.25, 1.25, 1.40, 1.45
- 1.25, 1.30, 1.35, 1.40, 1.40
- 1.27, 1.30, 1.35, 1.40, 1.67
- 1.33, 1.34, 1.35, 1.36, 1.37

Select one answer choice.

The sale price of a television set was 25 percent less than its original price. A customer who purchased the television set used a coupon that reduced the sale price by 10 percent and paid a 6 percent sales tax on the reduced sale price. If the customer paid a total of \$601.02, what was the original price of the television set?

- \$765.00
- \$780.00
- \$840.00
- \$847.00
- \$872.00

Select one answer choice.

Section 6 of 6 | Question 14 of 20

Questions 14 to 16 are based on the following data.

Market Value of Five Condominiums in 2010 and 2018

Condominium	2010	2018
A	\$109,000	\$135,000
B	\$125,000	\$150,000
C	\$130,000	\$175,000
D	\$142,000	\$145,000
E	\$149,000	\$185,000

By approximately what percent did the total market value of the five condominiums in 2018 exceed that in 2010 ?

- 17%
- 21%
- 27%
- 105%
- 135%

Select one answer choice.

Section 6 of 6 | Question 15 of 20

Questions 14 to 16 are based on the following data.

Market Value of Five Condominiums in 2010 and 2018

Condominium	2010	2018
A	\$109,000	\$135,000
B	\$125,000	\$150,000
C	\$130,000	\$175,000
D	\$142,000	\$145,000
E	\$149,000	\$185,000

For the five condominiums in 2018, by how much was the average (arithmetic mean) of the market values greater or less than the median of the market values?

- \$13,000 greater
- \$8,000 greater
- \$200 less
- \$2,000 less
- \$17,000 less

Select one answer choice.

Section 6 of 6 | Question 16 of 20

Questions 14 to 16 are based on the following data.

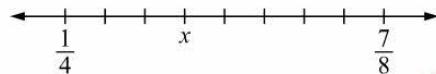
Market Value of Five Condominiums in 2010 and 2018

Condominium	2010	2018
A	\$109,000	\$135,000
B	\$125,000	\$150,000
C	\$130,000	\$175,000
D	\$142,000	\$145,000
E	\$149,000	\$185,000

If a circle graph is drawn to represent the total increase in market value from 2010 to 2018 for the five condominiums, including their individual increases, what would be the measure of the central angle that represents the increase for condominium D ?

 degrees

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.



On the number line shown, the tick marks are equally spaced. What is the value of x ?

Give your answer as a fraction.

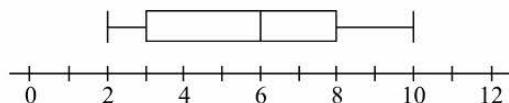
$$x = \frac{\boxed{}}{\boxed{}}$$

Enter your answer as a fraction, with the numerator and denominator in their respective answer boxes. Backspace to erase.

Working alone at their respective constant rates, pump A takes 12 hours to fill an empty pool to its capacity and pump B takes 14 hours to fill the same empty pool to its capacity. Which of the following is closest to the number of hours that it will take both pumps, working simultaneously, to fill the empty pool to $\frac{1}{2}$ of its capacity?

- 1.6
- 3.0
- 3.2
- 6.0
- 6.5

Select one answer choice.

Number of Eggs Laid Daily

The boxplot shown summarizes the total numbers of eggs laid daily by a flock of chickens on a certain farm last June. Based on the information given, which of the following statements must be true?

Indicate all such statements.

- The flock laid at least 2 eggs on all 30 days.
- The flock laid at least 6 eggs on at least 15 days.
- The flock laid 10 eggs on at least 1 day.

Select one or more answer choices.

Let a , b , c , and d be numbers such that $\frac{d}{a} = \frac{1}{2}$ and $\frac{c}{b} = \frac{2}{5}$. In the xy -plane, if the slope of the line with equation $ax + by = 1$ is $\frac{2}{3}$, what is the slope of the line with equation $cx + dy = -1$?

- $-\frac{3}{2}$ $-\frac{2}{3}$ $\frac{3}{5}$ $\frac{3}{2}$ $\frac{6}{5}$

Select one answer choice.

$$2x + y > 5 \text{ and } x < 0$$

Quantity A y Quantity B

5

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

Select one answer choice.

**Frequency Distribution of
18 Measurements**

Measurement	Frequency
25.0	4
26.0	2
27.0	9
28.0	3

Quantity A

The median of the measurements in the frequency distribution

Quantity B

26.5

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

Select one answer choice.

In the 3-digit positive integer N , the hundreds digit is m , the tens digit is s , and the units digit is p .

Quantity A

N

Quantity B

$m + 10s + 100p$

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

Select one answer choice.

The average (arithmetic mean) of x and z is greater than y , and $x < y < z$.

Quantity A

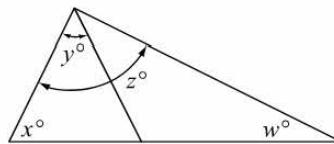
The average of x , y , and z

Quantity B

The median of x , y , and z

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

Select one answer choice.



The figure above has the angle measures shown.

Quantity A

$$x + w$$

Quantity B

$$y + z$$

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

Select one answer choice.

On a one-year loan of \$50,000, the interest charged for the first month is d dollars per \$1,000 loaned and the interest charged for each of the remaining 11 months is n dollars per \$1,000 loaned.

Quantity A

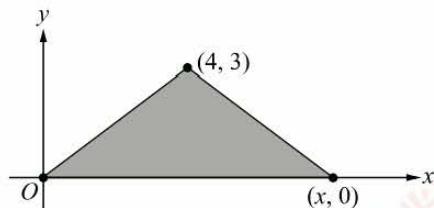
The total interest charged for the first 4 months

Quantity B

$50(d + 3n)$ dollars

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

Select one answer choice.



The area of the shaded triangular region is 12.

Quantity A

x

Quantity B

8

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

Select one answer choice.

$$\frac{x^3}{y^6} = \frac{1}{27}$$

Quantity A $3x$ Quantity B y^2

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

Select one answer choice.

-2.137, 0.048, 0.449, 1.687

Which of the following is closest to the average (arithmetic mean) of the 4 numbers shown?

- 0
- 0.25
- 0.5
- 0.75
- 1

Select one answer choice.

Working alone at its constant rate, machine A produces n plastic cups in 6 hours.
Working alone at its constant rate, machine B produces n plastic cups in 4 hours.
How many hours does it take machines A and B , working simultaneously at their
respective constant rates, to produce n plastic cups?

- 1.2 2.4 10 12 24

Select one answer choice.

If r is the remainder when 3^n is divided by 10, where n is a positive integer, which of the following is NOT a possible value of r ?

- 1
- 3
- 5
- 7
- 9

Select one answer choice.

It costs d dollars to buy c candies. At this rate, what is the cost of $c + 3,000$ candies, in dollars?

- $\frac{cd + c}{3,000d}$
- $\frac{cd + c}{3,000c}$
- $\frac{3,000c + d}{d}$
- $\frac{3,000d + cd}{c}$
- $\frac{cd + d}{3,000d}$

Select one answer choice.

First digit of employee number	1	2	3	4	5
Number of employees	75	32	12	5	2

Each of the 126 employees at a small company is assigned a unique five-digit employee number such that the first digit is from 1 through 5. The table above shows the distribution of the first digits for the employees. If one employee number is to be selected at random from the employee numbers with a first digit that is even, what is the probability that the number selected will have a first digit of 4?

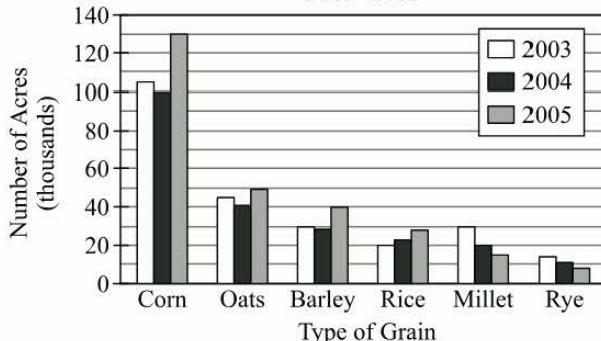
Give your answer as a fraction.

$$\frac{\boxed{}}{\boxed{}}$$

Enter your answer as a fraction, with the numerator and denominator in their respective answer boxes. Backspace to erase.

Section 2 of 6 | Question 14 of 20

Questions 14 to 16 are based on the following data.

Selected Grains Grown in Country X**Acres of Grain Grown Organically
2003–2005****Acres of Grain Grown Organically
as a Percent of All Acres of Grain in 2005**

Type of Grain	Corn	Oats	Barley	Rice	Millet	Rye
Percent grown organically	0.2%	2.0%	1.0%	0.8%	2.5%	0.6%

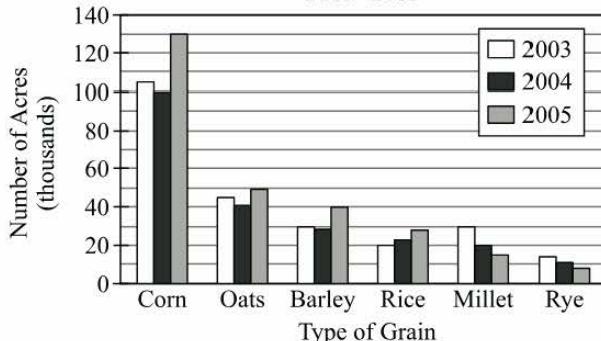
In 2003 approximately what was the ratio of the number of acres of millet grown organically to the number of acres of rice grown organically?

- 6 to 5
- 5 to 4
- 4 to 3
- 3 to 2
- 2 to 1

Select one answer choice.

Section 2 of 6 | Question 15 of 20

Questions 14 to 16 are based on the following data.

Selected Grains Grown in Country X**Acres of Grain Grown Organically
2003–2005****Acres of Grain Grown Organically
as a Percent of All Acres of Grain in 2005**

Type of Grain	Corn	Oats	Barley	Rice	Millet	Rye
Percent grown organically	0.2%	2.0%	1.0%	0.8%	2.5%	0.6%

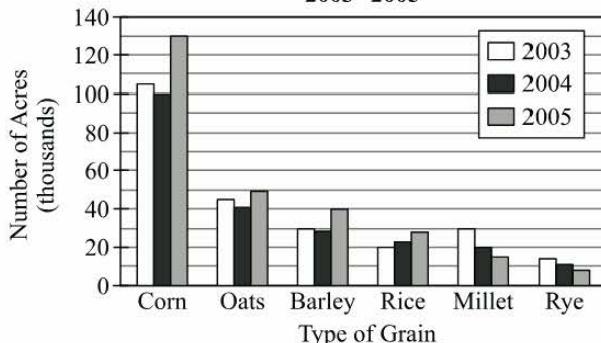
Approximately what was the percent decrease from 2003 to 2004 in the number of acres of millet grown organically?

- 10%
- 25%
- 33%
- 50%
- 67%

Select one answer choice.

Section 2 of 6 | Question 16 of 20

Questions 14 to 16 are based on the following data.

Selected Grains Grown in Country X**Acres of Grain Grown Organically
2003–2005****Acres of Grain Grown Organically
as a Percent of All Acres of Grain in 2005**

Type of Grain	Corn	Oats	Barley	Rice	Millet	Rye
Percent grown organically	0.2%	2.0%	1.0%	0.8%	2.5%	0.6%

In 2005 the number of acres of oats grown organically was approximately how much less than the number of acres of oats not grown organically?

- 50,000
- 240,000
- 1,500,000
- 2,400,000
- 2,500,000

Select one answer choice.

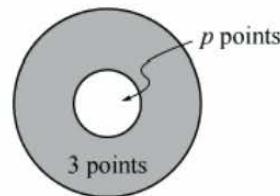
How many five-digit positive integers can be formed by using the digits 1, 2, and 4 if the digit 1 is used once and each of the digits 2 and 4 are used twice?

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

If $-8 \leq h \leq 10$ and $h + m = -4$, what is the least possible value of mh ?

- 0
- 32
- 56
- 112
- 140

Select one answer choice.

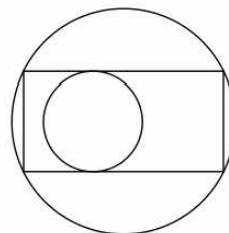


The figure above shows a circular dartboard at which players throw darts. A player earns 3 points each time a dart hits the shaded region and p points each time a dart hits the unshaded circular region. If a player earns a total of 47 points for a number of darts that hit the dartboard, which of the following could be the value of p ?

Indicate all such values.

- 11
- 12
- 13

Select one or more answer choices.



The figure above shows a rectangle inscribed in a large circle. Inside the rectangle is a small circle of radius 2 that is tangent to two sides of the rectangle. If the length of the rectangle is twice its width, what is the area of the large circle?

- $12\pi\sqrt{3}$
- $16\pi\sqrt{2}$
- 16π
- 18π
- 20π

Select one answer choice.

$$x - y > 0$$

Quantity A

$$|x| - |y|$$

Quantity B

$$0$$

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

Select one answer choice.

$$\begin{aligned}x &= y - 3 \\x &= -x\end{aligned}$$

Quantity A y Quantity B

2

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

Select one answer choice.

Quantity A

The remainder when 2^{32} is divided by 3

Quantity B

1

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

Select one answer choice.

$$x \neq y \text{ and } x - y = x^2 - y^2.$$

Quantity A

$$x + y$$

Quantity B

$$1$$

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

Select one answer choice.

All applicants for a certain job will take a skills test. An applicant who scores 80 percent or greater on the test has a probability of 0.65 of being hired.

Quantity A

The probability that an applicant who scores less than 80 percent on the test will be hired

Quantity B

0.35

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

Select one answer choice.

$$B_n = \frac{n}{n+1} \text{ for all integers } n > 1.$$

$$C_n = B_n + B_{n-1} \text{ for all integers } n > 2.$$

The integer k is greater than 2.

Quantity A

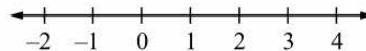
$$C_k$$

Quantity B

$$\frac{2k^2 - 1}{k^2 + k}$$

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

Select one answer choice.



Point Q (not shown) is on the number line between -2 and -1 . Point R (not shown) is on the number line between 0 and 1 . Point S (not shown) is on the number line between 3 and 4 .

Quantity A

$$QR$$

Quantity B

$$RS$$

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

Select one answer choice.

A certain device is a rectangular box with dimensions 20 inches by 5 inches by 6 inches. If the device has mass 17 kilograms, then the device's density is approximately how many kilograms per cubic foot?
(Density is the ratio of mass to volume, and 1 foot = 12 inches.)

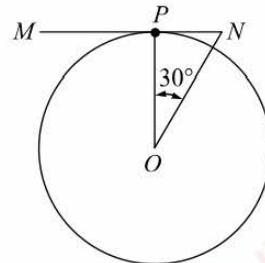
- 20
- 30
- 40
- 50
- 60

Select one answer choice.

If $1 \leq x \leq 4$ and $-3 \leq y \leq 2$, what is the least possible value of $x^{-2} + y^{-2}$?

- $\frac{7}{144}$
- $\frac{25}{144}$
- $\frac{5}{16}$
- $\frac{9}{16}$
- $\frac{7}{12}$

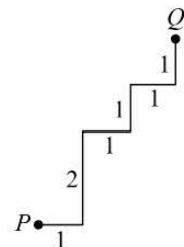
Select one answer choice.



In the figure, MN is tangent to the circle at point P , and O is the center of the circle. If the length of PN is $2\sqrt{3}$, what is the circumference of the circle?

- 6π
- 9π
- 12π
- 36π
- $8\pi\sqrt{3}$

Select one answer choice.



All angles in the figure above are right angles. What is the straight-line distance from point P to point Q ?

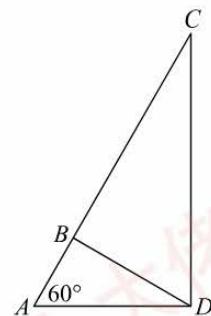
- $\sqrt{5}$
- $\sqrt{5} + \sqrt{2} + 1$
- $\sqrt{5} + 2\sqrt{2}$
- 5
- 7

Select one answer choice.

Of the applicants for a job, 6 percent had a degree in computer science and spoke Russian. If 90 percent of the applicants who had a degree in computer science did not speak Russian, what fraction of all the applicants had a degree in computer science?

- $\frac{2}{5}$
- $\frac{1}{2}$
- $\frac{3}{5}$
- $\frac{2}{3}$
- $\frac{3}{4}$

Select one answer choice.



In the figure shown, angles ADC and ABD are right angles. If $AB = 4$, what is the length of AC ?

$$AC = \boxed{\quad}$$

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

Section 4 of 6 | Question 14 of 20

Questions 14– 16 are based on the following data.

Kim's Budget for June

	Budgeted	Actual
<u>Work-Related Expenditures</u>		
Transportation	\$120	\$120
Tolls and Parking	100	100
Uniforms	75	40
Laundry/Dry Cleaning	55	40
Lunch and Snacks	50	80
<u>Non-Work-Related Expenditures</u>		
Rent	\$800	\$800
Automobile	550	500
Savings	300	300
Entertainment/Restaurants	300	380
Groceries	250	290
Heat/Light/Telephone	160	150
Insurance	100	100
Clothing	50	30
Other	90	70

Of the following fractions, which best approximates the ratio of total budgeted work-related expenditures to the total amount budgeted?

- $\frac{1}{3}$
- $\frac{1}{4}$
- $\frac{1}{5}$
- $\frac{1}{8}$
- $\frac{1}{10}$

Select one answer choice.

Section 4 of 6 | Question 15 of 20

Questions 14– 16 are based on the following data.

Kim's Budget for June

	Budgeted	Actual
<u>Work-Related Expenditures</u>		
Transportation	\$120	\$120
Tolls and Parking	100	100
Uniforms	75	40
Laundry/Dry Cleaning	55	40
Lunch and Snacks	50	80
<u>Non-Work-Related Expenditures</u>		
Rent	\$800	\$800
Automobile	550	500
Savings	300	300
Entertainment/Restaurants	300	380
Groceries	250	290
Heat/Light/Telephone	160	150
Insurance	100	100
Clothing	50	30
Other	90	70

If 23.75 percent of actual work-related expenditures for lunch and snacks was for soft drinks, what percent of total actual work-related expenditures was for soft drinks?

- 5%
- 4%
- 3%
- 2%
- 1%

Select one answer choice.

Section 4 of 6 | Question 16 of 20

Questions 14– 16 are based on the following data.

Kim's Budget for June

	Budgeted	Actual
<u>Work-Related Expenditures</u>		
Transportation	\$120	\$120
Tolls and Parking	100	100
Uniforms	75	40
Laundry/Dry Cleaning	55	40
Lunch and Snacks	50	80
<u>Non-Work-Related Expenditures</u>		
Rent	\$800	\$800
Automobile	550	500
Savings	300	300
Entertainment/Restaurants	300	380
Groceries	250	290
Heat/Light/Telephone	160	150
Insurance	100	100
Clothing	50	30
Other	90	70

For how many of the 14 categories shown did actual expenditures differ from budgeted expenditures by more than 20 percent of budgeted expenditures?

- Three
- Five
- Six
- Seven
- Nine

Select one answer choice.

After taking a quiz, 25 students each received a score on the quiz that was an integer from 1 to 10 inclusive. The average (arithmetic mean) of the 25 scores was 8.8. Only 1 student received the lowest score, and the sum of the 24 scores greater than the lowest score was 217. What was the range of the 25 scores?

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

If x and y are nonzero integers such that the sum of x and $3y$ is equal to $4x$ minus y , what is the ratio of x to y ?

- 2 to 3
- 3 to 2
- 3 to 4
- 4 to 3
- It cannot be determined from the information given.

Select one answer choice.

In the xy -plane, three of the four vertices of a parallelogram are the points $(6, 8)$, $(12, 8)$, and $(12, 4)$. Which of the following points could be the fourth vertex of the parallelogram?

Indicate all such points.

- $(6, 4)$
- $(6, 12)$
- $(12, 12)$
- $(18, 8)$

Select one or more answer choices.

Number of Dollars Invested	Simple Annual Interest Rate
12,000	3.0%
20,000	1.8%
x	4.5%
y	3.6%

The table shows four different amounts of money invested on the same day at different simple annual interest rates. If each investment earns the same amount of interest for the first year after the investment is made, what is the value of $y - x$?

- 2,000
- 4,000
- 6,000
- 8,000
- 10,000

Select one answer choice.

r , s , and t are negative integers.

Quantity A

$$rst$$

Quantity B

$$r^2 + s^2 + t^2$$

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

Select one answer choice.

$$z > 0$$

Quantity A20% of z Quantity B10% of $2z$

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

Select one answer choice.

Of Amy's four sisters, two are taller than Amy and two are shorter than Amy.

Quantity A

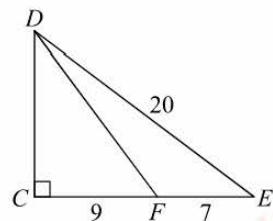
The average (arithmetic mean) height of Amy's four sisters

Quantity B

Amy's height

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

Select one answer choice.

Quantity AThe length of line segment DF Quantity B

12

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

Select one answer choice.

Quantity A

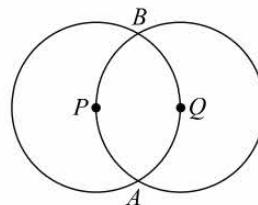
$$\left(\left(\frac{1}{10}\right)^{10}\right)^{10}$$

Quantity B

$$\frac{1}{10^{(10^{10})}}$$

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

Select one answer choice.



The circles shown intersect at points A and B and have centers P and Q , respectively. The radius of each circle is 3.

Quantity A

The sum of the lengths of arcs APB and BQA

Quantity B

4π

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

Select one answer choice.

Let a and b be positive numbers such that $\sqrt[3]{b} > a$ and $\sqrt{a} > b$.

Quantity A

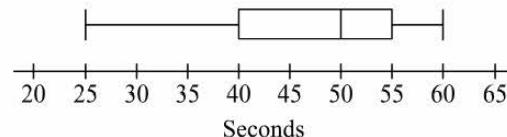
$$ab$$

Quantity B

$$1$$

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

Select one answer choice.

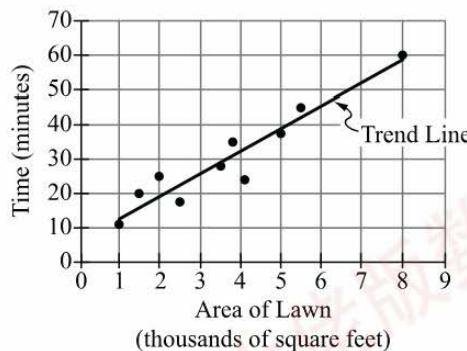


A researcher recorded the amount of time, rounded to the nearest second, that it took each of 14 people to complete a certain task. The recorded times are summarized in the boxplot shown. Which of the following statements must be true?

Indicate all such statements.

- At least one person had a recorded time of 25 seconds.
- At least one person had a recorded time of 50 seconds.
- Each of the 14 people had a recorded time of at most 60 seconds.

Select one or more answer choices.



The scatterplot shows the amount of time, in minutes, that it took a team of two people to mow each of 10 lawns, including a lawn with area 4,100 square feet. Also shown is a trend line that is used to predict the amount of time, in minutes, that it will take the team to mow a lawn based on its area. The amount of time that it took the team to mow the lawn with area 4,100 square feet is approximately what percent less than the amount of time predicted by the trend line?

 10% 30% 40% 50% 70%

Select one answer choice.

Approximately how many days will it take for a space vehicle to travel $5.5(10^7)$ kilometers at an average speed of 10 kilometers per second?

- 3,800
- 1,500
- 640
- 320
- 64

Select one answer choice.

An organization will loan an amount of \$100,000 that will be paid back over 10 years with a loan payment at the end of each year according to a graduated payment plan, as follows. Each year the payment will consist of $\frac{1}{10}$ of the amount loaned, plus interest. For each of the first 2 years, the interest will be 8 percent of the amount loaned. For each of the next 2 years, the interest will be 12 percent of the amount loaned. For each of the last 6 years, the interest will be 16 percent of the amount loaned. What is the total amount of interest that will be paid?

- \$80,000
- \$96,000
- \$120,000
- \$136,000
- \$160,000

Select one answer choice.

Rectangular solids A and B each have two square faces. The distance between the square faces of A is 20 percent greater than the distance between the square faces of B . The length of each side of a square face of A is x percent less than the length of each side of a square face of B . If the volume of A is equal to the volume of B , which of the following is closest to the value of x ?

- 4.47
- 6.67
- 8.71
- 8.94
- 9.54

Select one answer choice.

In triangle ABC , the length of side AB is 13, the length of side AC is 15, and the length of side BC is 14. What is the length of the height that corresponds to the base BC ?

- 5
- 8
- 9
- 11
- 12

Select one answer choice.

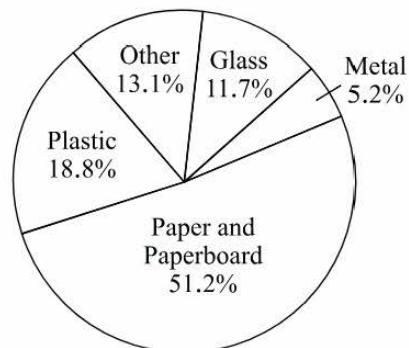
Section 6 of 6 | Question 14 of 20

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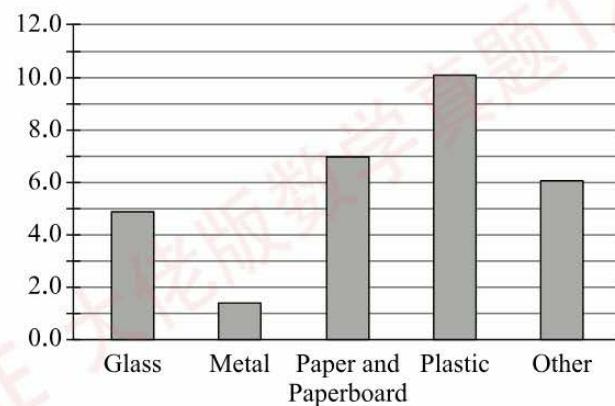
Questions 14 to 16 are based on the following data.

Types of Packaging Material in Municipal Solid Waste in the United States in 2015**Packaging Material Generated**

Total: 77.9 million tons

**Packaging Material Landfilled**

(in millions of tons)

Which of the following is closest to the amount of glass generated, in tons, that was not landfilled? 3.4 million 4.1 million 5.0 million 6.7 million 9.1 million

Select one answer choice.

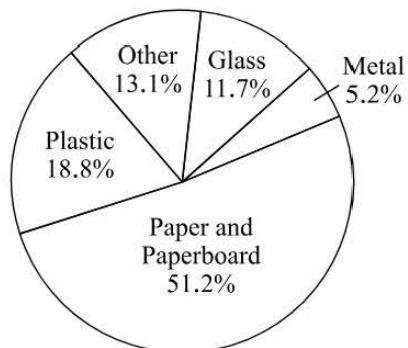
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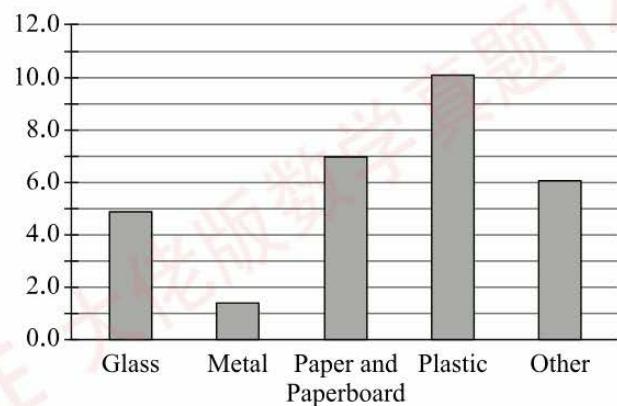
Questions 14 to 16 are based on the following data.

Types of Packaging Material in Municipal Solid Waste in the United States in 2015**Packaging Material Generated**

Total: 77.9 million tons

**Packaging Material Landfilled**

(in millions of tons)



If 33 percent of the glass generated and 15 percent of the plastic generated were recycled, approximately how many tons of the glass and plastic generated were recycled?

 3.2 million 5.2 million 6.7 million 23.8 million 37.4 million

Select one answer choice.

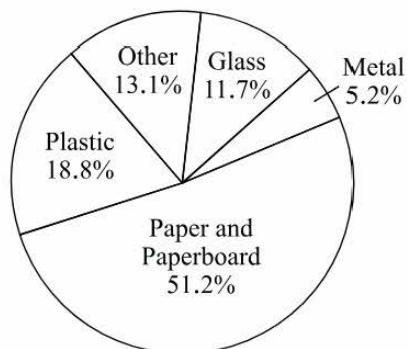
Section 6 of 6 | Question 16 of 20

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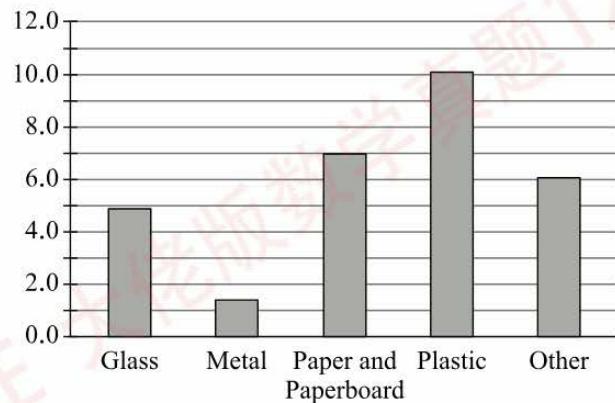
Questions 14 to 16 are based on the following data.

Types of Packaging Material in Municipal Solid Waste in the United States in 2015**Packaging Material Generated**

Total: 77.9 million tons

**Packaging Material Landfilled**

(in millions of tons)



For which of the types of packaging material shown was the number of tons landfilled greater than half the number of tons generated?

Indicate all such types.

 Glass Metal Paper and paperboard Plastic Other

Select one or more answer choices.

What fraction of the integers that are greater than 1 and less than 14 are prime numbers?

$$\frac{\boxed{}}{\boxed{}}$$

Enter your answer as a fraction, with the numerator and denominator in their respective answer boxes. Backspace to erase.

The operation \triangle is defined by $a \triangle b = a^2 - 4b^2$ for all numbers a and b . For which of the following values of x is $2x \triangle 3 = (x - 1) \triangle 2$?

- $\frac{7}{3}$ 3 $\sqrt{7}$ $-1 + \sqrt{6}$ $-1 + \sqrt{22}$

Select one answer choice.

In sequence A , the first term is 1 and each term after the first term is 8 greater than the preceding term. In sequence B , each term is twice the corresponding term of A . In sequence C , the first term is 1 and each term after the first term is d greater than the preceding term, where d is an integer. If the sum of the first 100 terms of B is subtracted from the sum of the first 200 terms of A , the result is equal to 8 times the sum of the first 100 terms of C . What is the value of d ?

- 1
- 2
- 4
- 8
- 16

Select one answer choice.

$$-4 \leq 3x + 1 \leq 5$$

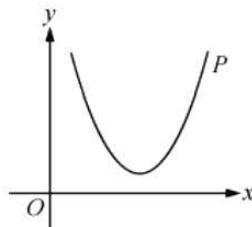
$$-1 \leq 2x - 1 \leq 4$$

Which of the following values satisfy the system of inequalities shown above?

Indicate all such values.

- $-\frac{2}{3}$
- $\frac{3}{4}$
- $\frac{8}{9}$
- $\frac{9}{8}$
- $\frac{3}{2}$

Select one or more answer choices.



In the xy -plane, a circle C (not shown) intersects the parabola P shown.

Quantity A

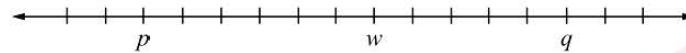
The number of points at which parabola P intersects circle C

Quantity B

2

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

Select one answer choice.



The 16 tick marks shown on the number line are equally spaced, and p , w , and q are negative.

Quantity A

$$\frac{p+q}{2}$$

Quantity B

$$w$$

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

Select one answer choice.

$$x = 549,999$$

$$y = 549,998$$

$$z = 549,997$$

Quantity A

$$x^2 z^2$$

Quantity B

$$y^4$$

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

Select one answer choice.

$$n > 4$$

Quantity A

The sum of the first n positive prime numbers

Quantity B

The sum of the first n positive integers

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

Select one answer choice.

$$\begin{aligned}2x &< -1 \\3y &> 7\end{aligned}$$

Quantity A

$$x^2$$

Quantity B

$$y^2$$

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

Select one answer choice.

x and y are positive decimals such that $x + y$ rounded to the nearest hundredth is x .

Quantity A

y

Quantity B

0.007

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

Select one answer choice.

$$(x^2 + 4x + 3)(x^2 - 4x + 4) = 0$$

Quantity A

The number of different values of x
that satisfy the equation

Quantity B

3

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

Select one answer choice.

Quantity A

The standard deviation of the heights of 12 children whose mean height is 50 inches

Quantity B

The standard deviation of the heights of 10 children whose mean height is 60 inches

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

Select one answer choice.

A ball is dropped onto a concrete floor from a height of 50 feet, after which it bounces n times. After each bounce, the ball rebounds to $\frac{1}{3}$ of the height from which it has just fallen. To what height does the ball rebound after the n th bounce?

- $\left(\frac{1}{3}\right)^n$
- $\left(\frac{50}{3}\right)^n$
- $50\left(\frac{1}{3}\right)^n$
- $50\left(\frac{1}{3}\right)^{n-1}$
- $\left(\frac{50}{3}\right)^{n-1}$

Select one answer choice.

Three of the vertices of parallelogram $RSTU$ in the xy -plane are $R(-3, -2)$, $S(1, -5)$, and $T(9, 1)$. Which of the following could be the x -coordinate of vertex U ?

- 3
- 4
- 5
- 6
- 7

Select one answer choice.

For a list of k consecutive integers, the median is m and the range is r . Which of the following must be equal to k ?

- m
- r
- $m + 1$
- $r + 1$
- $r - m + 1$

Select one answer choice.

If k is a positive integer and $n = 7k + 8$, what is the remainder when $4n$ is divided by 14?

- 2
- 4
- 6
- 8
- 10

Select one answer choice.

78, 82, 73, 81, 95, 92, 86, 90, 92

The 9 numbers listed are the highest temperatures, in degrees Fahrenheit, in a certain city on 9 consecutive days. The relationship between temperature in degrees Fahrenheit F and temperature in degrees Celsius C is given by the formula $C = \frac{5}{9}(F - 32)$. What is the median of the 9 temperatures in degrees Celsius?

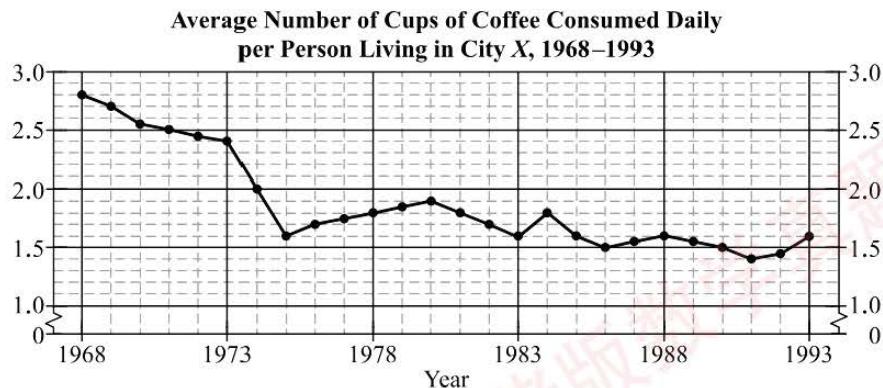
 °C

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

Section 2 of 6 | Question 14 of 20

00:34:36 ⏹ Hide Time

Questions 14 to 16 are based on the following data.



The range of the average numbers of cups of coffee consumed daily per person was greatest for which of the following time periods?

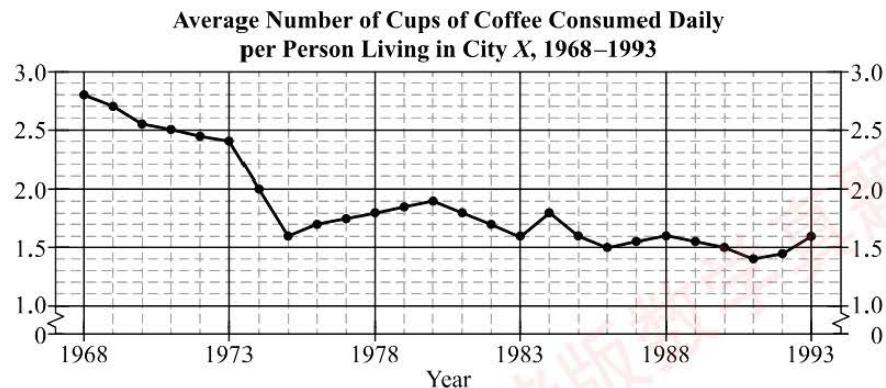
- 1968–1973
- 1973–1978
- 1978–1983
- 1983–1988
- 1988–1993

Select one answer choice.

Section 2 of 6 | Question 15 of 20

00:34:35 ⏹ Hide Time

Questions 14 to 16 are based on the following data.



The percent increase in the average number of cups of coffee consumed daily per person from 1975 to 1980 is closest to which of the following?

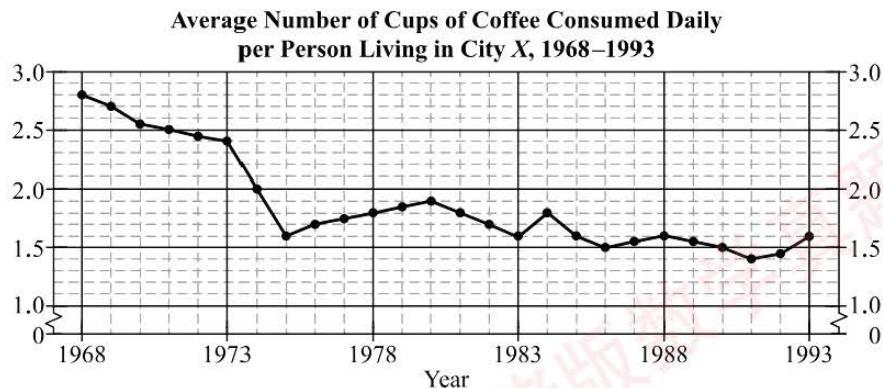
- 0.25% 2% 20% 35% 45%

Select one answer choice.

Section 2 of 6 | Question 16 of 20

00:34:33 ⏹ Hide Time

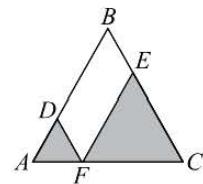
Questions 14 to 16 are based on the following data.



Suppose that the yearly decreases from 1968 through 1975 in the average number of cups of coffee consumed daily per person had been a constant decrease instead of what is shown, but that the averages for 1968 and 1975 had remained as shown. Which of the following would have been closest to the constant yearly decrease, in cups of coffee?

 0.7 0.6 0.5 0.2 0.1

Select one answer choice.



$$AD = \frac{1}{3}AB$$

$$AF = \frac{1}{3}AC$$

$$BE = \frac{1}{3}BC$$

The sum of the areas of the shaded regions is what fraction of the area of triangle ABC above?

<input type="text"/>
<hr/>
<input type="text"/>

Enter your answer as a fraction, with the numerator and denominator in their respective answer boxes. Backspace to erase.

Last month a certain contractor received \$350,000 for each home in a group of 8 homes sold. Additionally, the contractor received a total of \$2,150,000 for all 7 homes sold in another group of homes. For the 15 homes sold, how much less was the average (arithmetic mean) selling price than the median selling price?

- \$15,000
- \$20,000
- \$24,000
- \$32,000
- \$40,000

Select one answer choice.

If $km^{-1} + k^{-1}m^2 = 3$ and $m = \frac{k}{2}$, what is the value of m ?

- 2
- 3
- 4
- 5
- 6

Select one answer choice.

The average (arithmetic mean) of the daily high temperatures for the 28 days of February 2005 in City X was -5°C . Which of the following statements must be true?

Indicate all such statements.

- For at least 14 days in February 2005 in City X , the daily high temperature was less than -5°C .
- For at least 1 day in February 2005 in City X , the daily high temperature was less than 0°C .
- The range of the daily high temperatures in February 2005 in City X was less than 0°C .

Select one or more answer choices.

$$d > 1$$

Quantity A

$$\frac{d}{d-1}$$

Quantity B

$$\frac{d-1}{d+1}$$

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

Select one answer choice.

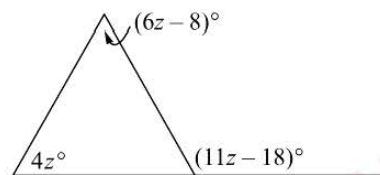
$$-3x + 7 > 1$$

Quantity A x Quantity B

3

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

Select one answer choice.

Quantity A z Quantity B

11

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

Select one answer choice.

X and Y are digits in the two 3-digit positive integers $XY9$ and $5XY$. The sum of the two 3-digit integers is 1,532.

Quantity A

$$X - Y$$

Quantity B

$$6$$

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

Select one answer choice.

In sequence S , the first term is 1 and each term after the first term is 3 more than the preceding term.
In sequence T , the first term is 100 and each term after the first term is 1 more than the preceding term.

Quantity A

The sum of the first 100 terms of S

Quantity B

The sum of the first 100 terms of T

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

Select one answer choice.

Employment Status

	Not Employed	Part-Time	Full-Time
Current	12%	18%	70%
Preferred	8%	12%	80%

In an employment study, 1,000 adults reported what their current employment status was and what their preferred employment status would be. The table shows the results of the reported current and preferred employment statuses as percents of the 1,000 adults.

Quantity A

The percent of adults in the study whose reported current employment status was not the same as their reported preferred employment status

Quantity B

30%

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

Select one answer choice.

The seven points A , B , C , D , E , F , and G lie on the number line in that order, where $AB = BC$, $DE = EF = FG$, and $AC = DG$.

Quantity A

$$AB + FG$$

Quantity B

$$\frac{5}{12}(AG)$$

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

Select one answer choice.

Distribution of Responses to a Survey Question

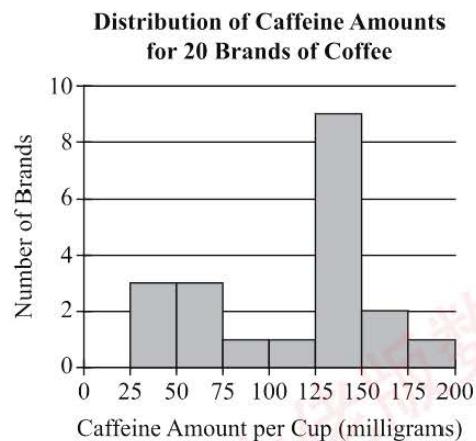
Response	2016	2019
More	45%	37%
Less	25%	29%
The same	30%	34%

The table shows the results of two surveys, taken at the beginning of 2016 and 2019, respectively, in which each person was asked, “Do you expect to spend more, less, or the same amount of money on gifts this year as compared to last year?” Which of the following statements must be true?

Indicate all such statements.

- The number of people surveyed who responded “more” in 2016 was greater than the number of people surveyed who responded “more” in 2019.
- The number of people surveyed who responded “less” in 2019 was 4 percent greater than the number of people surveyed who responded “less” in 2016.
- In 2019 more than $\frac{1}{3}$ of the people surveyed responded “the same.”

Select one or more answer choices.



The histogram shows the frequency distribution of caffeine amounts, rounded to the nearest milligram, for 20 brands of coffee, where each interval shown includes its left endpoint and excludes its right endpoint. Based on the histogram, which of the following could be the respective values of the average (arithmetic mean) and the median of the caffeine amounts for the 20 brands?

- 100 and 125
- 125 and 100
- 125 and 149
- 149 and 125
- 149 and 148

Select one answer choice.

A certain furnace consumes natural gas at a constant rate of 2.7 cubic meters per hour. Which of the following represents the number of cubic centimeters of natural gas that the furnace consumes per second?

- 9.72×10^{-3}
- 7.50×10^{-2}
- 9.72×10^1
- 7.50×10^2
- 4.50×10^4

Select one answer choice.

In 2013, Jean had taxable income equal to \$80,500. Her income tax for 2013 was assessed as 10 percent of her taxable income up to \$8,925, plus 15 percent of her taxable income in excess of \$8,925 and up to \$36,250, plus 25 percent of her taxable income in excess of \$36,250. What was the total amount assessed for Jean's income tax for 2013, rounded to the nearest dollar?

- \$15,161
- \$16,054
- \$17,891
- \$20,125
- \$22,540

Select one answer choice.

Let n be a positive integer such that the number of positive factors of 5^n is 15. What is the number of positive factors of 9^n ?

- 14
- 15
- 28
- 29
- 30

Select one answer choice.

Let S and T be trapezoids, each of which has two nonparallel opposite sides that are congruent. The bases of S have lengths 8 and 18, the bases of T have lengths 8 and 26, and the heights of S and T are equal. If the perimeter of S is 52, what is the perimeter of T ?

- 60
- 64
- 68
- 72
- 76

Select one answer choice.

Section 4 of 6 | Question 14 of 20

Questions 14 to 16 are based on the following data.

Market Value of Five Condominiums in 2010 and 2018

Condominium	2010	2018
A	\$109,000	\$135,000
B	\$125,000	\$150,000
C	\$130,000	\$175,000
D	\$142,000	\$145,000
E	\$149,000	\$185,000

In 2018 the market value of condominium *B* was n percent greater than it was in 2010. If the market value continues to increase by n percent every 8 years from the market value 8 years earlier, in what year will the market value be \$216,000 ?

- 2021
- 2026
- 2034
- 2042
- 2047

Select one answer choice.

Section 4 of 6 | Question 15 of 20

Questions 14 to 16 are based on the following data.

Market Value of Five Condominiums in 2010 and 2018

Condominium	2010	2018
A	\$109,000	\$135,000
B	\$125,000	\$150,000
C	\$130,000	\$175,000
D	\$142,000	\$145,000
E	\$149,000	\$185,000

The two condominiums that had the least increase in market value from 2010 to 2018 were purchased at their market values in 2010 and sold at their market values in 2018. For a condominium that was purchased and later sold at a higher price, if the capital gains tax was equal to 20 percent of the difference between the selling price and the purchase price, what would have been the total capital gains tax on the sales of the two condominiums?

- \$5,600
- \$5,800
- \$5,900
- \$9,200
- \$10,200

Select one answer choice.

Section 4 of 6 | Question 16 of 20

Questions 14 to 16 are based on the following data.

Market Value of Five Condominiums in 2010 and 2018

Condominium	2010	2018
A	\$109,000	\$135,000
B	\$125,000	\$150,000
C	\$130,000	\$175,000
D	\$142,000	\$145,000
E	\$149,000	\$185,000

For which of the five condominiums was the average increase per year in market value from 2010 to 2018 less than \$3,500 ?

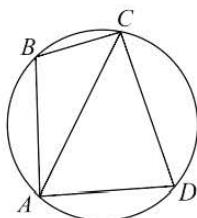
Indicate all such condominiums.

- A
- B
- C
- D
- E

Select one or more answer choices.

If 40 percent of a number x is equal to 6,000, what is 8 percent of 1.5 percent of x ?

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.



Quadrilateral $ABCD$ is inscribed in a circle, as shown in the figure. The measure of the shorter arc between points A and B is x degrees. If the measure of angle BAC is y degrees, what is the degree measure of angle ADC , in terms of x and y ? (Note: The measure of an angle inscribed in a circle is half the measure of the central angle that subtends the same arc.)

- $\frac{x}{2} + y$
- $x + y$
- $x + 2y$
- $180 - x - y$
- $180 - \frac{x}{2} - y$

Select one answer choice.

If the difference $\frac{3}{\left(\frac{2}{x}\right)} - \frac{1}{6}$ is $\frac{11}{12}$ of the sum $\frac{2}{\left(\frac{3}{x}\right)} + \frac{1}{6}$, what is the value of x ?

- $\frac{23}{64}$
- $\frac{11}{36}$
- $\frac{1}{12}$
- $\frac{36}{11}$
- $\frac{64}{23}$

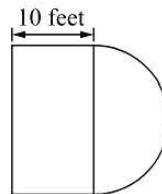
Select one answer choice.

The integers a and b are positive. When a is divided by 7, the remainder is 3. When b is divided by 7, the remainder is 5. Which of the following integers have a remainder of 1 when divided by 7?

Indicate all such integers.

- ab
- $a + b$
- $a^2 + b^2$
- a^2b^2

Select one or more answer choices.



A rectangular patio with an area of 240 square feet is to be expanded by attaching a semicircular region to one side, as shown in the figure.

Quantity A

The perimeter of the entire expanded patio

Quantity B

80 feet

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

Select one answer choice.

Q is a set of 36 different numbers with the property that if p is in Q , then $-p$ is also in Q . The number 25 is in Q .

Quantity A

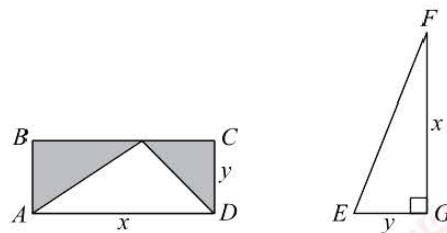
The range of the numbers in Q

Quantity B

40

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

Select one answer choice.



In the figures shown, $ABCD$ is a rectangle and EFG is a right triangle.

Quantity A

The sum of the areas of the shaded regions in rectangle $ABCD$

Quantity B

The area of triangle EFG

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

Select one answer choice.

$$c > 1$$

$$d < -1$$

Quantity A

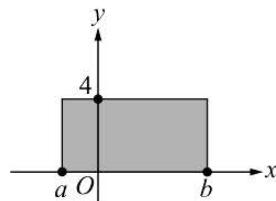
$$(c^3d^2)^{-5}$$

Quantity B

$$c^{-2}d^{-3}$$

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

Select one answer choice.



The shaded rectangular region in the xy -plane shown has an area of 28 square units.

Quantity A

$$a + b$$

Quantity B

$$7$$

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

Select one answer choice.

In a probability experiment, R and S are independent events such that $0 < P(R) < \frac{1}{2}$ and $0 < P(S) < 1$.

Quantity A

The probability that S will occur given that R has occurred

Quantity B

$P(R)$

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

Select one answer choice.

$$Y_1, Y_2, Y_3, \dots, Y_i, \dots$$

The sequence shown is defined by $Y_1 = 5$ and $Y_{i+1} = \frac{1}{5}Y_i$ for each positive integer i .

Quantity A

$$Y_6$$

Quantity B

$$(25^5) Y_{16}$$

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

Select one answer choice.

It costs d dollars to buy f flowers. At this rate, what is the cost of $f + 1,350$ flowers, in dollars?

$\frac{1,350f+f^2}{d}$

$\frac{fd+d}{1,350f}$

$\frac{1,350d+f}{d}$

$\frac{1,350d+fd}{f}$

$\frac{1,350fd+d}{f}$

Select one answer choice.

Which of the following is equal to $\frac{5^9 - 5^8}{4}$?

- $\frac{1}{4}$
- $\frac{5}{4}$
- $\frac{5^3}{4}$
- 5^8
- 5^9

Select one answer choice.

If $x < y$, which of the following must be true?

- $2x < y$
- $2x > y$
- $x^2 < y^2$
- $2x - y < y$
- $2x - y < 2xy$

Select one answer choice.

A gardener plans to cover a rectangular plot of land with pine bark mulch to a depth of 4 inches. The plot measures 8 feet by 12 feet, and the gardener will buy mulch packed in bags. If each bag contains 3.5 cubic feet of mulch and costs \$6, what is the cost of the least number of bags that the gardener will need to cover the plot? (Note: 1 foot = 12 inches.)

- \$30
- \$48
- \$54
- \$55
- \$60

Select one answer choice.

At a department store, $\frac{2}{3}$ of the employees helped customers and $\frac{1}{5}$ of the remaining employees restocked shelves. What fraction of the employees at the department store neither helped customers nor restocked shelves?

- $\frac{2}{15}$
- $\frac{1}{5}$
- $\frac{4}{15}$
- $\frac{1}{3}$
- $\frac{2}{5}$

Select one answer choice.

Company A has twice as many employees as Company B . The average (arithmetic mean) salary per employee is \$25,400 at Company A and \$35,000 at Company B . What is the average salary per employee for all employees in the two companies?

\$

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

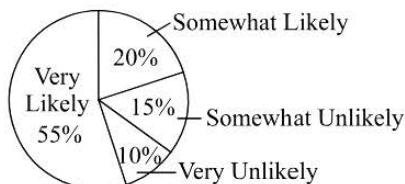
Section 6 of 6 | Question 14 of 20

Questions 14 to 16 are based on the following data.

In a survey, 2,400 homeowners responded to the following question.

Question 1. How likely is it that you will continue to live in your current home for at least ten more years?

Responses to Question 1



The homeowners who responded “very likely” or “somewhat likely” to Question 1 were asked Question 2.

Question 2. What aspects of your current home make it likely that you will continue to live there? (Select all that apply.)

Responses to Question 2 as a Percent of Those Who Were Asked Question 2

Response	Percent
House is in a good location.	46%
House is attractive.	43%
House is comfortable.	38%
House is in good condition.	31%
House has no mortgage.	25%

For how many of the five response categories in the table was the number of responses less than 750?

- None
- One
- Two
- Three
- Four

Select one answer choice.

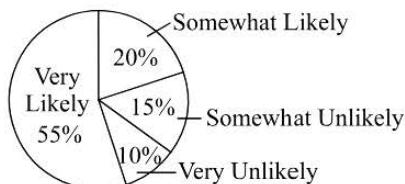
Section 6 of 6 | Question 15 of 20

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House is in good condition.	31%
House has no mortgage.	25%

Based on the information given, which of the following statements are true?

Indicate all such statements.

- For Question 1, the ratio of the number of homeowners who responded “somewhat likely” to the number of homeowners who responded “somewhat unlikely” is 4 to 3.
- 75 percent of the homeowners in the survey were asked Question 2.
- More than 40 percent of the homeowners in the survey responded “house is attractive” to Question 2.

Select one or more answer choices.

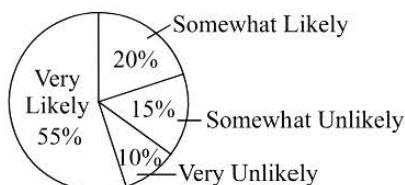
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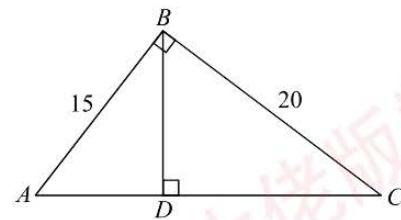
Responses to Question 2 as a Percent of Those Who Were Asked Question 2

Response	Percent
House is in a good location.	46%
House is attractive.	43%
House is comfortable.	38%
House is in good condition.	31%
House has no mortgage.	25%

If 24 percent of the homeowners who were asked Question 2 responded both “house is comfortable” and “house is in good condition,” what percent of the homeowners who were asked Question 2 gave neither of these responses?

- 21%
- 31%
- 38%
- 45%
- 55%

Select one answer choice.



In the figure shown, what is the length of line segment BD ?

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

$$1,575 = (3^2)(5^2)(7)$$

How many positive factors does the integer 1,575 have, including the factors 1 and 1,575 ?

- 5
- 8
- 13
- 18
- 32

Select one answer choice.

If $xy \neq 0$ and $x - 2y = 3x$, which of the following CANNOT be equal to x^2y ?

- xy^2 $-xy^2$ $-x^3$ y^3 1

Select one answer choice.

The function f is defined by $f(x) = 2^{-x^2}$ for all integers x . Which of the following could be the value of $f(x)$?

Indicate all such values.

- 2 -1 -0.5 0 0.5 1 2

Select one or more answer choices.

Quantity A

$$2^{(3^3)}$$

Quantity B

$$(2^3)^{(2^3)}$$

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

Select one answer choice.

$n \neq 0$ and $n \neq -1$ Quantity A

$$\frac{n + n^2}{n^3 + n^4}$$

Quantity B

$$\frac{1}{n^2}$$

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

Select one answer choice.

In a normal distribution, the amount of the distribution that lies within 1 standard deviation of the mean is 68 percent, rounded to the nearest whole percent. A certain set of values is normally distributed with a mean of 81 and a standard deviation of 5. A value x will be randomly selected from the set.

Quantity A

The probability that x will be less than 76 or greater than 86

Quantity B

The probability that x will be between 81 and 86

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

Select one answer choice.

A circle of radius r is tangent to three of the four sides of a rectangle.

Quantity A

Half of the area of the rectangular region

Quantity B

πr^2

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

Select one answer choice.

-9, -6, 3, 9, ...

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

Quantity A

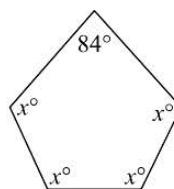
The 26th term of the sequence

Quantity B

0

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

Select one answer choice.

Quantity A x Quantity B

112

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

Select one answer choice.

$$\left(1 + \frac{1}{m}\right)x = 1$$

Quantity A x Quantity B

$$\frac{m}{m+1}$$

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

Select one answer choice.

The dollar value of a certain carving in 1983 was 20 percent greater than its dollar value in 1978. The dollar value of the carving in 1988 was 70 percent greater than its dollar value in 1978.

Quantity A

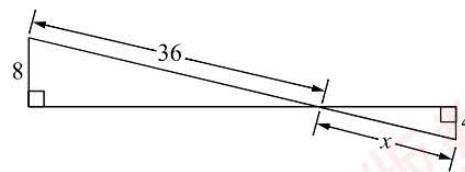
The percent increase in the dollar value of the carving from 1983 to 1988

Quantity B

50%

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

Select one answer choice.



In the figure above, x equals

- $4\frac{1}{2}$
- 8
- 12
- 16
- 18

Select one answer choice.

The numbers of employees in three regional offices of a company are n , p , and q , respectively. Each employee from each office mailed a card to each employee in the other two offices. Which of the following represents the total number of cards mailed by the employees?

- npq
- $2npq$
- $2np + 2nq + 2pq$
- $3n + 3p + 3q$
- $3np + 3nq + 3pq$

Select one answer choice.

The purchase price of each used book at a certain mail-order bookstore is $\frac{2}{15}$ of the original list price of the book. For each used-book order of more than 5 books, the total purchase price of the order is reduced by \$2.50 for each book in excess of 5 books. If the total purchase price of an order of 10 books is \$23.10, what was the total of the original list prices of the 10 books?

- \$173.30
- \$192.00
- \$203.10
- \$267.00
- \$360.80

Select one answer choice.

x is an odd integer, and y is a multiple of x . Which of the following must be an even integer?

- xy $x+y$ x^2y^2 $(x+1)y$ $x(y+1)$

Select one answer choice.

It cost a certain business a total of \$4,050.00 to make and sell 4,500 widgets. If the business sold each of the 4,500 widgets for \$2.40, what was the business's profit per widget? (Profit is equal to the selling price minus the cost.)

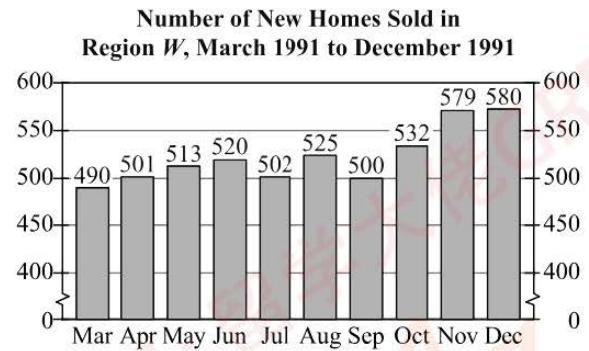
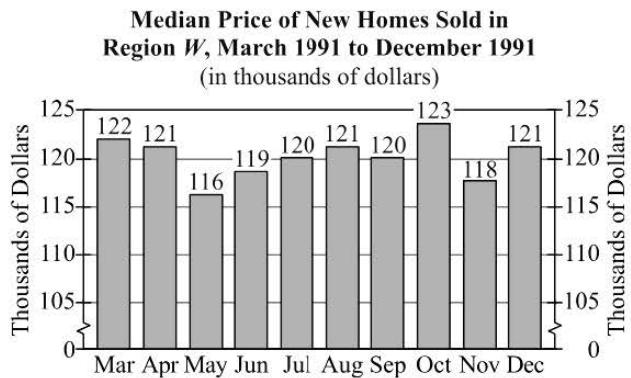
\$

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

Section 2 of 6 | Question 14 of 20

00:34:19 ⏹ Hide Time

Questions 14–16 are based on the following data.



For how many of the months after March did both the median price of new homes sold and the number of new homes sold increase from the previous month?

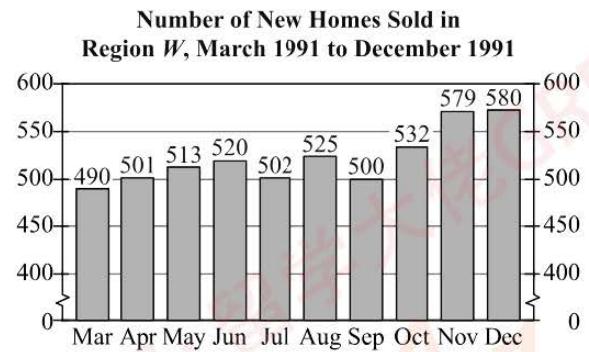
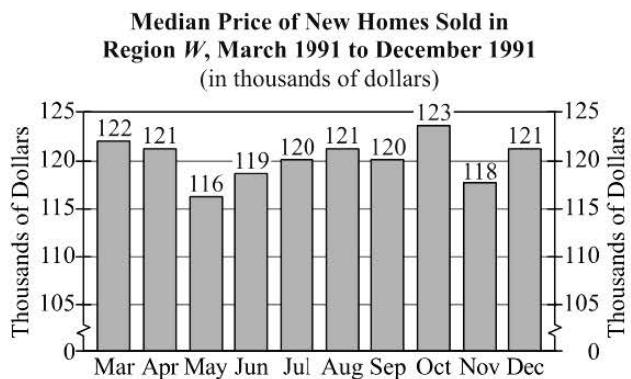
- One
- Two
- Three
- Four
- Five

Select one answer choice.

Section 2 of 6 | Question 15 of 20

00:34:15 ⏳ Hide Time

Questions 14–16 are based on the following data.



The number of new homes sold in December was approximately what percent greater than the number sold in March?

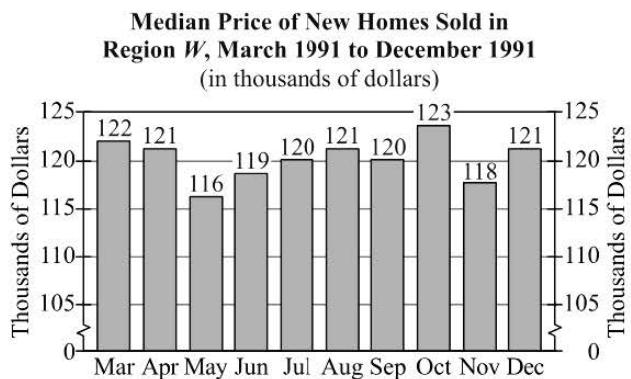
- 9%
- 16%
- 18%
- 20%
- 90%

Select one answer choice.

Section 2 of 6 | Question 16 of 20

00:34:12 ⏳ Hide Time

Questions 14–16 are based on the following data.



Of the following, which is closest to the average (arithmetic mean) monthly change in the median price of new homes sold from March to December?

- \$1,000
- \$100
- \$100
- \$500
- \$1,000

Select one answer choice.

The sum of n numbers is greater than 48. If the average (arithmetic mean) of the n numbers is 1.2, what is the least possible value of n ?

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

The average (arithmetic mean) of the r integers in a certain list is 23, and the average of the k integers in another list is 20. If $r = 4k$, what is the average of the $r + k$ integers in the two lists?

- 22.1
- 22.4
- 22.7
- 23.0
- 23.3

Select one answer choice.

If $xy \neq 0$, which of the following is equivalent to $y^{-1} = 3x^{-1}$?

- $y = -3x$
- $y = -\frac{x}{3}$
- $y = \frac{x}{3}$
- $y = 3x$
- $y = 3 - x$

Select one answer choice.

For two statistics classes, class A and class B , there are more students in class A than in class B . The heights of the students in both classes were measured.

Which of the following statements individually provide(s) sufficient additional information to conclude that the average (arithmetic mean) height of the students in class A is greater than the average height of the students in class B ?

Indicate all such statements.

- The average height of the students in class A is greater than the median height of the students in class B .
- The height of the tallest student in class B is less than the average height of the students in class A .
- The height of the shortest student in class A is greater than the median height of the students in class B .

Select one or more answer choices.

$$\begin{aligned}-\frac{1}{4} < x < \frac{3}{8} \\ -\frac{2}{3} < y < \frac{5}{6}\end{aligned}$$

Quantity A

$$xy$$

Quantity B

$$0.4$$

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

Select one answer choice.

p is the least prime number such that $|p - 28| < 4$.

Quantity A

p

Quantity B

26

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

Select one answer choice.

$$x < y < 0$$

Quantity A

$$\frac{1}{2}(x + y)$$

Quantity B

$$\frac{1}{2}x + y$$

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

Select one answer choice.

x and y are integers and $0 < x < y$.

Quantity A

$$x^y$$

Quantity B

$$y^x$$

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

Select one answer choice.

k is an integer such that $33 \leq k \leq 35$.

Quantity A

The number of positive factors of k ,
including 1 and k

Quantity B

4

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

Select one answer choice.

Quantity A

The area enclosed by a square with a side of length 2

Quantity B

Twice the area enclosed by an equilateral triangle with a side of length 2

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

Select one answer choice.

$$M - P = 0$$

Quantity A

$$M + P$$

Quantity B

$$M$$

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

Select one answer choice.

A large number of samples of water were tested for the presence of two different minerals, X and Y . Of all the samples tested, 52 percent showed the presence of X , 18 percent showed the presence of Y , and 10 percent showed the presence of both X and Y .

Quantity A

The percent of all the samples tested that showed the presence of neither X nor Y

Quantity B

34%

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

Select one answer choice.

At a medical clinic, there are exactly 20 medical personnel—8 doctors and 12 nurses. Of these medical personnel, 9 are men, and 3 of the 9 men are nurses. If a doctor is chosen at random, what is the probability that the doctor chosen will be a woman?

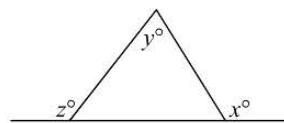
- $\frac{1}{10}$
- $\frac{3}{20}$
- $\frac{1}{4}$
- $\frac{3}{8}$
- $\frac{11}{20}$

Select one answer choice.

The daily profit P , in dollars, made by a dairy farmer is represented by $P = 0.6x - 320$, where x is the number of gallons of milk sold that day. If the farmer's profit for a certain day was greater than \$100.00, which of the following could be the number of gallons of milk sold that day?

- 367
- 534
- 600
- 700
- 760

Select one answer choice.



In the figure above, which of the following is equal to z ?

- $x + y$
- $90 + x - y$
- $90 + y - x$
- $180 + y - x$
- $180 + 2y - x$

Select one answer choice.

For how many integers between 100 and 999, inclusive, is the sum of the three digits of the integer equal to 4 ?

- 6
- 10
- 12
- 15
- 24

Select one answer choice.

A company has only two kinds of vehicles: cars and trucks. If 24 percent of the company's vehicles are cars that have automatic transmission and 60 percent of the company's cars have automatic transmission, what percent of the company's vehicles are cars?

 %

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

Section 4 of 6 | Question 14 of 20

00:34:11 ⏳ Hide Time

Questions 14 to 16 are based on the following data.

**Foreign-Language Placement Exam Data at College X
1990–1995**

Year	Number of First-Year Students Who Took the Placement Exam	Percent of First-Year Students Who Took the Placement Exam
1990	529	92%
1991	540	91%
1992	641	80%
1993	629	85%
1994	660	90%
1995	630	90%

In which of the following years did the number of students who took the placement exam decrease by the greatest amount from the previous year?

- 1991
- 1992
- 1993
- 1994
- 1995

Select one answer choice.

Section 4 of 6 | Question 15 of 20

00:34:08 ⏳ Hide Time

Questions 14 to 16 are based on the following data.

**Foreign-Language Placement Exam Data at College X
1990–1995**

Year	Number of First-Year Students Who Took the Placement Exam	Percent of First-Year Students Who Took the Placement Exam
1990	529	92%
1991	540	91%
1992	641	80%
1993	629	85%
1994	660	90%
1995	630	90%

In 1994, if 20 percent of the first-year students who took the placement exam received a score of 85 or higher, approximately what percent of all first-year students received a score of 85 or higher on the placement exam that year?

- 30%
- 22%
- 18%
- 9%
- 4.5%

Select one answer choice.

Section 4 of 6 | Question 16 of 20

00:34:06 ⏳ Hide Time

Questions 14 to 16 are based on the following data.

Foreign-Language Placement Exam Data at College X
1990–1995

Year	Number of First-Year Students Who Took the Placement Exam	Percent of First-Year Students Who Took the Placement Exam
1990	529	92%
1991	540	91%
1992	641	80%
1993	629	85%
1994	660	90%
1995	630	90%

How many first-year students did not take the placement exam in 1995?

- 57
- 63
- 66
- 70
- 73

Select one answer choice.

$$\frac{3}{a} - \frac{b}{14} = \frac{1}{7} \text{ and } \frac{a}{15} = \frac{2}{b}$$

If a and b satisfy the equations above, what is the value of $\frac{a}{b}$?

Give your answer as a fraction.

$$\frac{a}{b} = \frac{\boxed{}}{\boxed{}}$$

A1_GRE

Enter your answer as a fraction, with the numerator and denominator in their respective answer boxes. Backspace to erase.

Rating	1	2	3	4	5
Number of Applicants	2	9	14	20	8

Each of the 53 applicants for a job was interviewed and given a rating from 1 to 5. The table shows the number of applicants who were given each rating. Boris is one of the applicants who were given a rating of 4. Which of the following statements are true?

Indicate all such statements.

- The average (arithmetic mean) of the ratings given to the 53 applicants is greater than 3.
- The median of the ratings given to the 53 applicants is greater than the average of the ratings.
- If the person to be hired for the job is to be selected at random from the applicants with a rating of 4 or 5, then the probability that Boris will be hired is $\frac{28}{53}$.

Select one or more answer choices.

A total of 125 cubes, each 2 inches on an edge, are stacked in layers to form a large solid cube. What is the surface area, in square inches, of the large cube?

- 250
- 500
- 600
- 1,500
- 3,000

Select one answer choice.

$$\frac{60! - 59!}{58!} =$$

- (59)(58)
- (60)(59)
- $(58)^2$
- $(59)^2$
- $(60)^2$

Select one answer choice.

x is a member of the set $\{-3, 0, 1, 4, 7\}$.
 y is a member of the set $\{-4, -1, 2, 6, 8\}$.

Quantity A

The least possible value of xy

Quantity B

-26

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

Select one answer choice.

The operation \otimes is defined for all positive numbers x and y by $x \otimes y = x^2 - 2xy + y^2$.

r and s are positive numbers.

Quantity A

$$r \otimes s$$

Quantity B

$$s \otimes r$$

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

Select one answer choice.

The number of bacteria in culture A doubles every 2 hours, and the number of bacteria in culture B increases by 50 percent every hour. At 8:00 in the morning the number of bacteria in each of the two cultures is 5,000.

Quantity A

The number of bacteria in culture A at 2:00 that afternoon

Quantity B

The number of bacteria in culture B at 2:00 that afternoon

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

Select one answer choice.

The standard deviation of x , y , and z is d .

Quantity A

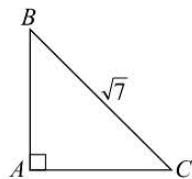
The standard deviation of $x + 1$, $y + 1$,
and $z + 1$

Quantity B

$d + 1$

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

Select one answer choice.



The length of side AC is an integer.

Quantity A

The length of side AB

Quantity B

$\sqrt{5}$

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

Select one answer choice.

S is the set of all integers x such that $2x < 15$.

T is the set of all integers y such that $3y > 10$.

Quantity A

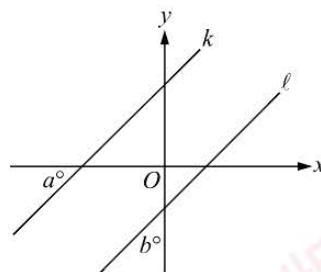
The number of integers that are in both set S and set T

Quantity B

4

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

Select one answer choice.



Lines k and ℓ lie in the xy -plane and are parallel.

Quantity A

a

Quantity B

b

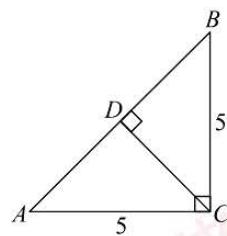
- Quantity A is greater.
- Quantity B is greater.
- The two quantities are equal.
- The relationship cannot be determined from the information given.

Select one answer choice.

In a certain homeowners' association, $\frac{2}{3}$ of the members in the association must vote in favor of a proposed change in the bylaws in order for the change to pass. At the last meeting, in which voting for a certain proposed change in the bylaws took place, $\frac{1}{4}$ of the members did not vote. If the proposed change was passed, at least what fraction of the members who voted must have voted in favor of the proposed change?

- $\frac{3}{4}$
- $\frac{5}{6}$
- $\frac{6}{7}$
- $\frac{8}{9}$
- $\frac{11}{12}$

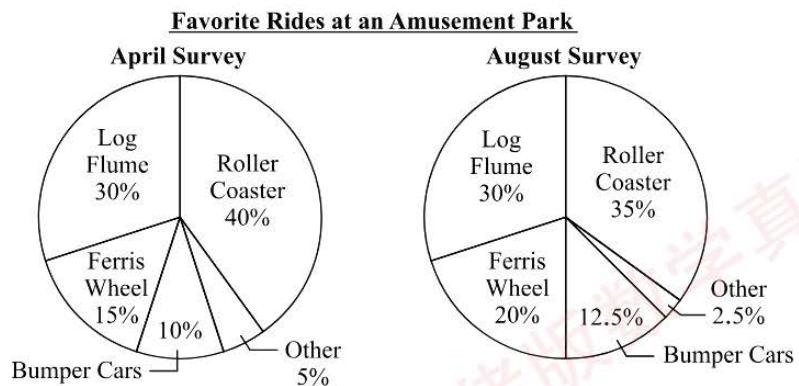
Select one answer choice.



In the figure above, what is the area of triangular region ADC ?

- $\frac{5\sqrt{2}}{2}$ $5\sqrt{2}$ $10\sqrt{2}$ $\frac{25}{4}$ $\frac{25}{2}$

Select one answer choice.

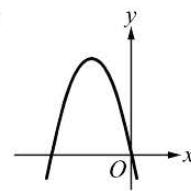
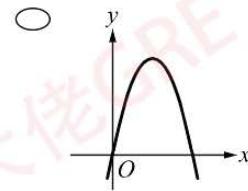
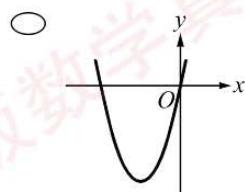
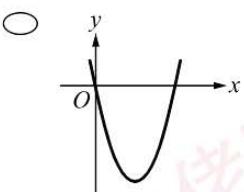
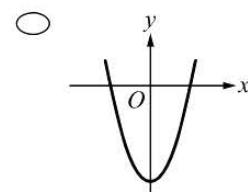


The circle graphs above summarize the responses from two surveys given at an amusement park in which the people surveyed were asked to choose a favorite ride. The numbers of people who responded to the surveys were 60 in April and 120 in August. From the April survey to the August survey, which of the five response categories shown had an increase of 150 percent in the number of people in that category?

- Roller coaster
- Log flume
- Ferris wheel
- Bumper cars
- Other

Select one answer choice.

Which of the following could be a portion of the graph of $y = (x + 2)^2 - 5$ in the xy -plane?



Select one answer choice.

In a sample of n people, 80 percent of the people filled out a questionnaire. If 65 percent of those who filled out the questionnaire are college graduates, what is the greatest possible percent of college graduates in the sample of n people?

- 52%
- 57%
- 62%
- 67%
- 72%

Select one answer choice.

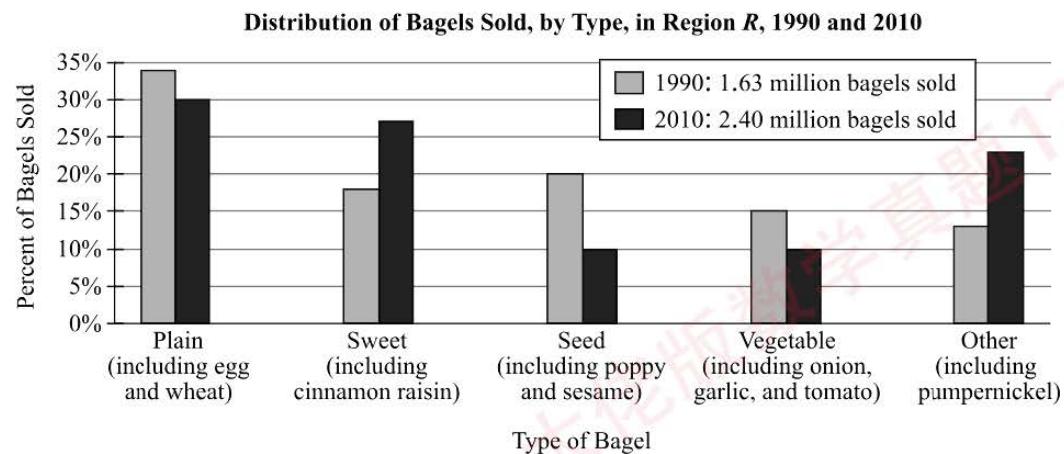
A scientist conducted an experiment and collected three measurements. Each measurement was an integer. The range of the three measurements was 2 and the least value was 1. Which of the following values could be the average (arithmetic mean) of the measurements collected for the experiment?

Indicate all such values.

- $\frac{4}{3}$ $\frac{5}{3}$ 2 $\frac{7}{3}$ 3

Select one or more answer choices.

Questions 14 to 16 are based on the following data.

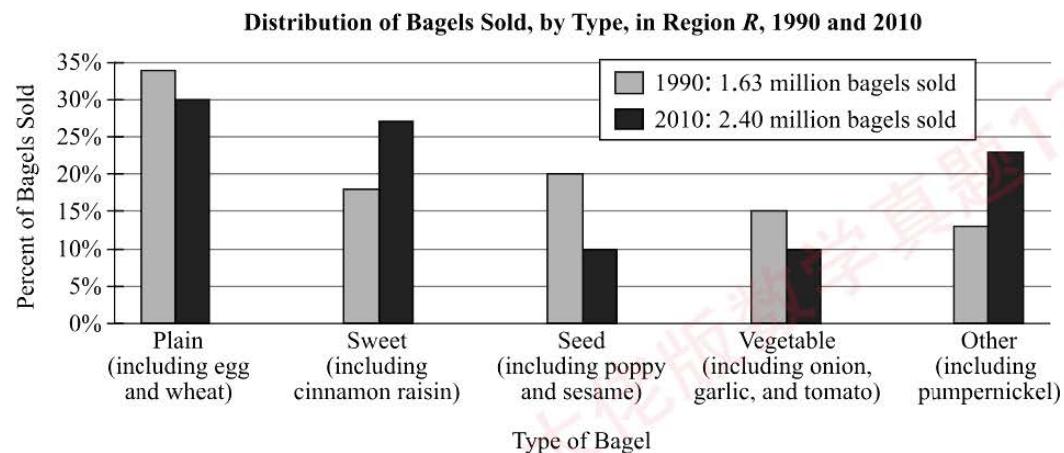


By approximately what percent did the number of seed bagels sold decrease from 1990 to 2010?

 26% 36% 50% 64% 74%

Select one answer choice.

Questions 14 to 16 are based on the following data.

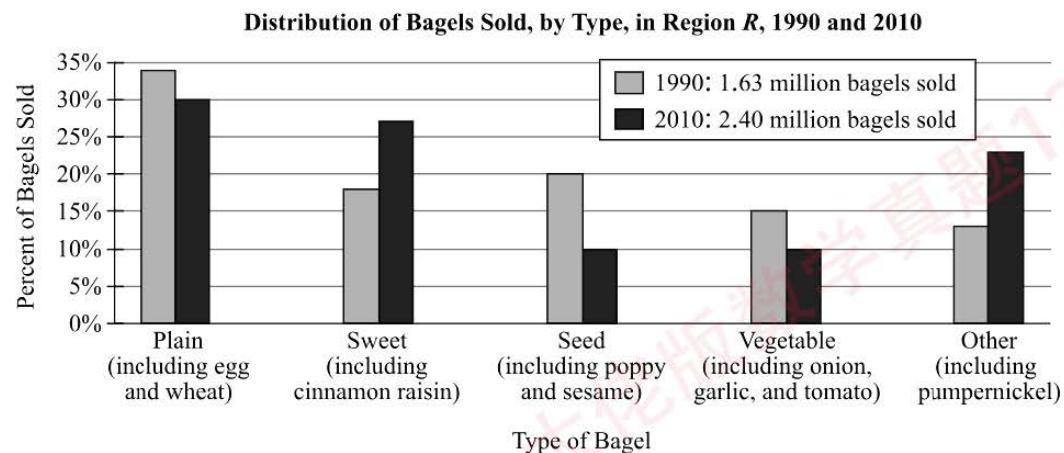


For how many combinations of 2 of the 4 types of bagels—plain, sweet, seed, and vegetable—was the total number of bagels of those 2 types sold in 2010 greater than 720,000?

 2 3 4 5 6

Select one answer choice.

Questions 14 to 16 are based on the following data.



For which type of bagel was the number of bagels of that type sold in 1990 closest to the number sold in 2010?

 Plain Sweet Seed Vegetable Other

Select one answer choice.

What is the remainder when $(345,606)^2$ is divided by 20 ?

A1_GRE

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

A line in the xy -plane has the equation $y = mx + 6$, where m is a constant and $3 \leq m \leq 4$. Which of the following values could be the x -intercept of the line?

Indicate all such values.

- 3 -2 $-\frac{7}{4}$ $-\frac{5}{4}$ $\frac{5}{4}$ $\frac{7}{4}$ 2 3

Select one or more answer choices.

In the sequence $1, -2, 3, -4, \dots, a_n, \dots$, the n th term is $a_n = (-1)^{n+1}n$ for each positive integer n . What is the sum of the first 99 terms?

- 198 -51 -49 49 50

Select one answer choice.

What is the greatest prime factor of $3^{100} - 3^{97}$?

- 3
- 5
- 7
- 11
- 13

Select one answer choice.

$$65 < k < m < p < r$$

List S : $65, k, m, p, r$

List T : $20, 40, 65, k, m, p, r$

The median and the average (arithmetic mean) of the numbers in list S are equal to 75.

Quantity A

The average of the numbers in list T

Quantity B

The median of the numbers in list T

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

Select one answer choice.

$$x^{-2} = \frac{1}{y+1}$$

Quantity A

$$x^2$$

Quantity B

$$y$$

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

Select one answer choice.

The equation $x^2 + 2x - 35 = (x - m)(x + n)$ is true for all values of x .

Quantity A

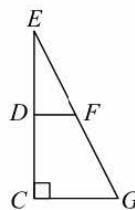
m

Quantity B

n

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

Select one answer choice.



$$\begin{aligned}ED &= DC \\EF &= FG\end{aligned}$$

Quantity A

The length of line segment CG

Quantity B

Twice the length of line segment DF

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

Select one answer choice.

$$n > 10,000$$

Quantity A

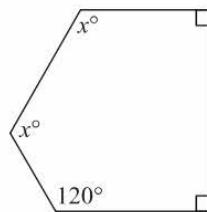
The thousands digit of $\frac{n}{8}$

Quantity B

7

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

Select one answer choice.

Quantity A x Quantity B

120

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

Select one answer choice.

k is a positive integer.

Quantity A

The remainder when k is divided by 7

Quantity B

The remainder when $2k$ is divided by 7

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

Select one answer choice.

In a company, $\frac{2}{3}$ of the employees are women and $\frac{1}{2}$ of the employees are college graduates.

Quantity A

The fraction of the employees in the company
who are women college graduates

Quantity B

$\frac{1}{6}$

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

Select one answer choice.

Five-sixths of six-fifths is equal to

- $\frac{25}{36}$
- 1
- $\frac{36}{25}$
- $\frac{61}{30}$
- 5

Select one answer choice.

List $P : 2, 11, 7, x$

The range of the four numbers in list P is 15 and for one of the numbers, n , in the list, $|n - x| = 11$.
What is the value of x ?

- 21
- 17
- 1
- 4
- 8

Select one answer choice.

A restaurant has a total of 16 tables, each of which can seat a maximum of 4 people. If 50 people were sitting at the tables in the restaurant, with no tables empty, what is the greatest possible number of tables that could be occupied by just 1 person?

- One
- Two
- Three
- Four
- Five

Select one answer choice.

A beaker contains 180 grams of a solution that is 75 percent alcohol and 25 percent water, by weight. What amount of water, in grams, must be added to the beaker to obtain a solution that is 60 percent alcohol, by weight?

- 15
- 45
- 50
- 55
- 90

Select one answer choice.

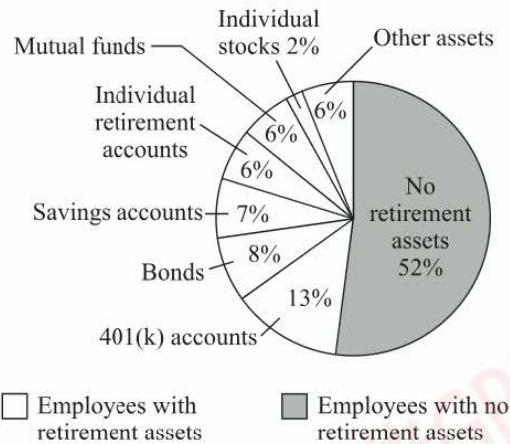
78, 82, 73, 81, 95, 92, 86, 90, 92

The 9 numbers listed are the highest temperatures, in degrees Fahrenheit, in a certain city on 9 consecutive days. The relationship between temperature in degrees Fahrenheit F and temperature in degrees Celsius C is given by the formula $C = \frac{5}{9}(F - 32)$. What is the median of the 9 temperatures in degrees Celsius?

 °C

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

Questions 14 to 16 are based on the following data.

Results of a Survey of 1,200 Employees About Retirement Assets**Survey question: If you have retirement assets, what is the main type of your assets?**

r is the number of employees surveyed whose main type of retirement assets are individual stocks or mutual funds.

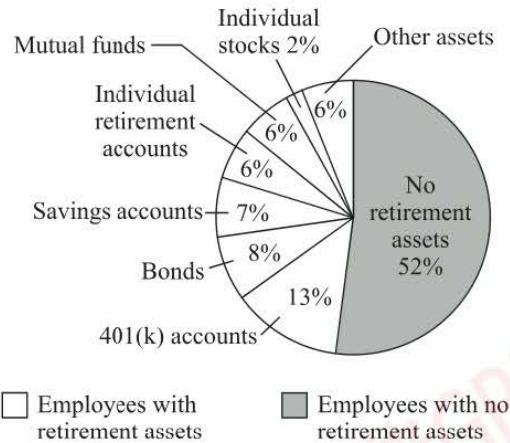
s is the number of employees surveyed whose main type of retirement assets are individual retirement accounts or bonds.

What is the ratio of r to s ?

- 1 to 1
- 1 to 4
- 2 to 5
- 4 to 5
- 4 to 7

Select one answer choice.

Questions 14 to 16 are based on the following data.

Results of a Survey of 1,200 Employees About Retirement Assets**Survey question: If you have retirement assets, what is the main type of your assets?**

Of those surveyed with retirement assets, 40 percent earn at least \$50,000 a year. Approximately how many of the employees surveyed have retirement assets and earn less than \$50,000 a year?

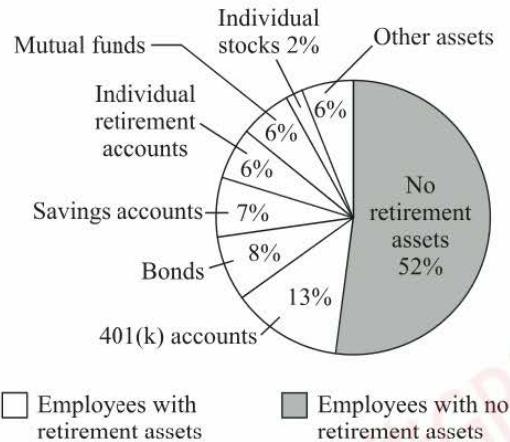
- 350
- 480
- 530
- 660
- 720

Select one answer choice.

Questions 14 to 16 are based on the following data.

Results of a Survey of 1,200 Employees About Retirement Assets

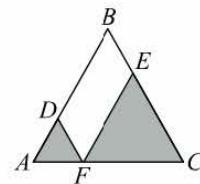
Survey question: If you have retirement assets, what is the main type of your assets?



Group W consists of those surveyed whose main type of retirement assets is individual retirement accounts or mutual funds. Of the employees in group W , 84 have only one type of retirement assets. One of the 1,200 employees surveyed is to be selected at random. What is the probability that the employee selected will be an employee in group W who has more than one type of retirement assets?

- $\frac{3}{100}$
- $\frac{1}{20}$
- $\frac{1}{10}$
- $\frac{3}{25}$
- $\frac{1}{5}$

Select one answer choice.



$$AD = \frac{1}{3}AB$$

$$AF = \frac{1}{3}AC$$

$$BE = \frac{1}{3}BC$$

The sum of the areas of the shaded regions is what fraction of the area of triangle ABC above?

<input type="text"/>
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Enter your answer as a fraction, with the numerator and denominator in their respective answer boxes. Backspace to erase.

What is the greatest possible value of $||x| - 3|$ for $-2 \leq x \leq 3$?

- 5
- 3
- 2
- 1
- 0

Select one answer choice.

If the average (arithmetic mean) of x and y is 0, which of the following must be true?

- $xy = 0$ $xy \neq 0$ $y = x$ $y = |x|$ $|y| = |x|$

Select one answer choice.

In the ceiling of a room, an opening was cut in the shape of a square with sides that are 1 foot in length. A circular fixture will be placed over the opening. If the circular fixture covers the square opening completely, which of the following could be the diameter of the circular fixture, in inches? (Note: 1 foot = 12 inches.)

Indicate all such diameters.

- 12
- 13
- 14
- 15
- 16
- 17
- 18

Select one or more answer choices.

Club G consists of women and men. For the women in club G , the lowest age is y years and the highest age is 57 years; and for the men in club G , the lowest age is 25 years and the highest age is x years.

Quantity A

The range of the ages of all of the members of club G

Quantity B

$$x - y$$

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

Select one answer choice.

In the xy -plane, line k passes through the points $(7, 0)$ and $(3, 4)$.

Quantity A

The y -intercept of line k

Quantity B

8

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

Select one answer choice.

$$x + y = 5$$

$$y > \frac{5}{2}$$

Quantity A x Quantity B y

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

Select one answer choice.

$$n > 1,000,000$$

Quantity A

$$\frac{\sqrt{1+n^2}}{n}$$

Quantity B

10

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

Select one answer choice.

Right isosceles triangle T is inscribed in circle C with diameter d .

Quantity A

The perimeter of triangle T

Quantity B

$$\frac{5}{2}d$$

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

Select one answer choice.

n is a four-digit positive integer such that its digits are all different and each digit is either 4, 7, 8, or 9.

Quantity A

The remainder when n is divided by 5

Quantity B

The remainder when n is divided by 9

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

Select one answer choice.

n and q are different positive integers.

Quantity A

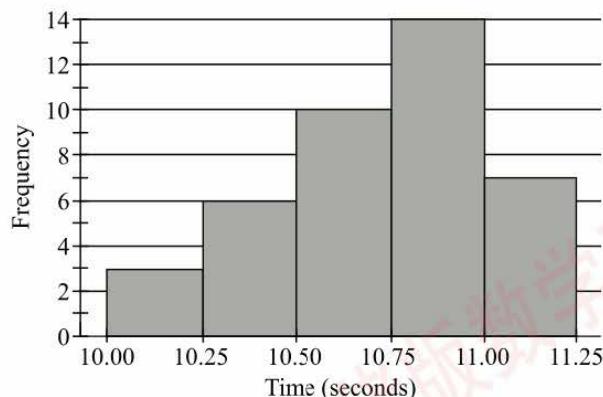
The greatest common factor of n and q

Quantity B

The greatest common factor of $201n + 2q$ and
 $100n + q$

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

Select one answer choice.



The histogram summarizes the running times, in seconds, of 40 runners competing in a track event. Which of the following values could be the median of the 40 running times, in seconds?

Indicate all such values.

- 10.65 10.72 10.85 10.97 11.01

Select one or more answer choices.

A drawer contains socks, of which 6 are white, 7 are red, and 10 are blue. Susan will randomly select socks from the drawer, one at a time and without replacement. What is the least number of socks that Susan must select in order to ensure that 2 of the socks selected are blue?

10

12

13

15

16

Select one answer choice.

Currency Exchange Rates

1 euro = 1.54 Canadian dollars
1 Australian dollar = 0.56 British pound
1 Canadian dollar = 1.04 Australian dollars

Selected exchange rates for four currencies on a certain day are shown. Based on the rates, approximately what is the value of 850 British pounds in euros?

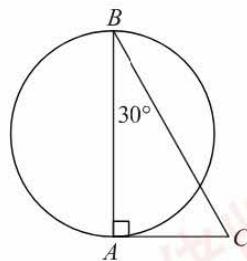
- 300
- 760
- 950
- 1,360
- 2,430

Select one answer choice.

A certain amusement park has expanded twice. The area of the park on January 1, 2019, was 25 percent greater than the area of the park on January 1, 2014. The area of the park on January 1, 2014, was 20 percent greater than the area of the park on January 1, 2009. The area of the park on January 1, 2009, was approximately what percent less than the area of the park on January 1, 2019?

- 33%
- 45%
- 50%
- 55%
- 67%

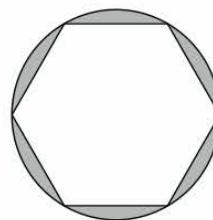
Select one answer choice.



In the figure shown, AB is a diameter of the circle. If the area of the circle is 3π , what is the area of triangle ABC ?

- $\sqrt{3}$
- 2
- $2\sqrt{2}$
- $2\sqrt{3}$
- $4\sqrt{3}$

Select one answer choice.



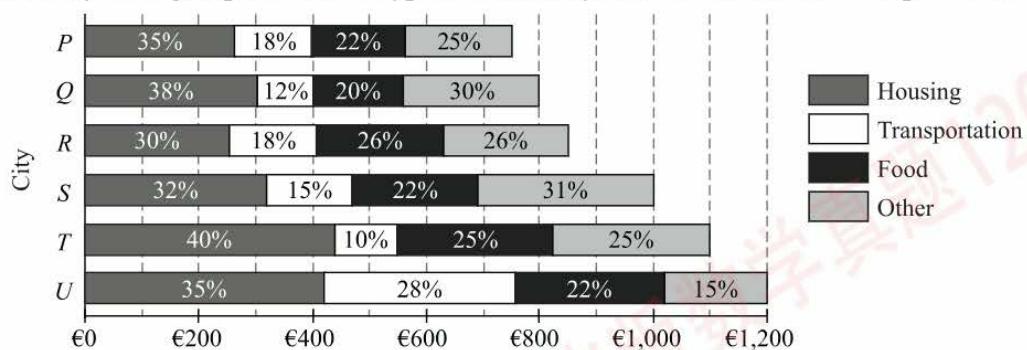
The figure shows a regular hexagon inscribed in a circle with circumference 8π . Approximately what is the sum of the areas of the shaded regions?

- 4
- 9
- 35
- 42
- 43

Select one answer choice.

Questions 14 to 16 are based on the following data.

Monthly Living Expenses for a Typical University Student in Selected European Cities



Note: The percents are based on total living expenses, in euros (€).

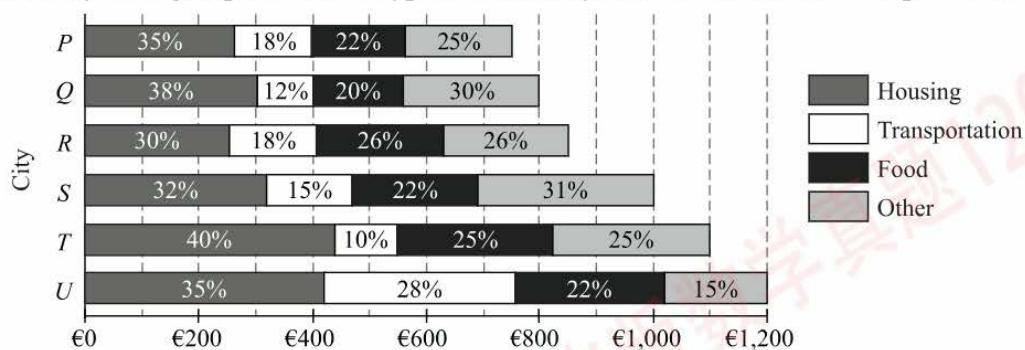
For the 6 cities shown, which of the following is the best estimate of the average (arithmetic mean) amount, in euros, of the Food expenses?

 218 226 234 242 250

Select one answer choice.

Questions 14 to 16 are based on the following data.

Monthly Living Expenses for a Typical University Student in Selected European Cities



Note: The percents are based on total living expenses, in euros (€).

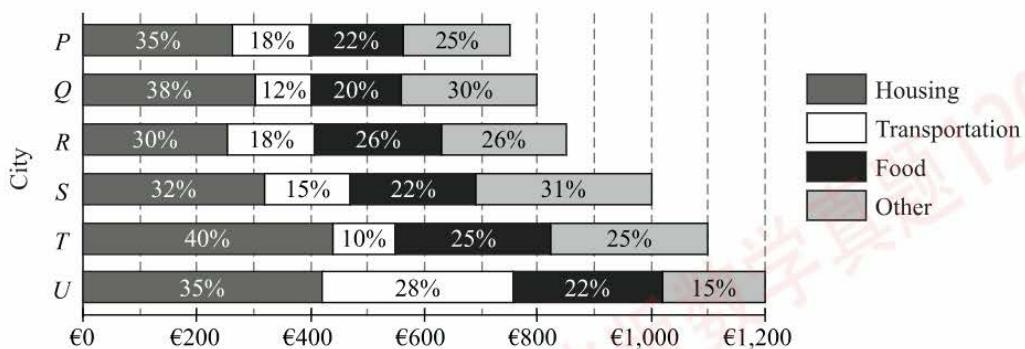
If a city is to be selected at random from the 6 cities shown, what is the probability that the city selected will be one for which the total amount of expenses in the categories Housing and Food combined is between 500 euros and 700 euros?

 $\frac{1}{6}$ $\frac{1}{3}$ $\frac{1}{2}$ $\frac{2}{3}$ $\frac{5}{6}$

Select one answer choice.

Questions 14 to 16 are based on the following data.

Monthly Living Expenses for a Typical University Student in Selected European Cities



Note: The percents are based on total living expenses, in euros (€).

If public transportation accounts for 50 percent of the Transportation expense for City Q and for 90 percent of the Transportation expense for City S , then the public transportation expense for City Q is what percent less than that for City S ?

Give your answer to the nearest whole percent.

 %

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

What fraction is equivalent to the repeating decimal $0.\overline{01}$?

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Enter your answer as a fraction, with the numerator and denominator in their respective answer boxes. Backspace to erase.

If $x < y < z$ and $xz < 0$, which of the following expressions is equivalent to $|x - y - z|$?

- $x - y - z$
- $x + y + z$
- $x + z - y$
- $y + z - x$
- $z - x - y$

Select one answer choice.

The sequence $a_1, a_2, a_3, \dots, a_{200}$ is defined by $a_n = n!$ for all integers n from 1 to 200. What is the units digit of the sum of the 200 integers in the sequence?

- 1
- 2
- 3
- 4
- 5

Select one answer choice.

If $\frac{a}{b} > \frac{c}{d}$, where a , b , c , and d are positive numbers, which of the following inequalities must be true?

Indicate all such inequalities.

- $ad - bc > 0$
- $\frac{a}{c} > \frac{b}{d}$
- $a > c$

Select one or more answer choices.

Data Value	Frequency
2	7
8	11
15	9
23	5
25	3

The table shows the frequency distribution of data values recorded during an experiment.

Quantity A

The median of the data values

Quantity B

15

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

Select one answer choice.

Line k in the xy -plane is perpendicular to the line joining the points $(1, 1)$ and $(2, 2)$.

Quantity A

The slope of line k

Quantity B

1

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

Select one answer choice.

The range of a list of 13 numbers is 110. The range of 10 of these numbers is 80.

Quantity A

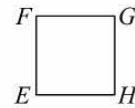
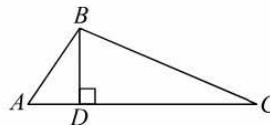
The range of the remaining 3 numbers

Quantity B

30

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

Select one answer choice.



The area of triangular region ABC is equal to the area of square region $EFGH$. The length of AC is equal to 4 times the length of EH .

Quantity A

The length of BD

Quantity B

The length of EH

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

Select one answer choice.

Quantity A

$$\frac{8^2 8^{-4}}{8^3}$$

Quantity B

$$\frac{1}{2^{15}}$$

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

Select one answer choice.

Quantity A

$$(x + 3)\left(x + \frac{1}{3}\right)$$

Quantity B

$$x\left(x + \frac{11}{3}\right)$$

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

Select one answer choice.

The function f is defined by $f(n) = 3n^2 + 2n + 5$ for all integers n .

Quantity A

The least value of $f(n)$ for all integers n

Quantity B

5

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

Select one answer choice.

A bicycle is traveling at a constant rate such that the wheels rotate 72 degrees per 0.1 second. If each wheel of the bicycle has a diameter of 26 inches, how many inches does the bicycle travel in 2 seconds?

- 52
- 52π
- 104
- 104π
- 396

Select one answer choice.

In a certain election, $\frac{3}{5}$ of the voters in District K and $\frac{1}{2}$ of the voters in District P voted for the candidate Miguel García. If 4 times as many people voted in District K as voted in District P , what percent of the voters in both districts combined voted for Miguel García?

- 52%
- 54%
- 55%
- 56%
- 58%

Select one answer choice.

The price of a apples is d dollars. At this rate, what is the price of $a + 700$ apples, in dollars?

- $\frac{700d + ad}{a}$
- $\frac{ad + d}{700a}$
- $\frac{700d + a}{d}$
- $\frac{700a + a^2}{d}$
- $\frac{700ad + d}{a}$

Select one answer choice.

$$N = 32^{19} - 32$$

What is the units digit of N ?

- 1
- 2
- 4
- 6
- 8

Select one answer choice.

Integers x and y are each greater than 1, and $7 < xy < 13$. How many different values of xy are possible?

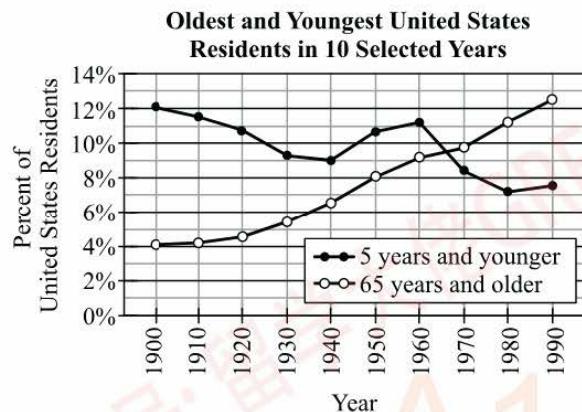
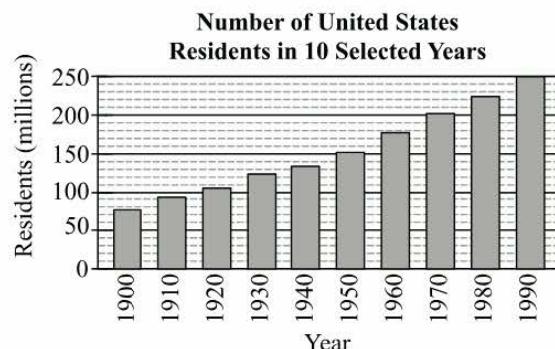
- Seven
- Six
- Five
- Four
- Three

Select one answer choice.

The sequence $a_1, a_2, a_3, \dots, a_k, \dots$ is defined by $a_1 = 1$ and $a_k = a_{k-1} + 3$ for all integers $k \geq 2$. What is the remainder when a_{2009} is divided by 9?

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

Questions 14 to 16 are based on the following data.

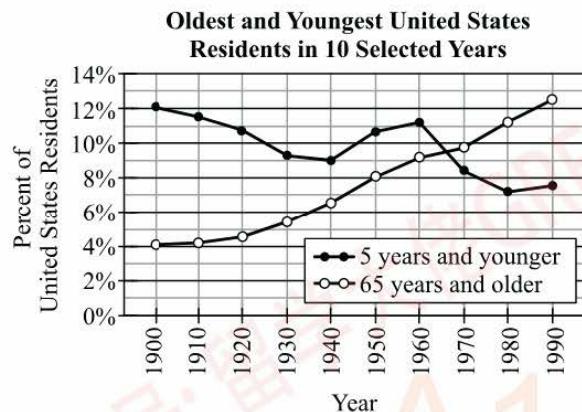
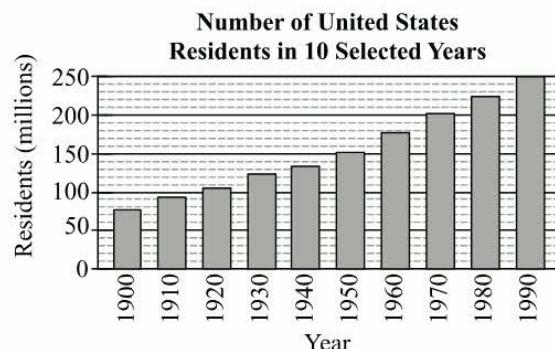


In 1970 approximately what percent of United States residents were older than 5 but younger than 65 years old?

- 2%
- 18%
- 64%
- 82%
- 98%

Select one answer choice.

Questions 14 to 16 are based on the following data.

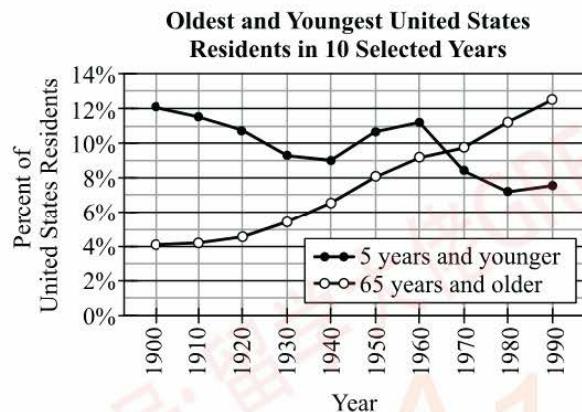
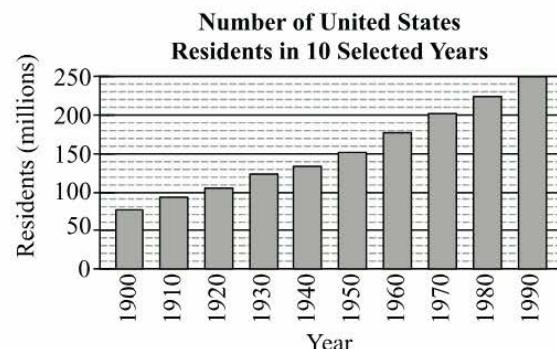


Of the 10 selected years, which had the greatest total number of United States residents in the combined age-groups of "5 years and younger" and "65 years and older"?

- 1900
- 1920
- 1960
- 1980
- 1990

Select one answer choice.

Questions 14 to 16 are based on the following data.



Of the following, which best describes how the number of United States residents that were in the age-group "5 years and younger" changed from 1900 to 1940?

- It increased by more than 50 percent.
- It increased by less than 50 percent but more than 5 percent.
- It changed by less than 5 percent.
- It decreased by less than 50 percent but more than 5 percent.
- It decreased by more than 50 percent.

Select one answer choice.

During each run of a computer simulation, either the letter X or the letter Y is displayed. For each run of the simulation, if the letter X is displayed, then the probability that X will be displayed in the next run is 0.3. Also for each run of the simulation, if the letter Y is displayed, then the probability that Y will be displayed in the next run is 0.4.

In 7 consecutive runs of the simulation, if X is displayed in the 5th run, what is the probability that X will be displayed in the 7th run?

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

The lengths of the sides of triangle RST are 3, 4, and y . Which of the following inequalities specifies those values of y for which each angle measure of triangle RST is less than 90° ?

- $1 < y < 4$
- $1 < y < 5$
- $2 < y < 5$
- $\sqrt{7} < y < 5$
- $\sqrt{7} < y < 6$

Select one answer choice.

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, B, C, D
- A, D, B, C
- B, C, D, A
- C, B, D, A
- C, D, B, A

Select one answer choice.

x and y are integers, $0 < x < y$, and $x^2 + y^2$ is even. Which of the following integers must be even?

Indicate all such integers.

- xy
- $x + y$
- $y - x$
- $x^2 + y$

Select one or more answer choices.

Quantity A

2 percent of $\frac{1}{2}$

Quantity B

3 percent of $\frac{1}{3}$

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

Select one answer choice.

The lengths of two sides of a triangle are 46 and 20.

Quantity A

The length of the third side of the triangle

Quantity B

67

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

Select one answer choice.

$$65 < k < m < p < r$$

List S : $65, k, m, p, r$

List T : $20, 40, 65, k, m, p, r$

The median and the average (arithmetic mean) of the numbers in list S are equal to 75.

Quantity A

The average of the numbers in list T

Quantity B

The median of the numbers in list T

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

Select one answer choice.

The number n is the least positive integer for which $108n$ is the square of an integer.

Quantity A

n

Quantity B

9

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

Select one answer choice.

Only 30 percent of the students in the 1965 graduating class of College X contributed money to last year's alumni fund. For these contributors, the average (arithmetic mean) amount donated per contributor was \$1,350.

Quantity A

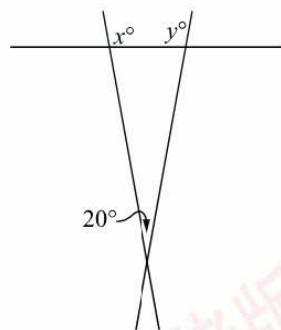
For all of the students in this graduating class,
the average amount donated, per student, to last
year's alumni fund

Quantity B

\$450

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

Select one answer choice.

Quantity A

$$x + y$$

Quantity B

$$200$$

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

Select one answer choice.

x , y , and c are positive integers.

Quantity A

$$\frac{x}{y}$$

Quantity B

$$\frac{x+c}{y+c}$$

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

Select one answer choice.

a and b are the roots of the equation $x^2 + x - 20 = 0$.

Quantity A

$$(a - b)^2$$

Quantity B

$$(a + b)^2$$

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

Select one answer choice.

$$S = \{1, 2, 3, 4\}$$
$$T = \{-4, -5, -6, -7\}$$

If a number x is selected from set S and a number y is selected from set T , what is the range of all possible values of $x + y$?

- 3
- 4
- 5
- 6
- 8

Select one answer choice.

In a survey of 1,400 college students, the ratio of women interviewed to men interviewed was 4 to 3. If 63 percent of the women and 48 percent of the men said they preferred product *A* to product *B*, what was the number of women and men combined who said they preferred product *A* to product *B* ?

- 762
- 770
- 780
- 792
- 817

Select one answer choice.

The sequence $b_1, b_2, b_3, \dots, b_k, \dots$ is defined by the equations $b_1 = -6$ and $b_{k+1} = b_k + 4$ for all integers $k \geq 1$. What is the value of $b_{12} - b_1$?

- 22
- 32
- 44
- 48
- 54

Select one answer choice.

What is the measure of an interior angle of a regular polygon with 5 sides?

- 36°
- 60°
- 72°
- 108°
- 144°

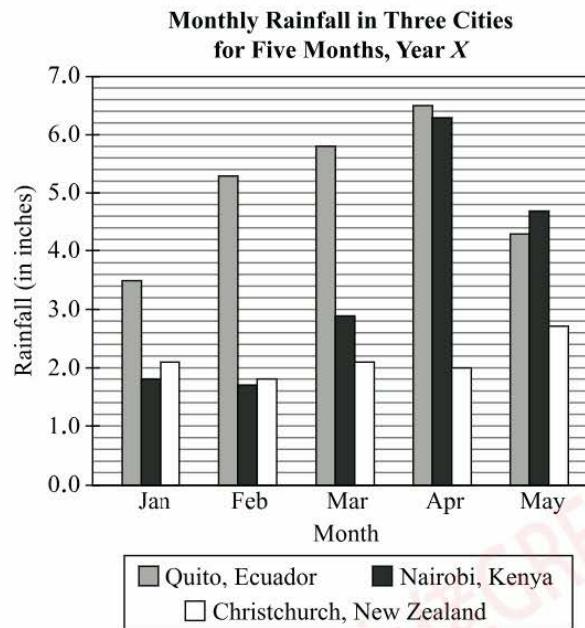
Select one answer choice.

Of 50 people surveyed, 32 people reported that they own a dog and the rest reported that they do not own a dog. Of the same group of people surveyed, 19 people reported that they own a cat and the rest reported that they do not own a cat. If 14 of the people who reported they own a dog also reported they own a cat, how many of the people surveyed reported that they do not own either a dog or a cat?

 people

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

Questions 14 to 16 are based on the following data.

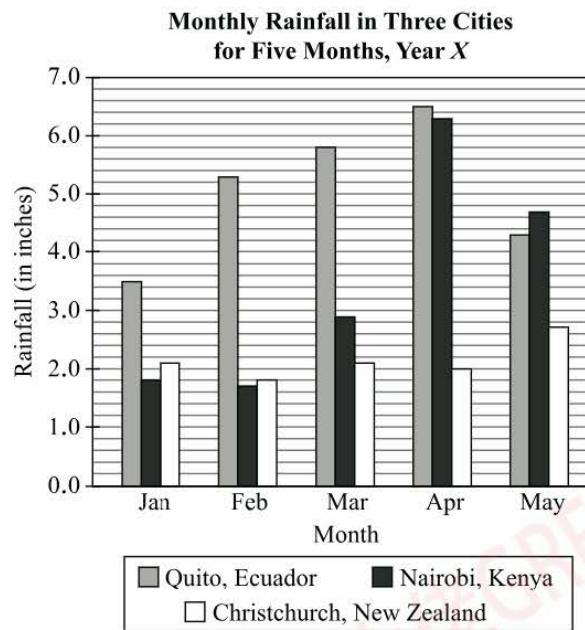


The total annual rainfall during year X in Nairobi was 29.9 inches. Approximately what percent of the total annual rainfall occurred during April?

- 45%
- 40%
- 30%
- 25%
- 20%

Select one answer choice.

Questions 14 to 16 are based on the following data.

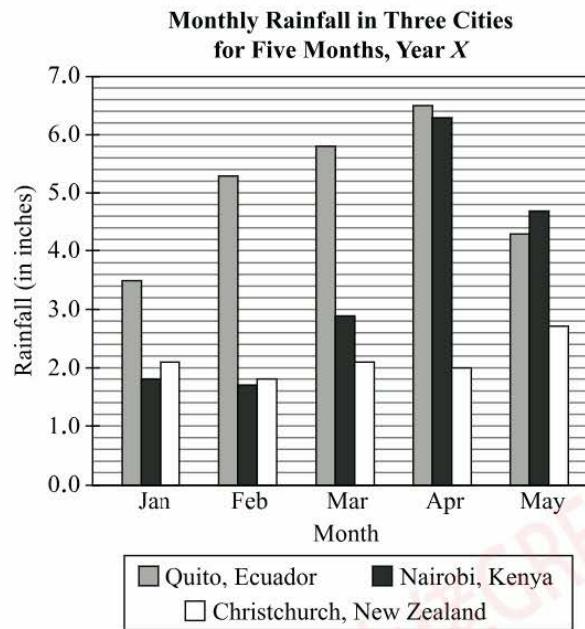


For the five months, the median of the values shown for monthly rainfall, in inches, for Quito was which of the following?

- 4.3
- 4.8
- 5.1
- 5.3
- 5.8

Select one answer choice.

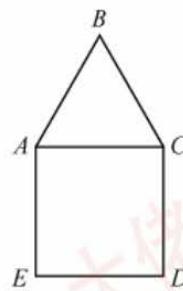
Questions 14 to 16 are based on the following data.



In Christchurch, the ratio of the number of inches of rainfall during May to the number of inches of rainfall during February was closest to which of the following?

- 2.3 to 1
- 1.8 to 1
- 1.5 to 1
- 1.3 to 1
- 0.7 to 1

Select one answer choice.



In the figure above, the area of equilateral triangle ABC is $25\sqrt{3}$. What is the area of square $ACDE$?

A1_GRE

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

A bag contains 11 blue marbles, x red marbles, and no other marbles. If a marble is to be selected at random from the bag, the probability that the marble selected will be red is less than $\frac{1}{3}$. What is the greatest possible value of x ?

- 3
- 4
- 5
- 6
- 7

Select one answer choice.



The sum of two numbers, divided by 2, gives a result of 24, and their difference divided by 2 gives a result of 17. The product of these two numbers is divisible by which of the following?

- 4
- 6
- 34
- 41
- 51

Select one answer choice.

Last week a company manufactured N dolls that were to be packed into boxes for shipment. The company was able to pack a total of $N - 3$ dolls into 5 boxes, each of which was packed with the same number of dolls.

Which of the following statements individually provide(s) sufficient additional information to determine the value of N ?

Indicate all such statements.

- N is a multiple of 3.
- 6 dolls were packed into each box.
- N is 27 greater than the number of dolls packed into each box.

Select one or more answer choices.

Quantity A

The area of a circular region with radius $\frac{1}{2}$

Quantity B

The area of a circular region with diameter 1

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

Select one answer choice.

One patient is to be randomly selected from a certain group of dental patients. The probability that the patient selected will be a male who is older than 60 years of age is $\frac{3}{25}$.

Quantity A

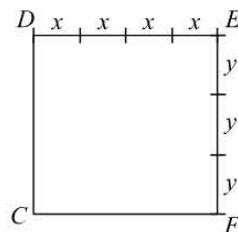
The probability that the patient selected will be a female who is 60 years old or younger

Quantity B

$\frac{7}{25}$

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

Select one answer choice.



CDEF is a square with an area of 324, and x and y are the lengths of the line segments indicated.

Quantity A

$$x + y$$

Quantity B

$$10$$

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

Select one answer choice.

$\frac{13}{x} = p$ and $\frac{13}{y} = m$, where p and m are integers and $0 < p < m$.

Quantity A

x

Quantity B

y

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

Select one answer choice.

$$n > 0$$

Quantity A

$$(n + 6)((n + 7) - (n + 8))$$

Quantity B

$$((n + 6) - (n + 7))(n + 8)$$

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

Select one answer choice.

n is an integer greater than 10.

Quantity A

The sum of the reciprocals of the first $2n$ positive integers

Quantity B

1 more than the sum of the reciprocals of the first n positive integers

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

Select one answer choice.

The five points C , D , E , F , and G lie on the number line, in that order from left to right, so that $CD = 1.5(EF)$ and $DE = 1.5(FG)$.

Quantity A

$$0.4(CG)$$

Quantity B

$$EG$$

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

Select one answer choice.

Mineral	Amount (milligrams)	Recommended Dietary Allowance (milligrams)
Calcium	6	1,000
Iron	0.12	18
Magnesium	5	420
Phosphorus	11	700
Sodium	1	1,500
Zinc	0.04	11

For selected minerals, the table shows the mineral content in an apple that weighs 100 grams and also shows the recommended daily allowance of the minerals. For which of the following minerals is the total amount of the mineral contained in 5 such apples greater than 4 percent of the recommended dietary allowance of the mineral?

Indicate all such minerals.

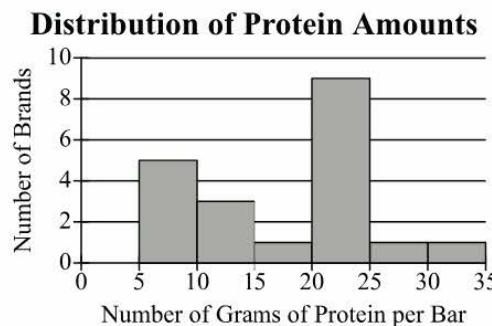
- Calcium Magnesium Sodium Zinc

Select one or more answer choices.

Chloe spent a total of x dollars last August on clothes, transportation, and college textbooks. She spent 23 percent of the total on college textbooks, of which 13 percent was spent on her college mathematics textbook. Chloe spent a total of \$450 on the college textbooks that were not her college mathematics textbook. Which of the following is closest to the value of x ?

- 1,250
- 1,500
- 1,750
- 2,000
- 2,250

Select one answer choice.



For each of 20 brands of protein bars, the number of grams of protein per bar was rounded to the nearest gram and recorded. The histogram shows the frequency distribution of the recorded numbers of grams of protein per bar for the 20 brands, where each interval shown includes its left endpoint and excludes its right endpoint. Based on the histogram, which of the following could be the average (arithmetic mean) and the median, respectively, of the recorded numbers of grams of protein per bar for the 20 brands?

- 16 and 21
- 18 and 17
- 19 and 19
- 21 and 22
- 23 and 21

Select one answer choice.

Fish Type	Cost per Fish
A	\$12
B	\$11
C	\$9

Hezekiah has a whole number of dollars to purchase fish for his fish tank. He has less than \$100, and the cost of each type of fish is shown in the table. If he purchases as many fish of type *A* as he can and no other fish, he will have \$4 remaining. If he purchases as many fish of type *B* as he can and 1 fish of type *C*, he will have \$0 remaining. How many dollars does Hezekiah have?

\$52

\$64

\$66

\$72

\$75

Select one answer choice.

How many noncongruent triangles are there such that the length of each side of each triangle is an integer and the perimeter of each triangle is 15 ?

- Five
- Six
- Seven
- Eight
- Nine

Select one answer choice.

A circle is inscribed in a regular hexagon that is inscribed in a circle. What is the ratio of the area of the smaller circle to the area of the larger circle?

- $\frac{1}{2}$
- $\frac{\sqrt{2}}{2}$
- $\frac{3}{4}$
- $\frac{\sqrt{3}}{2}$
- $\frac{\sqrt{3}}{\sqrt{2}}$

Select one answer choice.

Questions 14 to 16 are based on the following data.



Note: 1 tonne = 1,000 kilograms.

Uses, 2017

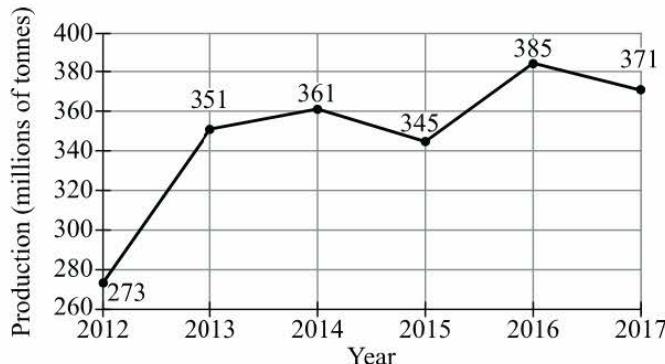
Use	Percent of Production
Feed	39%
Ethanol and fuel	27%
Exports	16%
Food and industrial use	9%
Residual	9%

Which of the following is closest to the average rate of change, in tonnes per year, for maize production from 2012 to 2017?

- 20 million
- 19 million
- 18 million
- 17 million
- 16 million

Select one answer choice.

Questions 14 to 16 are based on the following data.

Maize Production and Uses in the United States**Annual Production, 2012–2017**

Note: 1 tonne = 1,000 kilograms.

Uses, 2017

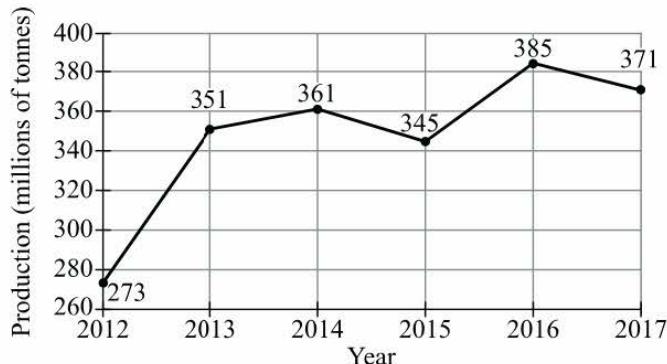
Use	Percent of Production
Feed	39%
Ethanol and fuel	27%
Exports	16%
Food and industrial use	9%
Residual	9%

In 2017, if 19 percent of the maize production that was used for feed was used for dairy cows, approximately how many tonnes of the maize production was feed used for dairy cows?

- 27 million
- 70 million
- 145 million
- 181 million
- 215 million

Select one answer choice.

Questions 14 to 16 are based on the following data.

Maize Production and Uses in the United States**Annual Production, 2012–2017**

Note: 1 tonne = 1,000 kilograms.

Uses, 2017

Use	Percent of Production
Feed	39%
Ethanol and fuel	27%
Exports	16%
Food and industrial use	9%
Residual	9%

For the years shown, the greatest annual maize production was what percent greater than the median annual maize production?

Give your answer to the nearest whole percent.

 %

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

How many positive integers less than or equal to 29 can be expressed as the product of two different integers greater than 1 ?

A1_GRE

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

In the xy -plane, the graph of a certain quadratic function has a single x -intercept and passes through the point $(2, 8)$. If the x -intercept of the graph is -3 , what is its y -intercept?

- $\frac{8}{25}$ $\frac{8}{5}$ $\frac{72}{25}$ $\frac{24}{5}$ $\frac{121}{25}$

Select one answer choice.

If $-1 < x < 0 < y < z < 1$, which of the following must be true?

- $|x - z| > |y|$
- $|x - z| < |y|$
- $|x| < |y| + |z|$
- $|x - y| > |z - y|$
- $|x - y| < |z - y|$

Select one answer choice.

If $x \leq -1$, which of the following statements must be true?

Indicate all such statements.

- $\sqrt{x^2} = x$
- $\sqrt{(-x)|x|} = -x$
- $\sqrt{(x-1)^2} = 1-x$

Select one or more answer choices.

x , y , and z are three positive integers, and their average (arithmetic mean) is 20.

Quantity A

$$2x + 2y + 2z$$

Quantity B

$$120$$

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

Select one answer choice.

$$\begin{aligned}y &= 2x + 5 \\x^2 &= 4\end{aligned}$$

Quantity A y Quantity B

6

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

Select one answer choice.

The area of a circular region with radius r is 3 times the area of a triangular region with base b and height h , where $bhr \neq 0$.

Quantity A

r

Quantity B

h

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

Select one answer choice.

In a certain school district, the school budget for 2003 was 24 percent greater than the budget for 2002, and the budget for 2004 was 40 percent greater than the budget for 2002.

Quantity A

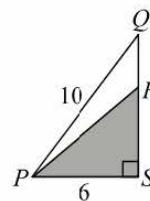
The percent increase in the school budget from
2003 to 2004

Quantity B

16%

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

Select one answer choice.



The area of region PQR is 15.

Quantity A

The area of shaded region PRS

Quantity B

9

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

Select one answer choice.

In the xy -plane, the graph of the line $y = kx - 5$ has an x -intercept of $\frac{-10}{3}$.

Quantity A

k

Quantity B

$\frac{-3}{2}$

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

Select one answer choice.

The function f is defined for all positive integers n as follows.

$$f(n) = \begin{cases} 1 & \text{if the remainder is 1 when } n^2 \text{ is divided by 5} \\ 0 & \text{otherwise} \end{cases}$$

Let $S = f(100) + f(101) + f(102) + f(103) + f(104)$.

Quantity A

S

Quantity B

2

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

Select one answer choice.

A father purchased theater tickets for 6 adjacent seats in the same row of seats for himself, his wife, and their 4 children. How many seating arrangements are possible if the father and mother sit in the 2 middle seats?

- 24
- 36
- 48
- 120
- 240

Select one answer choice.

The variables x and y are related by a linear equation. If y increases by 4 whenever x increases by 1, which of the following equations could represent the relationship between x and y ?

Indicate all such equations.

- $y = 4x$
- $y = x - 4$
- $y = 8x + 4$
- $y = 4(x - 5)$

Select one or more answer choices.

What is the units digit of the sum $13^{10} + 17^{10}$?

- 0
- 2
- 4
- 6
- 8

Select one answer choice.

A scale diagram of a kitchen has a scale in which 1 unit represents 3 feet. In the diagram, the area of the base of a row of cabinets is 2.5 square units. What is the area, in square feet, of the base of the row of cabinets in the actual kitchen?

- $2.5\sqrt{3}$ 7.5 $9\sqrt{2.5}$ $3(2.5^2)$ 22.5

Select one answer choice.

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, B, C, D
- A, D, B, C
- B, C, D, A
- C, B, D, A
- C, D, B, A

Select one answer choice.

Working at their respective constant rates, machine A can produce 10,000 widgets in 10 hours, and machine B can produce 10,000 widgets in 5 hours. If the two machines work simultaneously and independently at their respective constant rates, then they would produce a total of 10,000 widgets in how many minutes?

 minutes

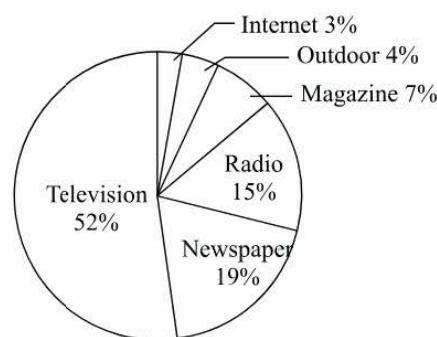
Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

Questions 14 to 16 are based on the following data.

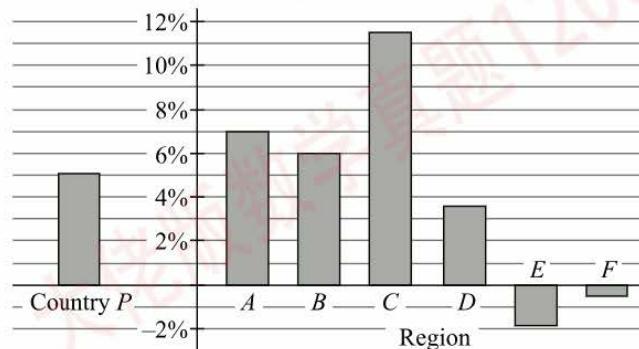
Amount Spent on Advertising in Country P in 2013

(Total amount spent: \$952 million)

Distribution of Amount Spent on Advertising, by Media Type



Percent Change in Amount Spent on Advertising from 2012 to 2013, by Region of Country P



Of the regions of Country P that had a positive percent change in the amount spent on advertising from 2012 to 2013, which had the least percent change?

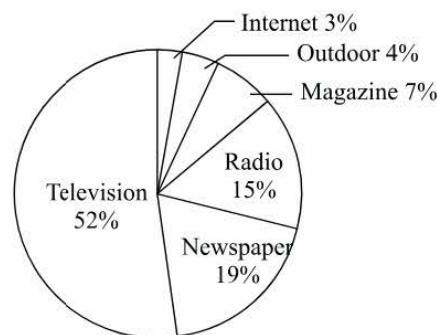
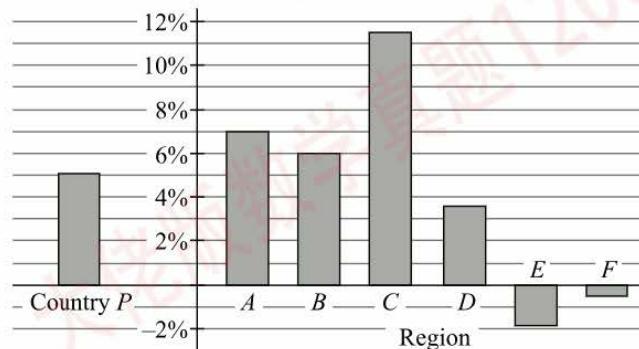
 A B C D F

Select one answer choice.

Questions 14 to 16 are based on the following data.

Amount Spent on Advertising in Country P in 2013

(Total amount spent: \$952 million)

Distribution of Amount Spent on Advertising, by Media Type**Percent Change in Amount Spent on Advertising from 2012 to 2013, by Region of Country P**

For which of the six regions of Country P was the amount spent on advertising in 2012 greater than the amount spent on advertising in 2013?

Indicate all such regions. A B C D E F

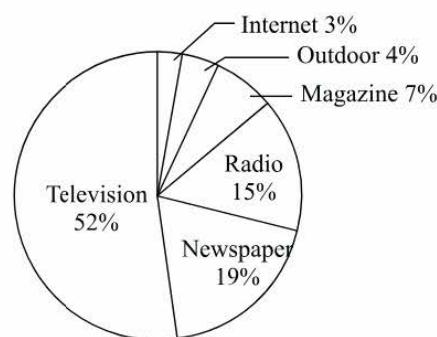
Select one or more answer choices.

Questions 14 to 16 are based on the following data.

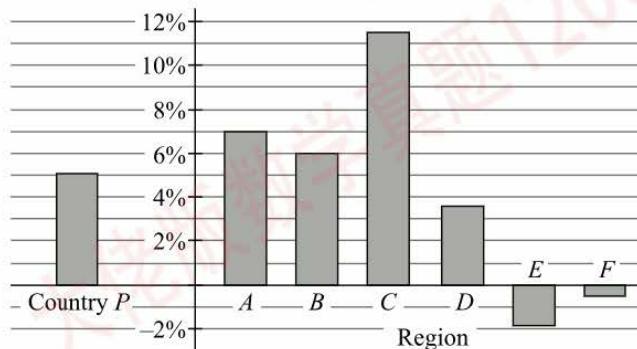
Amount Spent on Advertising in Country P in 2013

(Total amount spent: \$952 million)

Distribution of Amount Spent on Advertising, by Media Type



Percent Change in Amount Spent on Advertising from 2012 to 2013, by Region of Country P



In Country P the percent spent on outdoor advertising in 2012 was one-half of the corresponding percent spent in 2013. Which of the following is closest to the amount spent on outdoor advertising in Country P in 2012?

 \$18 million \$19 million \$36 million \$37 million \$38 million

Select one answer choice.

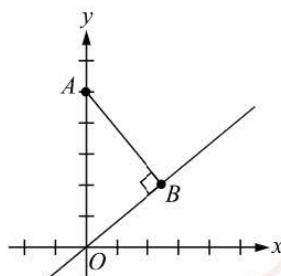
A list consists of 10 positive integers. The sum of the 10 integers is 101. If no integer appears more than twice in the list, what is the greatest possible integer that can appear in the list?

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

A right triangle has sides of length 2, 5, and x . A second right triangle has sides of length 4, 7, and y . A third right triangle has sides of length x , y , and n . Which of the following could be the value of n ?

- 3
- 6
- 8
- 9
- 10

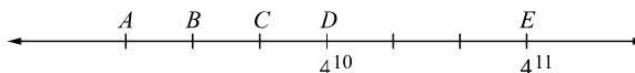
Select one answer choice.



In the xy -plane shown, the x -axis represents an east-west road, the y -axis represents a north-south road, and the origin represents the intersection of the two roads. Point A and point B represent the centers of Town A and Town B , respectively, and the center of Town A is 5 kilometers north of the intersection. If the line through the origin and point B has slope $\frac{3}{4}$, which of the following is closest to the distance, in kilometers, between the centers of Town A and Town B ?

- 2 2.5 3 3.5 4

Select one answer choice.



The tick marks shown on the number line are evenly spaced. Points D and E have coordinates of 4^{10} and 4^{11} , respectively. The point that has a coordinate of 4^9 is

- point A
- between points A and B
- between points B and C
- point C
- between points C and D

Select one answer choice.

$$\begin{aligned}x &> |y| \\y &< 0\end{aligned}$$

Quantity A

$$x + y$$

Quantity B

$$0$$

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

Select one answer choice.

For all x , $x^2 + 4x - 12 = (x - r)(x + s)$, where $r > 0$ and $s > 0$.

Quantity A

r

Quantity B

s

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

Select one answer choice.

The lengths of two sides of a triangle are 46 and 20.

Quantity A

The length of the third side of the triangle

Quantity B

67

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

Select one answer choice.

List S consists of n different positive values, where n is greater than 1. List T consists of the squares of the n values in S .

Quantity A

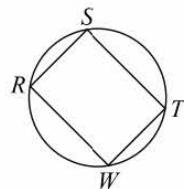
The square of the range of the values in S

Quantity B

The range of the values in T

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

Select one answer choice.



Rectangle $RSTW$ is inscribed in the circle. The width and length of $RSTW$ are 2 and 5, respectively.

Quantity A

The area of the circular region

Quantity B

7π

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

Select one answer choice.

The function f is defined by $f(x) = x^2 - 1$ for all numbers x .

p is a number greater than or equal to 0.

Quantity A

$$f(p)$$

Quantity B

$$(f(p))^2 - 1$$

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

Select one answer choice.

Drug	Percent of 800 Doctors Surveyed Who Said the Drug Was Effective
P	34%
Q	58%
R	37%

Quantity A

The number of doctors surveyed who said that drug Q was effective and did not say that drug R was effective

Quantity B

210

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

Select one answer choice.

The units digit of 3^n is 1, where n is an integer greater than 50.

Quantity A

The units digit of 3^{n+3}

Quantity B

7

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

Select one answer choice.

A group of adults and children spent a total of \$420 for tickets and food at the circus. Tickets to the circus cost \$20 per adult and \$10 per child. If the group spent an average of \$21 per person for tickets and food, and there were the same number of adults as children in the group, what was the total amount that the group spent on food at the circus?

- \$100
- \$120
- \$160
- \$200
- \$210

Select one answer choice.

If both the sum and the product of the four positive integers a , b , c , and d are even, what is the greatest number of these integers that could be odd?

- None
- One
- Two
- Three
- Four

Select one answer choice.

If an integer x is to be randomly selected from among the integers between 1 and 10, inclusive, what is the probability that $2|x - 3| < 4$?

- $\frac{1}{5}$ $\frac{3}{10}$ $\frac{2}{5}$ $\frac{1}{2}$ $\frac{3}{5}$

Select one answer choice.

A store is shipping 7 items to a single address. The items can be packed into 1, 2, or 3 different containers for shipping. If a container is used for shipping, it must be packed with at least 2 items. Which of the following statements about the different combinations of packing must be true?

Indicate all such statements.

- There will be exactly 3 items in one container.
- There will be at most 3 items in each container.
- There will be an odd number of items in one container.

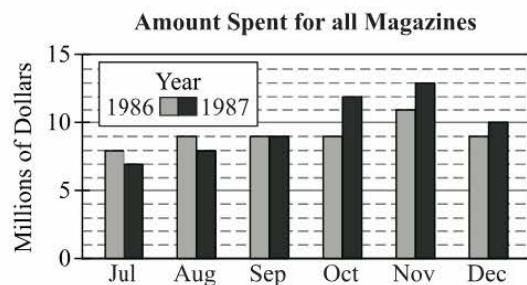
Select one or more answer choices.

A chair manufacturer's weekly fixed cost is \$3,000, and the manufacturer's cost of producing each chair is \$100. If the manufacturer sells each chair for \$200, what is the least number of chairs the manufacturer would have to produce and sell in a week in order to make a profit of \$1,430 or more for that week?

 chairs

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

Questions 14 to 16 are based on the following data.



Sales for Three Leading Magazines

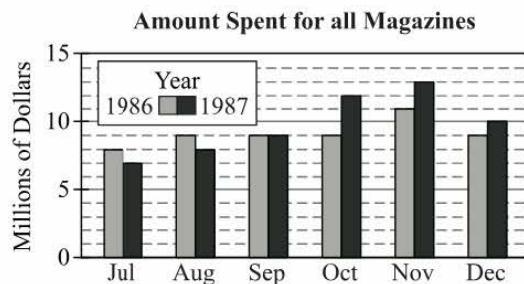
	Number of Copies Sold July 1–Dec. 31 1987	Percent Change in Number of Copies Sold from July 1–Dec. 31 1986 to July 1–Dec. 31 1987	Number of Copies Sold Dec. 1–Dec. 10 1987
Magazine A	2,518,776	+1.5	151,300
Magazine B	1,391,792	+6.3	110,313
Magazine C	614,399	-3.5	41,234
Total	4,524,967	+2.0	302,847

For which of the months, July through December, was the ratio
 $\frac{\text{amount spent for 1987}}{\text{amount spent for 1986}}$ greatest?

- July
- August
- September
- October
- November

Select one answer choice.

Questions 14 to 16 are based on the following data.



Sales for Three Leading Magazines

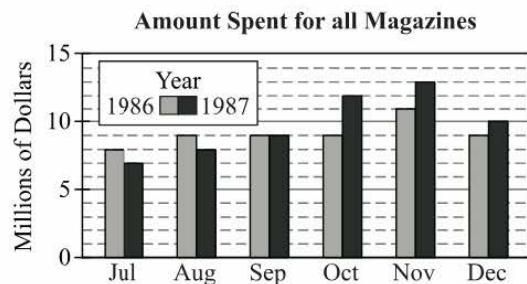
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Magazine B	1,391,792	+6.3	110,313
Magazine C	614,399	-3.5	41,234
Total	4,524,967	+2.0	302,847

For the month of December, what was the approximate percent increase in the amount spent for all magazines from 1986 to 1987?

- 11.1%
- 10.0%
- 8.0%
- 1.0%
- 0.1%

Select one answer choice.

Questions 14 to 16 are based on the following data.



Sales for Three Leading Magazines

	Number of Copies Sold July 1–Dec. 31 1987	Percent Change in Number of Copies Sold from July 1–Dec. 31 1986 to July 1–Dec. 31 1987	Number of Copies Sold Dec. 1–Dec. 10 1987
Magazine A	2,518,776	+1.5	151,300
Magazine B	1,391,792	+6.3	110,313
Magazine C	614,399	-3.5	41,234
Total	4,524,967	+2.0	302,847

The total number of copies of magazines *A*, *B*, and *C* sold during the last six months of 1986 was approximately

- 4,300,000
- 4,400,000
- 4,500,000
- 4,600,000
- 4,700,000

Select one answer choice.

If $y - 2x = 1$ and $3y + z = 2$, what is the value of x for which $3y + 2z = 0$?

Give your answer as a fraction.

$$x = \frac{\boxed{}}{\boxed{}}$$

Enter your answer as a fraction, with the numerator and denominator in their respective answer boxes. Backspace to erase.

What is the perimeter of a square with a diagonal of length 15 ?

- $15\sqrt{2}$
- 30
- $30\sqrt{2}$
- 60
- $60\sqrt{2}$

Select one answer choice.

If the average (arithmetic mean) of x and y is 0, which of the following must be true?

- $xy = 0$ $xy \neq 0$ $y = x$ $y = |x|$ $|y| = |x|$

Select one answer choice.

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?

- 15% 18% 20% 22% 43%

Select one answer choice.

A large number of measurements of a variable Y were taken. These measurements were found to be normally distributed with a mean of 56 and a standard deviation of 4.

Quantity A

The percent of the measurements that were between 60 and 62

Quantity B

The percent of the measurements that were between 62 and 64

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

Select one answer choice.

In an art history class, 70 percent of the students submitted their assignments on time, and of those who did not, 40 percent submitted their assignments one day late.

Quantity A

The percent of the class who neither submitted their assignments on time nor submitted them one day late

Quantity B

18%

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

Select one answer choice.

Integer m is a multiple of 15.

Quantity A

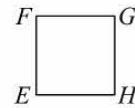
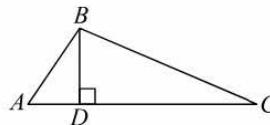
The remainder when $14m$ is divided by 6

Quantity B

0

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

Select one answer choice.



The area of triangular region ABC is equal to the area of square region $EFGH$. The length of AC is equal to 4 times the length of EH .

Quantity A

The length of BD

Quantity B

The length of EH

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

Select one answer choice.

x and y are nonnegative numbers.

Quantity A

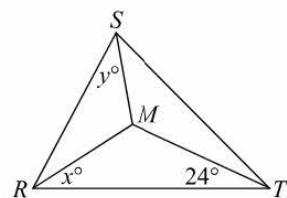
$$\sqrt{xy}$$

Quantity B

$$\frac{x+y}{2}$$

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

Select one answer choice.



In the figure, line segments RM , SM , and TM bisect the angles of $\triangle RST$.

Quantity A

$$\frac{x+y}{2}$$

Quantity B

33

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

Select one answer choice.

$$\frac{m^3}{n^6} = \frac{1}{27}$$

Quantity A

$$3m$$

Quantity B

$$n^2$$

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

Select one answer choice.

Stations A , M , and B are located along a certain train route, and Station M is between Stations A and B . At noon, a train engine passed Station A traveling at a constant speed of 80 kilometers per hour toward Station B . Also at noon, another train engine passed Station B traveling at a constant speed of 60 kilometers per hour toward Station A . Both train engines passed Station M at the same time. What is the ratio of the distance along the route between Stations A and M to the distance along the route between Stations A and B ?

- $\frac{1}{4}$ $\frac{3}{7}$ $\frac{1}{2}$ $\frac{4}{7}$ $\frac{3}{4}$

Select one answer choice.

Bucket A currently has 20 percent more paint than bucket B has. If 0.4 gallon of paint is transferred from bucket A to bucket B , then the two buckets will have the same amount of paint. How many gallons of paint does bucket B currently have?

- 1
- 2
- 3
- 4
- 5

Select one answer choice.

In the xy -plane, a triangular region is enclosed by the x -axis, the y -axis, and the line with equation $2x - y + k = 0$, where k is a positive constant. For which of the following values of k is the area of the triangular region greater than 1 and less than 4?

- 0
- 1
- 2
- 3
- 4

Select one answer choice.

Three machines, working independently, can make a production lot of widgets in 4, 6, and 8 hours, respectively. If the machines work simultaneously at their respective uniform rates to make a single lot, what fraction of the lot will be made by the fastest machine?

- $\frac{2}{3}$
- $\frac{6}{13}$
- $\frac{1}{2}$
- $\frac{1}{4}$
- $\frac{2}{9}$

Select one answer choice.

If x is an integer, what is the least possible value of $3^x + 3^{-x}$?

- 0
- 2
- $2\frac{2}{3}$
- 3
- $3\frac{1}{3}$

Select one answer choice.

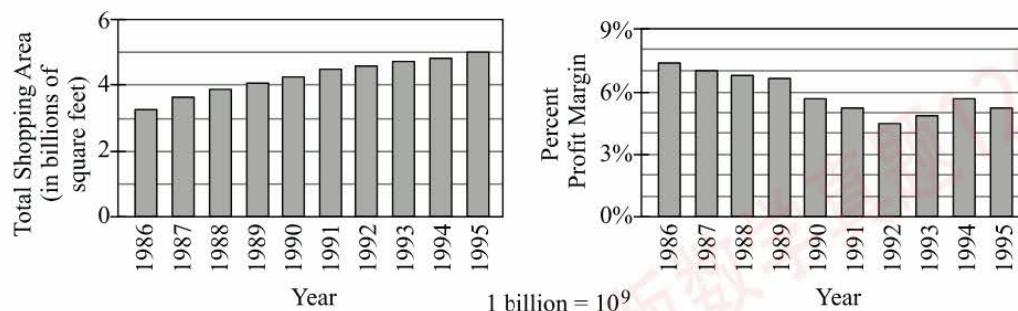
Last week George's annual salary increased by 6 percent and he received a \$450 bonus. The combined total of George's annual salary after the increase and the bonus he received is 8 percent greater than his annual salary before the increase. What was George's annual salary before the increase?

\$

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

Questions 14– 16 are based on the following data.

Shopping Area on December 31 and Yearly Percent Profit Margin in Country X, 1986–1995



Approximately what is the range of the percent profit margin for the ten years shown?

7%

6%

5%

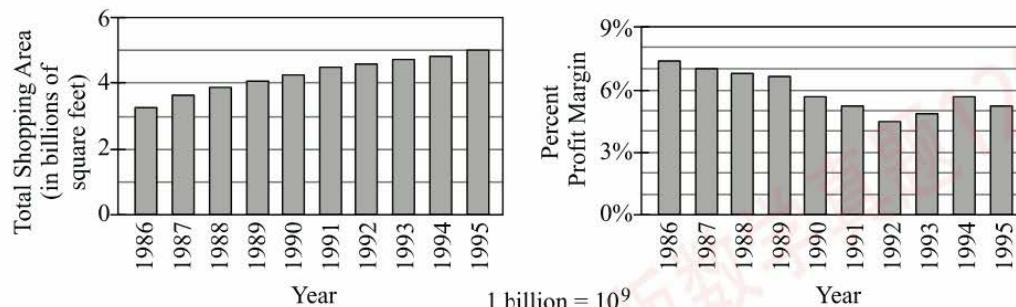
3%

2%

Select one answer choice.

Questions 14– 16 are based on the following data.

Shopping Area on December 31 and Yearly Percent Profit Margin in Country X, 1986–1995



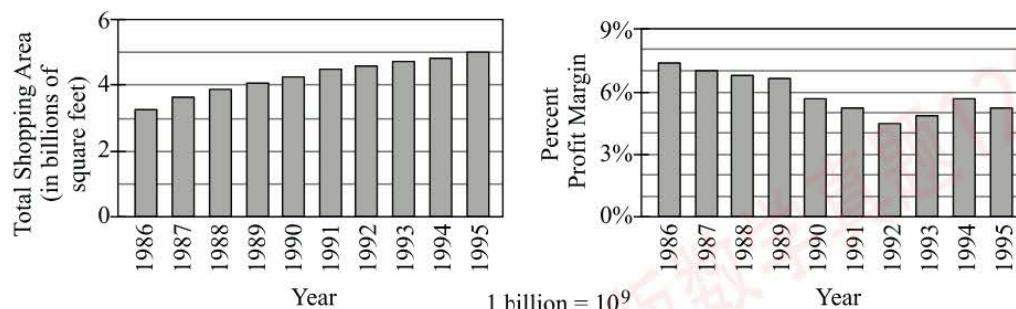
From December 31, 1986, to December 31, 1995, approximately what was the average (arithmetic mean) annual increase, in square feet per year, of the total shopping area?

- 200 million
- 150 million
- 20 million
- 18 million
- 2 million

Select one answer choice.

Questions 14– 16 are based on the following data.

Shopping Area on December 31 and Yearly Percent Profit Margin in Country X, 1986–1995



If the total shopping area on December 31, 1995, were represented by a square region with the same total area, approximately what would be the length in miles of one side of the square? (1 mile = 5,280 feet)

 95 70 20 13 4

Select one answer choice.

The function f is defined by $f(x) = 2x - 1$ for all numbers x . If the function g is given by $g(x) = 3f(2x - 1) + 2$ for all numbers x , what is the value of $g(2)$?

$$g(2) = \boxed{\quad}$$

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

A list of n integers has an arithmetic mean of 56, where $n > 100$. The arithmetic mean of 10 of the integers in the list is 60. Which of the following is closest to the arithmetic mean of the other $n - 10$ integers in the list?

- 50
- 52
- 56
- 60
- 66

Select one answer choice.

Which of the following integers are factors of $\frac{9!}{(6!)(3!)}?$

Indicate all such integers.

- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Select one or more answer choices.

$a_1, a_2, a_3, \dots, a_n, \dots$

The sequence of numbers shown is defined by $a_1 = 4$, $a_2 = 5$, and $a_n = 2a_{n-1} + a_{n-2}$ for all integers n greater than 2. Which of the following is a number in the sequence?

- 9
- 13
- 18
- 23
- 33

Select one answer choice.

$$a + b = 14$$

Quantity AThe greatest possible value of ab Quantity B

50

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

Select one answer choice.

The operation \odot is defined by $r \odot s = r^2 + rs + s^2$ for all numbers r and s .

Quantity A

$$12 \odot 15$$

Quantity B

$$15 \odot 12$$

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

Select one answer choice.

In the xy -plane, the point that has coordinates $(7, 9)$ is the midpoint of the line segment whose endpoints have coordinates $(1, 2)$ and (r, t) .

Quantity A

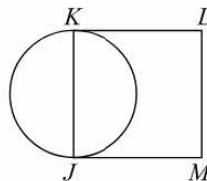
r

Quantity B

t

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

Select one answer choice.



JKLM is a square, *JK* is a diameter of the circle, and the length of *JM* is 3.

Quantity A

The circumference of the circle

Quantity B

10

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

Select one answer choice.

Of the 28 people in a room, 14 are men and 7 of the men are under 50 years old.

Quantity A

The percent of the people in the room who are under 50 years old

Quantity B

40%

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

Select one answer choice.

$$S = \{-2, -1, 1, 2\}$$

x and y are different numbers in set S .

Quantity A

$$x^y$$

Quantity B

$$-4$$

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

Select one answer choice.

p is an integer.

Quantity A

$$(-1)^{p(p+1)}$$

Quantity B

1

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

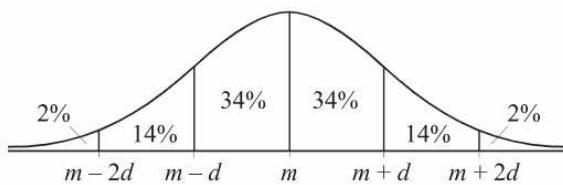
Select one answer choice.

If x satisfies the equation $\frac{(x^2 - 4)(x - 1)}{x^2 + 3x} = 0$, which of the following could be the value of x ?

Indicate all such values.

- 4
- 3
- 2
- 1
- 0
- 1
- 2
- 3

Select one or more answer choices.



The figure shows a normal distribution with mean m and standard deviation d , including approximate percents of the distribution corresponding to the six regions shown.

The HDL cholesterol levels, in milligrams per deciliter, of a certain population are approximately normally distributed with mean 50 and standard deviation 15. For the population, which of the following is the best estimate of the HDL cholesterol level, in milligrams per deciliter, that is at the 98th percentile of the distribution?

- 80
- 65
- 55
- 35
- 20

Select one answer choice.

Three lamps had the same original price, but they were sold at different selling prices: A , B , and C .

Selling price A was obtained by applying a 75 percent discount to the original price.

Selling price B was obtained by applying a 50 percent discount to the original price and then applying a 25 percent discount to the discounted price.

Selling price C was obtained by applying a 60 percent discount to the original price and then applying a 15 percent discount to the discounted price.

Which of the following shows A , B , and C listed in order from least to greatest?

A, B, C

A, C, B

B, C, A

C, A, B

C, B, A

Select one answer choice.

In a factory, machines A , B , and C package units of a certain product, working independently at their respective constant rates. Working simultaneously, A and B package 1,500 units in 4 hours. Working simultaneously, A , B , and C package 3,000 units in 6 hours. Working alone, how many hours does it take C to package 1,500 units?

- 8
- 10
- 12
- 15
- 18

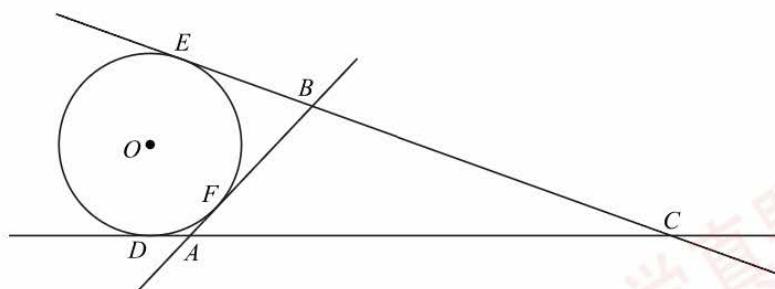
Select one answer choice.

In a group of students, each student was timed while typing the same text message. The times, in seconds, were rounded to the nearest whole second and recorded. The mean and standard deviation of the recorded times were determined. A recorded time of 34 seconds was at least 2 standard deviations above the mean, and a recorded time of 22 seconds was at least 1 standard deviation below the mean. Which of the following could be the values of the mean and standard deviation, respectively?

Indicate all such values.

- 25 and 4
- 26 and 3
- 27 and 4

Select one or more answer choices.



The circle shown has center O and a radius of 4. Lines AB , AC , and BC are tangent to the circle at points F , D , and E , respectively. If the length of line segment CE is 23, what is the perimeter of triangle ABC ?

38

46

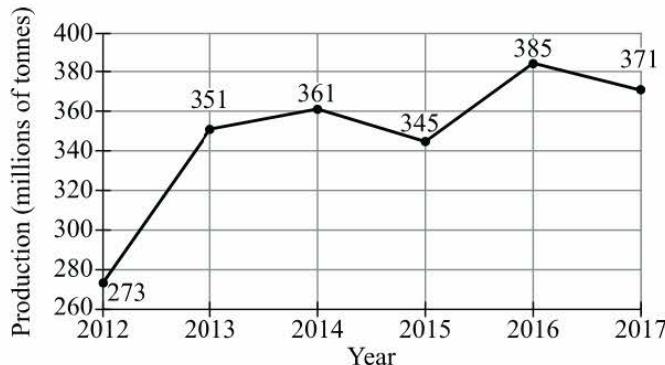
49

51

54

Select one answer choice.

Questions 14 to 16 are based on the following data.

Maize Production and Uses in the United States**Annual Production, 2012–2017**

Note: 1 tonne = 1,000 kilograms.

Uses, 2017

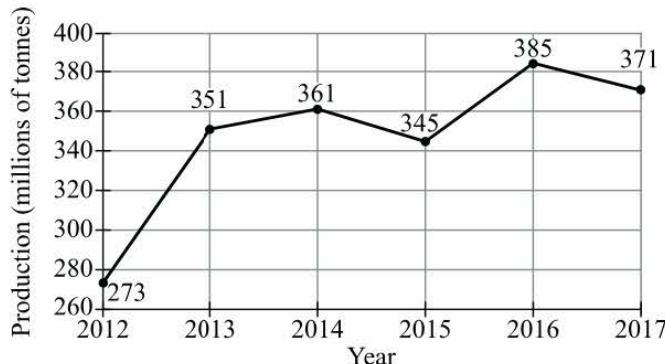
Use	Percent of Production
Feed	39%
Ethanol and fuel	27%
Exports	16%
Food and industrial use	9%
Residual	9%

Approximately how much greater was the average (arithmetic mean) annual maize production for the years 2013 through 2017 than the maize production, in tonnes, for 2012?

- 70 million
- 75 million
- 85 million
- 90 million
- 95 million

Select one answer choice.

Questions 14 to 16 are based on the following data.

Maize Production and Uses in the United States**Annual Production, 2012–2017**

Note: 1 tonne = 1,000 kilograms.

Uses, 2017

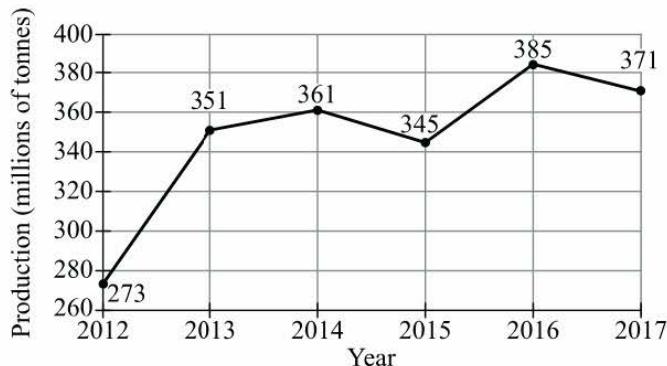
Use	Percent of Production
Feed	39%
Ethanol and fuel	27%
Exports	16%
Food and industrial use	9%
Residual	9%

If 1 bushel of maize is equivalent to 0.0254 tonne of maize, approximately how many bushels of the maize produced in 2017 were used for exports?

- 2 million
- 9 million
- 59 million
- 2,337 million
- 3,944 million

Select one answer choice.

Questions 14 to 16 are based on the following data.

Maize Production and Uses in the United States**Annual Production, 2012–2017**

Note: 1 tonne = 1,000 kilograms.

Uses, 2017

Use	Percent of Production
Feed	39%
Ethanol and fuel	27%
Exports	16%
Food and industrial use	9%
Residual	9%

In 2017 the maize production that was used for ethanol and fuel was what percent of the maize production that was not used for exports?

Give your answer to the nearest whole percent.

 %

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

If $x = \sqrt{6}$, what is the value of $(6\sqrt{6} + x)^2$?

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

A circle is inscribed in a regular octagon. If the perimeter of the octagon is 16, what is the circumference of the circle?

- $2\sqrt{2}\pi$
- $(2 + \sqrt{2})\pi$
- $3\sqrt{2}\pi$
- $(2 + 2\sqrt{2})\pi$
- $4\sqrt{2}\pi$

Select one answer choice.

How many positive integers are factors of 2,200 ?

- 3
- 6
- 24
- 30
- 48

Select one answer choice.

In the xy -plane, point C has coordinates $(0, 3)$, point D has coordinates $(4, 3)$, and E is a point such that $CE = 2$ and $DE = 4$. What is the x -coordinate of point E ?

- $\frac{1}{2}$ 1 $\frac{4}{3}$ $\frac{7}{4}$ 2

Select one answer choice.

$$\begin{aligned}x &> 0 \\y &< 0\end{aligned}$$

Quantity A

$$x + y$$

Quantity B

$$x$$

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

Select one answer choice.

Quantity A
 $2^{-2001} + 2^{-2002}$

Quantity B
 2^{-2004}

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

Select one answer choice.

$$(x + y + z)^3 = -27$$

Quantity AThe arithmetic mean of x , y , and z Quantity B

-2

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

Select one answer choice.

$$N = 11121314\dots50$$

The integer N is formed by writing the consecutive integers from 11 through 50, from left to right.

Quantity A

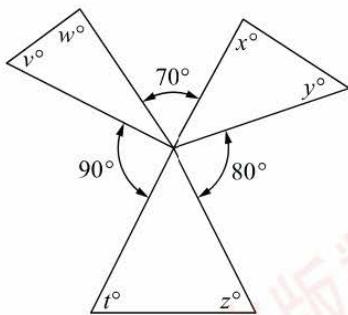
The 26th digit of N , counting from left to right

Quantity B

The 45th digit of N , counting from left to right

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

Select one answer choice.

Quantity A

$$t + v + w + x + y + z$$

Quantity B

$$400$$

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

Select one answer choice.

x and y are integers.

$$\frac{2^{x+y}}{2^{x-y}} = 4$$

Quantity A

y

Quantity B

1

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

Select one answer choice.

Of all travelers on a certain airline last year, 57 percent were business travelers. Of these business travelers, 70 percent carried a laptop computer.

Quantity A

The percent of all travelers on the airline last year that carried a laptop computer

Quantity B

42%

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

Select one answer choice.

The integer n is the product of three different prime numbers, each greater than 5.

Quantity A

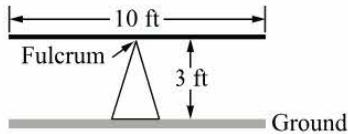
The remainder when n is divided by 5

Quantity B

2

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

Select one answer choice.



A 10-foot long board is parallel to level ground, and the fulcrum supporting it is at the board's midpoint, as shown in the figure above. If the board is tipped, with the fulcrum remaining at the board's midpoint, so that the board's left end just touches the ground, which of the following is closest to the number of feet that the right end of the board is above the ground?

- 4
- 5
- 6
- 7
- 8

Select one answer choice.

In the xy -plane, which of the following points is NOT on the circle that has center $(0, 0)$ and radius 5?

- $(-5, 0)$
- $(-3, -4)$
- $(1, -2\sqrt{6})$
- $(3, 3\sqrt{3})$
- $(\sqrt{21}, 2)$

Select one answer choice.

Al, Ben, Carl, Dina, and Edna are to be seated in a row of 5 adjoining chairs, with 1 person sitting in each chair. If Dina and Edna must each be seated in the first chair in the row or the last chair in the row, in how many different seating arrangements can the 5 people be seated?

- 6 12 24 30 60

Select one answer choice.

List $P : 2, 11, 7, x$

The range of the four numbers in list P is 15 and for one of the numbers, n , in the list, $|n - x| = 11$.
What is the value of x ?

- 21
- 17
- 1
- 4
- 8

Select one answer choice.

If $\frac{x+w}{2} + \frac{2x+2w}{3} = 5$, what is the value of $x+w$?

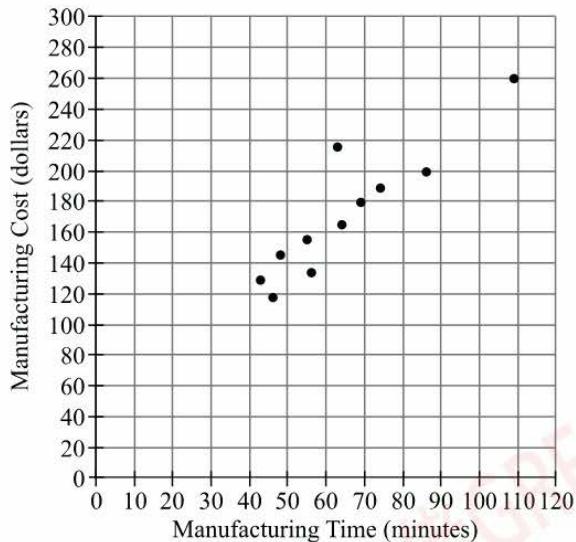
Give your answer as a fraction.

$$x+w = \frac{\boxed{}}{\boxed{}}$$

Enter your answer as a fraction, with the numerator and denominator in their respective answer boxes. Backspace to erase.

Questions 14– 16 are based on the following data.

Manufacturing Cost and Time for 11 Pottery Items from Company W



If one item is to be randomly selected from the items whose manufacturing cost is greater than \$140, what is the probability that the item selected will be one whose manufacturing time is greater than 60 minutes?

- $\frac{3}{8}$
- $\frac{1}{2}$
- $\frac{5}{8}$
- $\frac{2}{3}$
- $\frac{3}{4}$

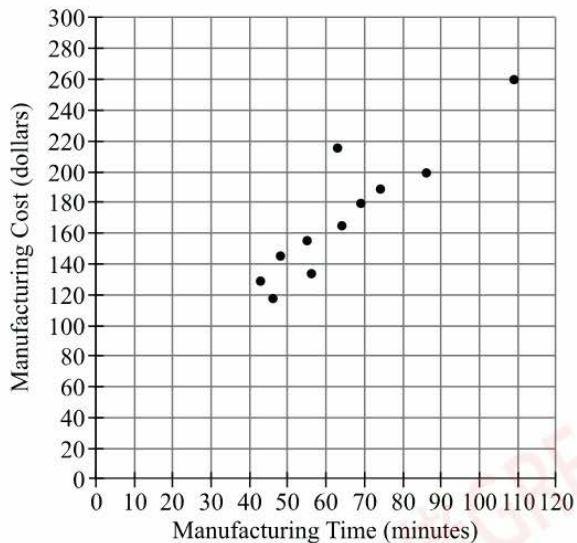
Select one answer choice.

Section 2 of 6 | Question 15 of 20

00:34:28 Hide Time

Questions 14– 16 are based on the following data.

Manufacturing Cost and Time for 11 Pottery Items from Company W



For each item, a manager calculates the ratio of the manufacturing cost to the manufacturing time. Which of the following is closest to the value of the greatest of these eleven ratios, in dollars per minute?

- 2.5
- 3.5
- 4.0
- 4.5
- 5.0

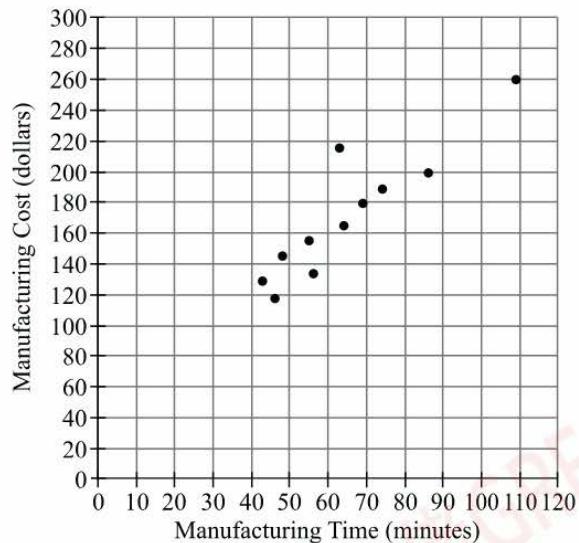
Select one answer choice.

Section 2 of 6 | Question 16 of 20

00:34:26 ⏳ Hide Time

Questions 14– 16 are based on the following data.

Manufacturing Cost and Time for 11 Pottery Items from Company W



The manufacturing cost of the item that takes the most time to manufacture is approximately what percent greater than the cost of the item that takes the least time to manufacture?

- 10%
- 50%
- 75%
- 100%
- 200%

Select one answer choice.

Benefit	Percent of Companies Polled
Wage increases	56.7%
Professional development	48.5%
Flexible schedule	12.8%
More vacation time	8.2%
Other	6.0%

Several hundred companies were asked to indicate what benefits they planned to offer during the next year to help retain workers. The results are summarized in the table above. If 30.0 percent of the companies polled indicated that they planned to offer both wage increases and professional development, what percent of the companies indicated that they planned to offer neither of these two benefits?

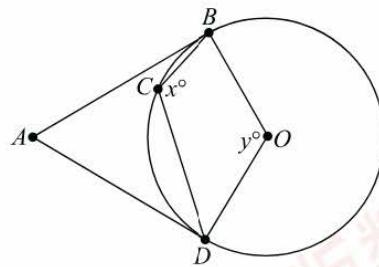
 %

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

How many of the eleven integers greater than 10^7 and less than $10^7 + 12$ are divisible by 11 ?

- None
- One
- Two
- Three
- Four

Select one answer choice.



In the figure above, the circle has center O , and AB and AD are tangent to the circle. If the degree measures of angles ABC and ADC are 20 and 40, respectively, what is the value of $x + y$?

- 140
- 160
- 190
- 210
- 240

Select one answer choice.

Number of colleges visited	0	1	2	3	4 or more
Number of students	3	x	24	32	7

The frequency distribution above shows the number of colleges visited by a sample of students. If the median of the numbers of colleges visited is 3, which of the following could be the value of x ?

Indicate all such values.

- 0
- 6
- 9
- 15
- 24

Select one or more answer choices.

In a survey of educators, 40 percent reported that they used the Internet for research. Also in the survey, 65 percent reported that they used the Internet for E-mail.

Quantity A

The percent of the educators surveyed who reported that they used the Internet for both research and E-mail

Quantity B

26%

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

Select one answer choice.

S is the set of all integers from 1 to 100, inclusive.

Quantity A

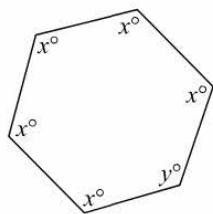
The number of integers in S that are multiples
of 7 but not of 6

Quantity B

12

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

Select one answer choice.



$$x = 115$$

Quantity A y Quantity B

115

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

Select one answer choice.

S is the set of all products xy such that $-4 \leq x \leq 5$ and $-3 \leq y \leq 2$.

Quantity A

The minimum value in set S

Quantity B

-8

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

Select one answer choice.

In the xy -plane, the graph of the line $y = kx - 5$ has an x -intercept of $\frac{-10}{3}$.

Quantity A

k

Quantity B

$\frac{-3}{2}$

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

Select one answer choice.

$$x - y = 1$$

Quantity A

$$x^2 - y^2$$

Quantity B

0

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

Select one answer choice.

c and d are integers greater than 1.

Quantity A

$$\sqrt{c^3} \sqrt{d^3}$$

Quantity B

$$\sqrt{c^5} \sqrt{d^2}$$

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

Select one answer choice.

A list of n integers has an arithmetic mean of 56, where $n > 100$. The arithmetic mean of 10 of the integers in the list is 60. Which of the following is closest to the arithmetic mean of the other $n - 10$ integers in the list?

- 50
- 52
- 56
- 60
- 66

Select one answer choice.

a , b , and c are integers, where $0 < a < b < c$. If the average (arithmetic mean) of a and c is 15, which of the following could be the value of b ?

Indicate all such values.

- 1
- 2
- 15
- 28
- 29
- 30

Select one or more answer choices.

What is the units digit of the sum $13^{10} + 17^{10}$?

- 0
- 2
- 4
- 6
- 8

Select one answer choice.

A telephone system has n telephone lines. For each of the n lines, the event that the line will fail during a certain reliability test has probability 0.3, and these n events are independent. If the probability that at least one of the n lines will not fail during the reliability test is greater than 0.99, what is the minimum value of n ?

- 2
- 3
- 4
- 5
- 6

Select one answer choice.

At a department store, $\frac{2}{3}$ of the employees helped customers and $\frac{1}{5}$ of the remaining employees restocked shelves. What fraction of the employees at the department store neither helped customers nor restocked shelves?

- $\frac{2}{15}$ $\frac{1}{5}$ $\frac{4}{15}$ $\frac{1}{3}$ $\frac{2}{5}$

Select one answer choice.

An escalator installed at a new shopping mall operates at a speed of 90 feet per minute. The handrail of the escalator operates on a separate motor at a speed of 93 feet per minute. A person steps onto the escalator and, at the same time, grabs the handrail. Assuming that the person's hand and shoes do not move on the escalator, in how many seconds will the person's hand have moved 0.25 foot more than the person's shoes?

 seconds

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

Section 4 of 6 | Question 14 of 20

00:34:35 Hide Time

Questions 14– 16 are based on the following data.

**High School Survey of
Departmental Use of Educational
Software Packages**
(responses from 240 departments)

Type of Educational Software Package	Percent of Departments Using Each Type of Package
Drill and Practice	56%
Exploratory	48%
Graphing	40%
Statistical	25%
Spreadsheet	20%
Symbolic Manipulation	15%

If the responses summarized in the table represent an 80 percent return from the total number of departments receiving the survey questionnaire, how many departments received the survey questionnaire?

- 192
- 248
- 260
- 288
- 300

Select one answer choice.

Section 4 of 6 | Question 15 of 20

00:34:34 Hide Time

Questions 14– 16 are based on the following data.

**High School Survey of
Departmental Use of Educational
Software Packages**
(responses from 240 departments)

Type of Educational Software Package	Percent of Departments Using Each Type of Package
Drill and Practice	56%
Exploratory	48%
Graphing	40%
Statistical	25%
Spreadsheet	20%
Symbolic Manipulation	15%

If a department uses exactly 2 of the types of software, how many different pairs are possible?

- 12
- 15
- 18
- 30
- 36

Select one answer choice.

Section 4 of 6 | Question 16 of 20

00:34:33 Hide Time

Questions 14– 16 are based on the following data.

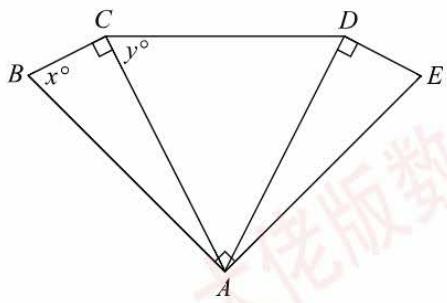
**High School Survey of
Departmental Use of Educational
Software Packages**
(responses from 240 departments)

Type of Educational Software Package	Percent of Departments Using Each Type of Package
Drill and Practice	56%
Exploratory	48%
Graphing	40%
Statistical	25%
Spreadsheet	20%
Symbolic Manipulation	15%

What is the greatest possible number of responding departments that could be using both exploratory and symbolic manipulation software packages?

- 17
- 36
- 79
- 115
- 151

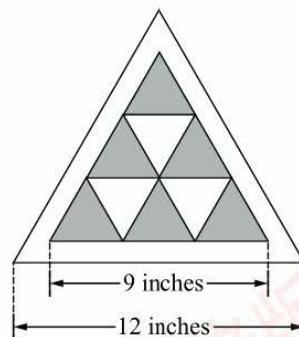
Select one answer choice.



Triangles ABC and AED are congruent, where $BC = DE$. If $y = 63$, what is the value of x ?

$$x = \boxed{\quad}$$

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.



The figure above shows a ceramic tile in the shape of an equilateral triangle with sides of length 12 inches. Parts of the tile are gray, as represented by the shaded regions, and the rest of the tile is white. The equilateral triangle in the middle of the tile has sides of length 9 inches and consists of nine congruent equilateral triangles. What fraction of the area of the tile is gray?

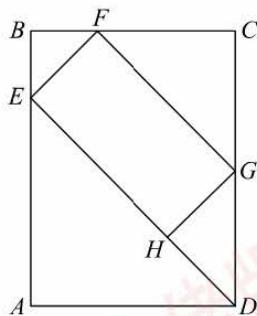
- $\frac{3}{10}$ $\frac{3}{8}$ $\frac{2}{5}$ $\frac{1}{2}$ $\frac{3}{5}$

Select one answer choice.

If $\frac{1}{2}$ is one solution of the equation $8x^2 + 2x - k = 0$, where k is a constant, what is the other solution of the equation?

- $-\frac{3}{4}$
- $-\frac{1}{2}$
- $-\frac{1}{4}$
- $\frac{1}{4}$
- $\frac{3}{4}$

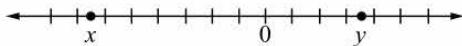
Select one answer choice.



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 $EFGH$?

- $32\sqrt{2}$ $32\sqrt{3}$ $64\sqrt{2}$ 32 64

Select one answer choice.



The coordinates of the two points shown on the number line are x and y , respectively.

Quantity A

$$x + y$$

Quantity B

$$0$$

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

Select one answer choice.

Of the 60 books at a book sale, 10 cost less than \$5 and 20 are textbooks.

Quantity A

The number of books at the book sale that are textbooks and cost less than \$5

Quantity B

8

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

Select one answer choice.

Quantity A

The greatest prime factor of 50

Quantity B

The greatest prime factor of 46

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

Select one answer choice.

a and b are the two solutions of the equation $x^2 = x + 2$.

Quantity A

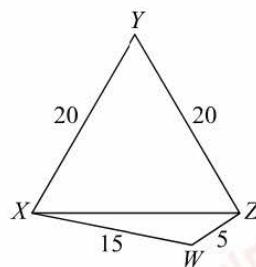
$$a + b$$

Quantity B

$$0$$

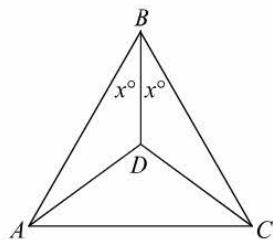
- Quantity A is greater.
- Quantity B is greater.
- The two quantities are equal.
- The relationship cannot be determined from the information given.

Select one answer choice.

Quantity AThe measure of angle XYZ Quantity B 60°

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

Select one answer choice.



$\triangle ABC$ is an equilateral triangle.

$$\begin{aligned}BC &= 2 \\BD &= 1\end{aligned}$$

Quantity A

The area of $\triangle ADC$

Quantity B

1

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

Select one answer choice.

In a certain sequence, the terms a_n satisfy $a_n = 3a_{n-1} + 2a_{n-2}$ for all integers $n > 2$.

$$a_5 = 5 \text{ and } a_6 = 17$$

Quantity A

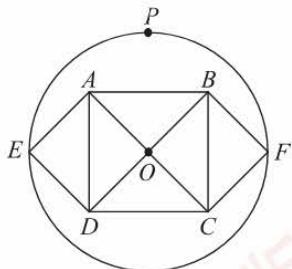
$$a_2$$

Quantity B

$$0$$

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

Select one answer choice.



The circle shown has center O, and arc EPF is a semicircle. Quadrilaterals $EAOD$, $ABCD$, and $OBFC$ are squares, and the length of each side of $ABCD$ is 1. What is the perimeter of region $EPFCD$?

- $\pi + 1 + \sqrt{2}$
- $2\pi + 4 + \sqrt{2}$
- $\pi + 4\sqrt{2}$
- $2\pi + 4\sqrt{2}$
- $\pi + 8 + \sqrt{2}$

Select one answer choice.

If $a < b < -1$, which of the following must be a positive number?

- $a + 1$
- $a + b$
- $a^2 - b^2$
- $b - a^2$
- $b^2 - ab$

Select one answer choice.

In State X last year, the amount of a resident's annual income tax was equal to 5 percent of the first \$20,000 of the resident's taxable income, plus 6 percent of the amount of the resident's taxable income in excess of \$20,000. If a resident of State X paid an annual income tax of \$2,500 last year, what was the amount of the resident's taxable income last year?

- \$40,000
- \$43,000
- \$45,000
- \$49,000
- \$50,000

Select one answer choice.

In the xy -plane, the line with the equation $x + ay = 6$ is perpendicular to the line with the equation $bx + y = 10$, where a and b are nonzero constants. Which of the following statements must be true?

Indicate all such statements.

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

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

$a = -b$

Select one or more answer choices.

Five boxes contain 4, 7, 12, 14, and 20 building blocks, respectively. Each of three children will select one of the five boxes. If all the blocks in the three selected boxes can be distributed equally among the three children, what is the greatest possible number of blocks that each child could receive?

- 10
- 11
- 13
- 14
- 15

Select one answer choice.

	Freshman	Sophomore	Junior	Senior
Male	8	13	10	4
Female	11	10	13	3

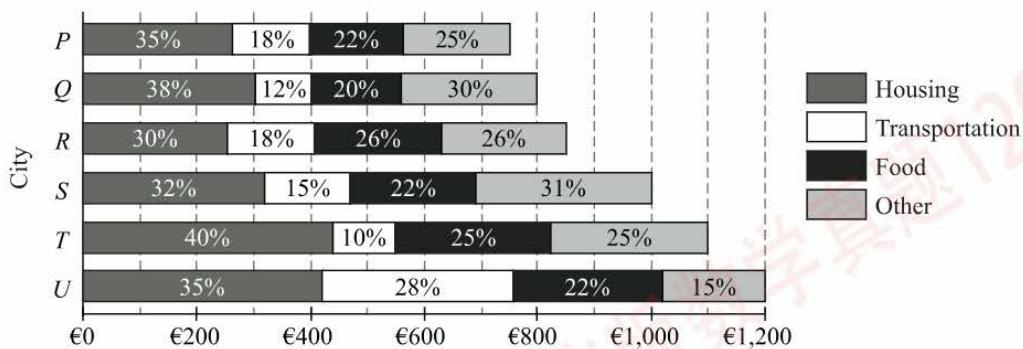
The table summarizes information about the 72 students in a history class. If a student is to be selected at random from the class, what is the probability that the student will be one who is male or a senior?

- $\frac{1}{18}$ $\frac{17}{36}$ $\frac{19}{36}$ $\frac{41}{72}$ $\frac{7}{12}$

Select one answer choice.

Questions 14 to 16 are based on the following data.

Monthly Living Expenses for a Typical University Student in Selected European Cities



Note: The percents are based on total living expenses, in euros (€).

For City T , the Transportation expense is what fraction of the sum of the three nonhousing expenses?

$\frac{1}{10}$

$\frac{1}{6}$

$\frac{1}{5}$

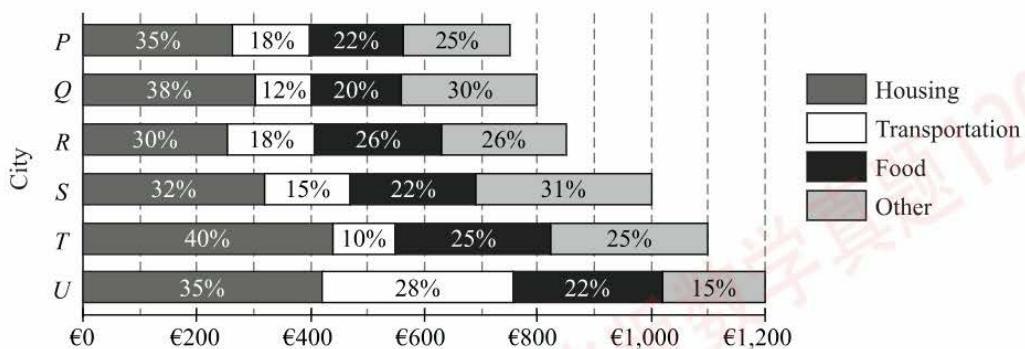
$\frac{1}{4}$

$\frac{1}{3}$

Select one answer choice.

Questions 14 to 16 are based on the following data.

Monthly Living Expenses for a Typical University Student in Selected European Cities



Note: The percents are based on total living expenses, in euros (€).

The expense, in euros, in the Other category for City *Q* is greater than the expense, in euros, in the Other category for which of the following cities?

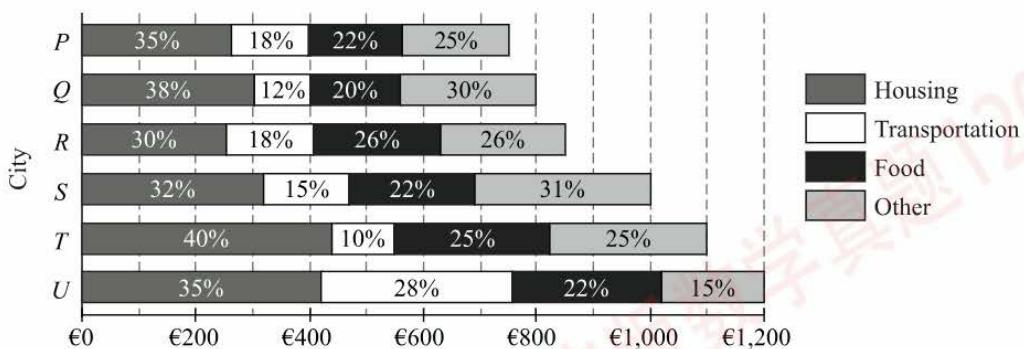
Indicate all such cities.

 P R S T U

Select one or more answer choices.

Questions 14 to 16 are based on the following data.

Monthly Living Expenses for a Typical University Student in Selected European Cities



Note: The percents are based on total living expenses, in euros (€).

For the city for which the range of the amounts of the four expenses, in euros, is least, the Transportation expense is what percent of the monthly living expenses for that city?

 10% 12% 15% 16% 18%

Select one answer choice.

If $x = \sqrt{2}$, what is the value of $(6\sqrt{2} + 5x)^2$?

Enter your answer as an integer or a decimal in the answer box. Backspace to erase.

Each person in a group of 5 friends has an annual salary that is a multiple of \$1,000. For the 5 annual salaries, the average (arithmetic mean) is \$45,000 and the range is \$6,000. Which of the following could be the number of the 5 friends whose annual salaries are greater than \$45,000 ?

Indicate all such numbers.

- 0
- 1
- 4
- 5

Select one or more answer choices.

The expression $x^4 + 2x^2y^2 + 9y^4$ is equivalent to which of the following?

- $(x^2 + 3y^2)^2$
- $(x^2 + 3y^2)(x^2 - 3y^2)$
- $(x^2 + 3y^2 + xy)^2$
- $(x^2 + 2xy + 3y^2)(x^2 - 2xy + 3y^2)$
- $(x^2 + 2xy - 3y^2)(x^2 - 2xy - 3y^2)$

Select one answer choice.

The length of each side of pentagon $ABCDE$ is an integer, and the perimeter is 35. The length of diagonal AC is 10, the length of diagonal AD is 11, and the length of side AE is 12. What is the greatest possible length of side DE ?

- 9
- 10
- 11
- 12
- 13

Select one answer choice.