



Question Bank

Math

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One-Variable Data (key)



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Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div><div></div><div></div><div></div></div>

ID: f890dc20

2, 2, 2, 3, 4, 4, 11

What is the median of the seven data values shown?

- A. 2
- B. 3
- C. 4
- D. 9

ID: f890dc20 Answer

Correct Answer: B

Rationale

Choice B is correct. When a data set has an odd number of values, the median can be found by ordering the values from least to greatest and determining the value in the middle. Since the values are already presented in order from least to greatest and there are 7 values, the median is the fourth value in the list. Therefore, the median is 3.

Choice A is incorrect. This is the mode. Choice C is incorrect. This is the mean. Choice D is incorrect. This is the range.

Question Difficulty: Easy



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ID: 8736334b

Data set A: 72, 73, 73, 76, 76

Data set B: 61, 64, 74, 85, x

Data set A and data set B each contain 5 numbers. If the mean of data set A is equal to the mean of data set B, what is the value of x ?

- A. 77
- B. 85
- C. 86
- D. 95

ID: 8736334b Answer

Correct Answer: C

Rationale

Choice C is correct. The mean of a data set is found by dividing the sum of the values in the data set by the number of values in the data set. Therefore, the mean of data set A is $\frac{72+73+73+76+76}{5}$, which simplifies to 74. The mean of data set B is represented by the equation $\frac{61+64+74+85+x}{5}$, or $\frac{284+x}{5}$. It's given that the mean of data set A is equal to the mean of data set B. Therefore, the equation $74 = \frac{284+x}{5}$ can be used to solve for x . Multiplying both sides of this equation by 5 yields $370 = 284 + x$. Subtracting 284 from both sides of this equation yields $86 = x$.

Choices A, B, and D are incorrect and may result from calculation errors.

Question Difficulty: Easy



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ID: c88e0663

For a school fund-raiser, 10 students sold a total of 90 boxes of cookies. Which of the following can be calculated from this information?

- A. The average number of boxes sold per student
- B. The median number of boxes sold per student
- C. The greatest number of boxes sold by one student
- D. The least number of boxes sold by one student

ID: c88e0663 Answer

Correct Answer: A

Rationale

Choice A is correct. The average can be found by dividing the total number of boxes sold by the number of students, which is $\frac{90}{10} = 9$.

Choices B, C, and D are incorrect. Each results from choosing measures that require the results of individual students, which are not given.

Question Difficulty: Easy



Assessment	Test	Domain	Skill	Difficulty
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ID: 12dae628

2, 9, 14, 23, 32

What is the mean of the data shown?

- A. 14
- B. 16
- C. 17
- D. 32

ID: 12dae628 Answer

Correct Answer: B

Rationale

Choice B is correct. The mean of a set of data values is the sum of all the data values divided by the number of data values in the set. The sum of the data values shown is $2 + 9 + 14 + 23 + 32$, or 80. Since there are 5 data values in the set, the mean of the data shown is $\frac{80}{5}$, or 16.

Choice A is incorrect. This is the median, not the mean, of the data shown.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect. This is the maximum, not the mean, of the data shown.

Question Difficulty: Easy



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div> <div></div> <div></div> <div></div> </div>

ID: fa7a0164

The table below shows the high and low temperatures in Houston, Texas, during a five-day period.

Temperatures in Houston, Texas
(degrees Fahrenheit)

	Monday	Tuesday	Wednesday	Thursday	Friday
High temperature	73	56	62	75	81
Low temperature	49	37	41	54	63

What was the mean low temperature, in degrees Fahrenheit, during the five-day period?

- A. 48.8
- B. 49
- C. 59
- D. 59.1

ID: fa7a0164 Answer

Correct Answer: A

Rationale

Choice A is correct. The mean low temperature can be calculated by finding the sum of the low temperatures for all the days shown in the table, $49 + 37 + 41 + 54 + 63 = 244$, and then dividing the sum by the number of days the temperature was recorded, $244 \div 5 = 48.8$.

Choice B is incorrect. This may be the result of choosing the median rather than calculating the mean. Choices C and D are incorrect and may be the result of calculation errors.

Question Difficulty: Easy



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ID: 708590d7

Data set A: 1, 2, 3, 4, 5, 6, 7

Data set B: 1, 1, 2, 2, 3, 3, 4

Which of the following statements correctly compares the means of data set A and data set B?

- A. The mean of each data set is 2.
- B. The mean of each data set is 4.
- C. The mean of data set A is less than the mean of data set B.
- D. The mean of data set A is greater than the mean of data set B.

ID: 708590d7 Answer

Correct Answer: D

Rationale

Choice D is correct. The mean of a data set is found by dividing the sum of the values in the data set by the number of values in the data set. Therefore, the mean of data set A is $\frac{1+2+3+4+5+6+7}{7} = \frac{28}{7}$, or 4. The mean of data set B is $\frac{1+1+2+2+3+3+4}{7} = \frac{16}{7}$, or approximately 2.2857. Therefore, the mean of data set A is greater than the mean of data set B.

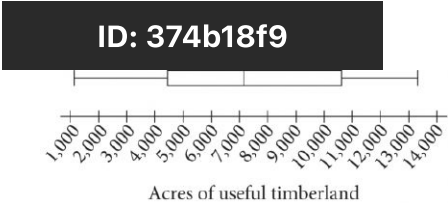
Alternate approach: Data set A and data set B are both ordered from least to greatest value. Besides the first value in each data set, which is 1, each value in ordered data set B is less than the respective value in ordered data set A. Therefore, conceptually, the mean of data set A must be greater than the mean of data set B.

Choices A, B, and C are incorrect and may result from various misconceptions or miscalculations.

Question Difficulty: Easy



Assessment	Test	Domain	Skill	Difficulty
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The number of acres of useful timberland in 13 counties in California is summarized in the box plot above. Which of the following is closest to the median number of acres?

- A. 4,399
- B. 7,067
- C. 8,831
- D. 10,595

ID: 374b18f9 Answer

Correct Answer: B

Rationale

Choice B is correct. The median of the data summarized by a box plot is the value associated with the vertical line segment within the box. According to the box plot shown, this value is slightly greater than 7,000. Therefore, the closest value for the median number of acres is 7,067.

Choice A is incorrect. This is the value associated with the vertical line segment forming the left-hand side of the box. Choice C is incorrect. This value is greater than the value associated with the vertical line segment within the box. Choice D is incorrect. This is the value associated with the vertical line segment forming the right-hand side of the box.

Question Difficulty: Easy



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ID: c54b92a2

A study was conducted on the production rates for a company that produces tractor wheels. The table below shows the number of wheels made during 11 consecutive one-hour production periods.

One-hour period	Number of wheels made
A	24
B	24
C	21
D	21
E	21
F	19
G	24
H	24
I	19
J	22
K	23

What is the range of the number of wheels made for the 11 one-hour periods?

- A. 5.5
- B. 5.0
- C. 4.5
- D. 4.0

ID: c54b92a2 Answer

Correct Answer: B

Rationale



Choice B is correct. Range is defined as the difference between the greatest and least values from a set of data. The greatest number of wheels made during a one-hour period was 24 wheels. The least number of wheels was 19. Hence, the range is $24 - 19 = 5$, or 5.0.

Choices A, C, and D are incorrect and may be the result of arithmetic errors or incorrectly identifying the greatest or least number of wheels made during a one-hour period.

Question Difficulty: Easy



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div><div></div><div></div><div></div></div>

ID: d1db8def

Response	Frequency
Once a week or more	3
Two or three times a month	16
About once a month	26
A few times a year	73
Almost never	53
Never	29
Total	200

The table gives the results of a survey of **200** people who were asked how often they see a movie in a theater. How many people responded either "never" or "almost never"?

- A. **24**
- B. **53**
- C. **82**
- D. **118**

ID: d1db8def Answer

Correct Answer: C

Rationale

Choice C is correct. The table gives the results of **200** people who were asked how often they see a movie in a theater. The table shows that **29** people responded "never" and **53** people responded "almost never." Therefore, **$29 + 53$** , or **82**, people responded either "never" or "almost never."

Choice A is incorrect. This is the difference between the number of people who responded "almost never" and the number of people who responded "never."

Choice B is incorrect. This is the number of people who responded "almost never" but doesn't include those who responded "never."

Choice D is incorrect. This is the number of people who responded something other than “never” or “almost never,” rather than the number of people who responded either “never” or “almost never.”

Question Difficulty: Easy



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ID: 4bb25495

Five Smallest Countries in 2016

Country	Land area (square kilometers)
Monaco	2.0
Nauru	21
San Marino	61
Tuvalu	26
Vatican City	0.44

The table above shows the land area, in square kilometers, of the five smallest countries of the world in 2016. Based on the table, what is the mean land area of the 5 smallest countries in 2016, to the nearest square kilometer?

- A. 20
- B. 22
- C. 61
- D. 110

ID: 4bb25495 Answer

Correct Answer: B

Rationale

Choice B is correct. The mean land area of these 5 countries is equal to the sum of the land areas of these countries, or $2.0 + 21 + 61 + 26 + 0.44$, divided by the number of countries in the table, 5, or

$\frac{2.0 + 21 + 61 + 26 + 0.44}{5}$. Combining like terms in the numerator yields $\frac{110.44}{5}$, which simplifies to 22.088 square kilometers. This value, when rounded to the nearest square kilometer, is 22.

Choice A is incorrect and may result from a calculation error. Choice C is incorrect. This is the greatest land area of the 5 countries in the table. Choice D is incorrect. This is the sum of the land areas of the 5 countries in the table, rounded to the nearest square kilometer.

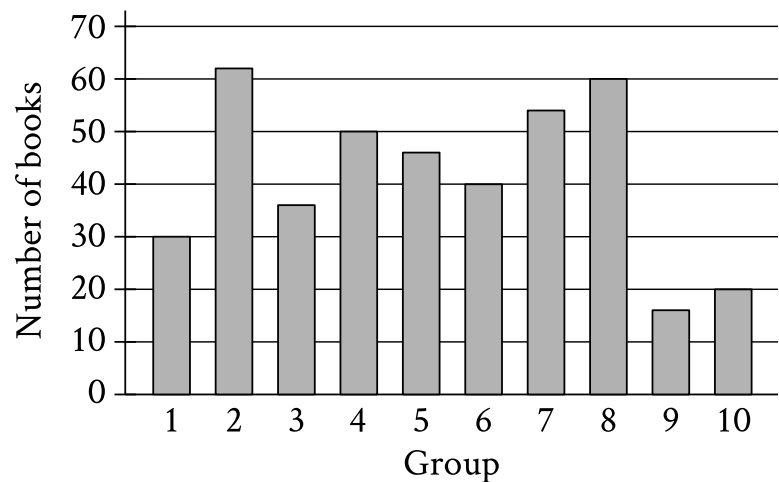
Question Difficulty: Easy





Assessment	Test	Domain	Skill	Difficulty
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ID: 79340403



The bar graph shows the distribution of **414** books collected by **10** different groups for a book drive. How many books were collected by group **1**?

ID: 79340403 Answer

Correct Answer: 30

Rationale

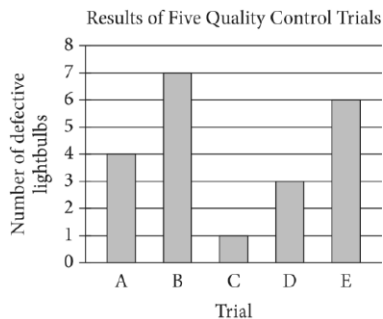
The correct answer is **30**. The height of each bar in the bar graph shown represents the number of books collected by the group specified at the bottom of the bar. The bar for group **1** reaches a height of **30**. Therefore, group **1** collected **30** books.

Question Difficulty: Easy



Assessment	Test	Domain	Skill	Difficulty
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ID: a9647302



For quality control, a company that manufactures lightbulbs conducted five different trials. In each trial, 500 different lightbulbs were tested. The bar graph above shows the number of defective lightbulbs found in each trial. What is the mean number of defective lightbulbs for the five trials?

- A. 4.0
- B. 4.2
- C. 4.6
- D. 5.0

ID: a9647302 Answer

Correct Answer: B

Rationale

Choice B is correct. The numbers of defective lightbulbs found for the five trials are 4, 7, 1, 3, and 6, respectively.

The mean is therefore $\frac{4+7+1+3+6}{5} = 4.2$.

Choice A is incorrect. This is the median number of defective lightbulbs for the five trials. Choice C is incorrect and may result from an arithmetic error. Choice D is incorrect and may result from mistaking the number of trials for the number of defective lightbulbs.

Question Difficulty: Easy



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SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div> <div></div> <div></div> <div></div> </div>

ID: 869a32f1

The high temperature, in degrees Fahrenheit ($^{\circ}\text{F}$), in a certain city was recorded for each of 5 days. The data are shown below.

Day	1	2	3	4	5
High temperature ($^{\circ}\text{F}$)	81	80	81	81	82

Over this 5-day period, which of the following is NOT equal to 81°F ?

- A. Median of the high temperatures
- B. Mean of the high temperatures
- C. Mode of the high temperatures
- D. Range of the high temperatures

ID: 869a32f1 Answer

Correct Answer: D

Rationale

Choice D is correct. The range of a data set is the difference between the maximum and the minimum values in the set. The maximum value among the high temperatures in the table is 82°F and the minimum value is 80°F . Therefore, the range is $82^{\circ}\text{F} - 80^{\circ}\text{F} = 2^{\circ}\text{F}$.

Choice A is incorrect. The median of a data set is the middle value when the values in the set are ordered from least to greatest. Ordering the high temperatures this way gives the list 80, 81, 81, 81, 82. Therefore, the median high temperature is 81°F . Choice B is incorrect. The mean high temperature is

$\frac{81 + 80 + 81 + 81 + 82}{5} = \frac{405}{5} = 81$. Choice C is incorrect. The mode is the value that occurs the greatest number of times. For the set of high temperatures shown, 81 is the value that occurs 3 times, and therefore, 81°F is the mode of the high temperatures.

Question Difficulty: Easy



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div> <div></div> <div></div> <div></div> </div>

ID: 6670e407

Number of High School Students Who
Completed Summer Internships

High school	Year				
	2008	2009	2010	2011	2012
Foothill	87	80	75	76	70
Valley	44	54	65	76	82
Total	131	134	140	152	152

The table above shows the number of students from two different high schools who completed summer internships in each of five years. No student attended both schools. Which of the following statements are true about the number of students who completed summer internships for the 5 years shown?

1. The mean number from Foothill High School is greater than the mean number from Valley High School.
2. The median number from Foothill High School is greater than the median number from Valley High School.

- A. I only
- B. II only
- C. I and II
- D. Neither I nor II


ID: 6670e407 Answer

Correct Answer: C

Rationale

Choice C is correct. The mean of a data set is found by dividing the sum of the values by the number of values. Therefore, the mean number of students who completed summer internships from Foothill High School is $\frac{87+80+75+76+70}{5} = \frac{388}{5}$, or 77.6. Similarly, the mean number from Valley High School is

$$\frac{44 + 54 + 65 + 76 + 82}{5} = \frac{321}{5}$$

 , or 64.2. Thus, the mean number from Foothill High School is greater than the mean number from Valley High School. When a data set has an odd number of elements, the median can be found by ordering the values from least to greatest and determining the value in the middle. Since there are five values in each data set, the third value in each ordered list is the median. Therefore, the median number from Foothill High School is 76 and the median number from Valley High School is 65. Thus, the median number from Foothill High School is greater than the median number from Valley High School.

Choices A, B, and D are incorrect and may result from various misconceptions or miscalculations.

Question Difficulty: Easy



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SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div> <div></div> <div></div> <div></div> </div>

ID: 4c774b00

Ages of 20 Students Enrolled in a College Class

Age	Frequency
18	6
19	5
20	4
21	2
22	1
23	1
30	1

The table above shows the distribution of ages of the 20 students enrolled in a college class. Which of the following gives the correct order of the mean, median, and mode of the ages?

- A. mode < median < mean
- B. mode < mean < median
- C. median < mode < mean
- D. mean < mode < median

ID: 4c774b00 Answer

Correct Answer: A

Rationale

Choice A is correct. The mode is the data value with the highest frequency. So for the data shown, the mode is 18. The median is the middle data value when the data values are sorted from least to greatest. Since there are 20 ages ordered, the median is the average of the two middle values, the 10th and 11th, which for these data are both 19. Therefore, the median is 19. The mean is the sum of the data values divided by the number of the data values. So for these data, the mean is

$$\frac{(18 \times 6) + (19 \times 5) + (20 \times 4) + (21 \times 2) + (22 \times 1) + (23 \times 1) + (30 \times 1)}{20} = 20$$

Since the mode is 18, the median is 19, and the mean is 20, $\text{mode} < \text{median} < \text{mean}$.



Choices B and D are incorrect because the mean is greater than the median. Choice C is incorrect because the median is greater than the mode.

Alternate approach: After determining the mode, 18, and the median, 19, it remains to determine whether the mean is less than 19 or more than 19. Because the mean is a balancing point, there is as much deviation below the mean as above the mean. It is possible to compare the data to 19 to determine the balance of deviation above and below the mean. There is a total deviation of only 6 below 19 (the 6 values of 18); however, the data value 30 alone deviates by 11 above 19. Thus the mean must be greater than 19.

Question Difficulty: Medium



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ID: 3f2ee20a

The results of two independent surveys are shown in the table below.

Men's Height

Group	Sample size	Mean (centimeters)	Standard deviation (centimeters)
A	2,500	186	12.5
B	2,500	186	19.1

Which statement is true based on the table?

- A. The Group A data set was identical to the Group B data set.
- B. Group B contained the tallest participant.
- C. The heights of the men in Group B had a larger spread than the heights of the men in Group A.
- D. The median height of Group B is larger than the median height of Group A.

ID: 3f2ee20a Answer

Correct Answer: C

Rationale

Choice C is correct. Standard deviation is a measure of spread, so data sets with larger standard deviations tend to have larger spread. The standard deviation of the heights of the men in Group B is larger than the standard deviation of the heights of the men in Group A. Therefore, the heights of the men in Group B had a larger spread than the heights of the men in Group A.

Choice A is incorrect. If two data sets are identical, they will have equivalent means and equivalent standard deviations. Since the two data sets have different standard deviations, they cannot be identical. Choice B is incorrect. Without knowing the maximum value for each data set, it's impossible to know which group contained the tallest participant. Choice D is incorrect. Since the means of the two groups are equivalent, the medians could also be the same or could be different, but it's impossible to tell from the given information.

Question Difficulty: Medium



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	■ ■ □

ID: d0efc1dd

15, 14, 18, 17, x

The mean and the median of the five numbers above are equal. Which of the following is NOT a possible value of x ?

- A. 6
- B. 11
- C. 16
- D. 21

ID: d0efc1dd Answer

Correct Answer: A

Rationale

Choice A is correct. If x is 6, then the five numbers in the given list are 15, 14, 18, 17, 6. The mean of these five numbers is the sum of all the values divided by the number of values, or $\frac{15+14+18+17+6}{5} = \frac{70}{5} = 14$.

The median of these five numbers can be found by ordering the numbers from least to greatest and determining the middle value. When ordered from least to greatest, the numbers in the given list are 6, 14, 15, 17, 18, and the middle value is 15. Since the mean is 14 and the median is 15, the mean and median aren't equal when x is 6.

Choices B, C, and D are incorrect. If any of these values is substituted for x , the mean and median of the data set would be equal.

Question Difficulty: Medium



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	■ ■ □

ID: 07f2829b

International Tourist
Arrivals, in millions

Country	2012	2013
France	83.0	84.7
United States	66.7	69.8
Spain	57.5	60.7
China	57.7	55.7
Italy	46.4	47.7
Turkey	35.7	37.8
Germany	30.4	31.5
United Kingdom	26.3	32.2
Russia	24.7	28.4

The table above shows the number of international tourist arrivals, rounded to the nearest tenth of a million, to the top nine tourist destinations in both 2012 and 2013. Based on the information given in the table, how much greater, in millions, was the median number of international tourist arrivals to the top nine tourist destinations in 2013 than the median number in 2012, to the nearest tenth of a million?

ID: 07f2829b Answer

Rationale

The correct answer is 1.3. The median number of tourists is found by ordering the number of tourists from least to greatest and determining the middle value from this list. When the number of tourists in 2012 is ordered from least to greatest, the middle value, or the fifth number, is 46.4 million. When the number of tourists in 2013 is ordered from least to greatest, the middle value, or the fifth number, is 47.7 million. The

difference between these two medians is $47.7 \text{ million} - 46.4 \text{ million} = 1.3 \text{ million}$. Note that 1.3 and $13/10$ are examples of ways to enter a correct answer.



Question Difficulty: Medium



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	■ ■ □

ID: 7b65bb28

Station 1	Station 2	Station 3	Station 4	Station 5
\$3.699	\$3.609	\$3.729	\$3.679	\$3.729

In the table above, Melissa recorded the price of one gallon of regular gas from five different local gas stations on the same day. What is the median of the gas prices Melissa recorded?

- A. \$3.679
- B. \$3.689
- C. \$3.699
- D. \$3.729

ID: 7b65bb28 Answer

Correct Answer: C

Rationale

Choice C is correct. The median of a data set is the middle value when the data is in ascending or descending order. In ascending order, the gas prices are \$3.609, \$3.679, \$3.699, \$3.729, and \$3.729. The middle number of this list is 3.699, so it follows that \$3.699 is the median gas price.

Choice A is incorrect. When the gas prices are listed in ascending order, this value isn't the middle number. Choice B is incorrect. This value represents the mean gas price. Choice D is incorrect. This value represents both the mode and the maximum gas price.

Question Difficulty: Medium



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ID: be00d896

For which of the following data sets is the mean greater than the median?

- A. 5, 5, 5, 5, 5, 5, 5, 5, 5
- B. 0, 10, 20, 30, 40, 50, 60, 70, 80
- C. 2, 4, 8, 16, 32, 64, 128, 256, 512
- D. 7, 107, 107, 207, 207, 207, 307, 307, 307

ID: be00d896 Answer

Correct Answer: C

Rationale

Choice C is correct. If the values in a data set are ordered from least to greatest, the median of the data set will be the middle value. Since each data set in the choices is ordered and contains exactly 9 data values, the 5th value in each is the median. It follows that the median of the data set in choice C is 32. The sum of the positive differences between 32 and each of the values that are less than 32 is significantly smaller than the sum of the positive differences between 32 and each of the values that are greater than 32. If 32 were the mean, these sums would have been equal to each other. Therefore, the mean of this data set must be greater than 32. This can also be confirmed by calculating the mean as the sum of the values divided by the number of values in the

data set: $\frac{2 + 4 + 8 + 16 + 32 + 64 + 128 + 256 + 512}{9} = 113\frac{5}{9}$.

Choices A and B are incorrect. Each of the data sets in these choices is symmetric with respect to its median, so the mean and the median for each of these choices are equivalent. Choice D is incorrect. The median of this data set is 207. Since the sum of the positive differences between 207 and each of the values less than 207 is greater than the sum of the positive differences between 207 and each value greater than 207 in this data set, the mean must be less than the median.

Question Difficulty: Medium



Assessment	Test	Domain	Skill	Difficulty
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ID: 5c3c2e3c

The weights, in pounds, for 15 horses in a stable were reported, and the mean, median, range, and standard deviation for the data were found. The horse with the lowest reported weight was found to actually weigh 10 pounds less than its reported weight. What value remains unchanged if the four values are reported using the corrected weight?

- A. Mean
- B. Median
- C. Range
- D. Standard deviation

ID: 5c3c2e3c Answer

Correct Answer: B

Rationale

Choice B is correct. The median weight is found by ordering the horses' weights from least to greatest and then determining the middle value from this list of weights. Decreasing the value for the horse with the lowest weight doesn't affect the median since it's still the lowest value.

Choice A is incorrect. The mean is calculated by finding the sum of all the weights of the horses and then dividing by the number of horses. Decreasing one of the weights would decrease the sum and therefore decrease the mean. Choice C is incorrect. Range is the difference between the highest and lowest weights, so decreasing the lowest weight would increase the range. Choice D is incorrect. Standard deviation is calculated based on the mean weight of the horses. Decreasing one of the weights decreases the mean and therefore would affect the standard deviation.

Question Difficulty: Medium



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div> <div></div> <div></div> <div></div> </div>

ID: 9110c120

Data set A: 5, 5, 5, 5, 5, 5, 5, 5, 5

Data set B: 5, 5, 5, 5, 5, 5, 5, 5, 5, 100

Which of the following statements about the means and medians of data set A and data set B is true?

- A. Only the means are different.
- B. Only the medians are different.
- C. Both the means and the medians are different.
- D. Neither the means nor the medians are different.

ID: 9110c120 Answer

Correct Answer: A

Rationale

Choice A is correct. The mean of a data set is the sum of the values divided by the number of values. The mean of data set A is $\frac{45}{9}$, or 5. The mean of data set B is $\frac{145}{10}$, or 14.5. Thus, the means are different. The median of a data set is the middle value when the values are ordered from least to greatest. The medians of data sets A and B are both 5. Therefore, the medians are the same, so only the means are different.

Choices B, C, and D are incorrect and may result from conceptual or calculation errors.

Question Difficulty: Medium



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div> <div></div> <div></div> <div></div> </div>

ID: 881ef5f5

If a is the mean and b is the median of nine consecutive integers, what is the value of $|a - b|$?

ID: 881ef5f5 Answer

Rationale

The correct answer is 0. Any nine consecutive integers can be written as $k, k+1, k+2, k+3, k+4, k+5, k+6, k+7, k+8$. The mean of the integers is their sum divided by 9: $\frac{(k+k+1+k+2+\dots+k+8)}{9} = \frac{(9k+36)}{9}$, which simplifies to $k+4$. So $a = k+4$. Since there is an odd number of integers (nine), the median is the integer in the middle when all the integers are ordered from least to greatest: $k+4$. So $b = k+4$. Therefore, $|a - b| = |(k+4) - (k+4)|$, which is 0.

Question Difficulty: Medium



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	■ ■ □

ID: 9e2bf782

A fish hatchery has three tanks for holding fish before they are introduced into the wild. Ten fish weighing less than 5 ounces are placed in tank A. Eleven fish weighing at least 5 ounces but no more than 13 ounces are placed in tank B. Twelve fish weighing more than 13 ounces are placed in tank C. Which of the following could be the median of the weights, in ounces, of these 33 fish?

- A. 4.5
- B. 8
- C. 13.5
- D. 15

ID: 9e2bf782 Answer

Correct Answer: B

Rationale

Choice B is correct. The median of a set of numbers is the middle number when the values in the set are ordered from least to greatest. There are 33 fish, so in an ordered list of the weights, the 17th value would be the median weight. The 10 fish in tank A weigh the least, and these 10 weights would be the first 10 values on the ordered list. The 11 fish in tank B have the next set of higher weights, and so would be the 11th through 21st weights in the ordered list, which includes the median weight as the 17th value. The fish in tank B weigh at least 5 ounces but no more than 13 ounces; of the given choices, only 8 ounces falls within this range of values.

Choice A is incorrect. It's given that tank A has ten fish weighing less than 5 ounces. Since there are more than ten fish in tanks B and C combined, the median weight cannot be less than 5 ounces. Choice C and D are incorrect. It's given that tank C has twelve fish weighing more than 13 ounces. There are more than twelve fish in tanks A and B combined, so the median weight can't be more than 13 ounces.

Question Difficulty: Medium



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	<div> <div></div> <div></div> <div></div> </div>

ID: 8193e8cd

2, 10, 3, 7, 6

The mean of the list of numbers above is what fraction of the sum of the five numbers?

ID: 8193e8cd Answer

Rationale

The correct answer is $\frac{1}{5}$. The mean of the list of numbers is found by dividing the sum of the numbers by the number of values in the list. Since there are 5 numbers in the list, the mean is $\frac{1}{5}$ of the sum of the numbers. Note that 1/5 and .2 are examples of ways to enter a correct answer.

Question Difficulty: Medium



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	■ ■ ■

ID: 457d2f2c

A data set of 27 different numbers has a mean of 33 and a median of 33. A new data set is created by adding 7 to each number in the original data set that is greater than the median and subtracting 7 from each number in the original data set that is less than the median. Which of the following measures does NOT have the same value in both the original and new data sets?

- A. Median
- B. Mean
- C. Sum of the numbers
- D. Standard deviation

ID: 457d2f2c Answer

Correct Answer: D

Rationale

Choice D is correct. When a data set has an odd number of elements, the median can be found by ordering the values from least to greatest and determining the middle value. Out of the 27 different numbers in this data set, 13 numbers are below the median, one number is exactly 33, and 13 numbers are above the median. When 7 is subtracted from each number below the median and added to each number above the median, the data spread out from the median. Since the median of this data set, 33, is equivalent to the mean of the data set, the data also spread out from the mean. Since standard deviation is a measure of how spread out the data are from the mean, a greater spread from the mean indicates an increased standard deviation.

Choice A is incorrect. All the numbers less than the median decrease and all the numbers greater than the median increase, but the median itself doesn't change. Choices B and C are incorrect. The mean of a data set is found by dividing the sum of the values by the number of values. The net change from subtracting 7 from 13 numbers and adding 7 to 13 numbers is zero. Therefore, neither the mean nor the sum of the numbers changes.

Question Difficulty: Hard



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	■ ■ ■

ID: 1142af44

Value	Frequency
1	a
2	$2a$
3	$3a$
4	$2a$
5	a

The frequency distribution above summarizes a set of data, where a is a positive integer. How much greater is the mean of the set of data than the median?

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

ID: 1142af44 Answer

Correct Answer: A

Rationale

Choice A is correct. Since the frequencies of values less than the middle value, 3, are the same as the frequencies of the values greater than 3, the set of data has a symmetric distribution. When a set of data has a symmetric distribution, the mean and median values are equal. Therefore, the mean is 0 greater than the median.

Choices B, C, and D are incorrect and may result from misinterpreting the set of data.

Question Difficulty: Hard



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	■ ■ ■

ID: 651d83bb

Two different teams consisting of 10 members each ran in a race. Each member's completion time of the race was recorded. The mean of the completion times for each team was calculated and is shown below.

Team A: 3.41 minutes

Team B: 3.79 minutes

Which of the following **MUST** be true?

1. Every member of team A completed the race in less time than any member of team B.
2. The median time it took the members of team B to complete the race is greater than the median time it took the members of team A to complete the race.
3. There is at least one member of team B who took more time to complete the race than some member of team A.

A. III only

B. I and III only

C. II and III only

D. I, II, and III

ID: 651d83bb Answer

Correct Answer: A

Rationale

Choice A is correct. Since the average time for the 10 members of team A is 3.41 minutes, the sum of the 10 times for team A is equal to $(10)(3.41) = 34.1$ minutes. Since the average time for the 10 members of team B is 3.79 minutes, the sum of the 10 times for team B is equal to $(10)(3.79) = 37.9$ minutes. Since the sum of the 10 times for team B is greater than the sum of the 10 times for team A, it must be true that at least one of the times for team B must be greater than one of the times for team A. Thus, statement III is true. However, it's possible that at least some of the times for team A were greater than some of the times for team B. For example, all of team A's times could be 3.41 minutes, and team B could have 1 time of 3.34 minutes and 9 times of 3.84 minutes. Thus, statement I need not be true. It's also possible that the median of the times for team B is less than the median of the times for team A. For example, all of team A's times could be 3.41 minutes, and team B could have 6 times of 3.37 minutes and 4 times of 4.42 minutes; then the median of team B's times would be 3.37 minutes and the median of team A's times would be 3.41 minutes. Thus, statement II need not be true.

Choices B, C, and D are incorrect because neither statement I nor statement II must be true.

Question Difficulty: Hard





Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	■ ■ ■

ID: 1e8ccffd

The mean score of 8 players in a basketball game was 14.5 points. If the highest individual score is removed, the mean score of the remaining 7 players becomes 12 points. What was the highest score?

- A. 20
- B. 24
- C. 32
- D. 36

ID: 1e8ccffd Answer

Correct Answer: C

Rationale

Choice C is correct. If the mean score of 8 players is 14.5, then the total of all 8 scores is $14.5 \times 8 = 116$. If the mean of 7 scores is 12, then the total of all 7 scores is $12 \times 7 = 84$. Since the set of 7 scores was made by removing the highest score of the set of 8 scores, then the difference between the total of all 8 scores and the total of all 7 scores is equal to the removed score: $116 - 84 = 32$.

Choice A is incorrect because if 20 is removed from the group of 8 scores, then the mean score of the

remaining 7 players is $\frac{(14.5 \times 8) - 20}{7}$ is approximately 13.71, not 12. Choice B is incorrect because if 24 is

removed from the group of 8 scores, then the mean score of the remaining 7 players is $\frac{(14.5 \times 8) - 24}{7}$ is

approximately 13.14, not 12. Choice D is incorrect because if 36 is removed from the group of 8 scores, then the

mean score of the remaining 7 players is $\frac{(14.5 \times 8) - 36}{7}$ or approximately 11.43, not 12.

Question Difficulty: Hard



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	■ ■ ■

ID: bf47ad54

Each of the following frequency tables represents a data set. Which data set has the greatest mean?

A.

Value	Frequency
70	4
80	5
90	6
100	7

B.

Value	Frequency
70	6
80	6
90	6
100	6

C.

Value	Frequency
70	7
80	6
90	6
100	7

D.

Value	Frequency
70	8
80	5
90	5
100	8

ID: bf47ad54 Answer

Correct Answer: A



Rationale

Choice A is correct. The tables in choices B, C, and D each represent a data set where the values **80** and **90** have the same frequency and the values **70** and **100** have the same frequency. It follows that each of these data sets is symmetric around the value halfway between **80** and **90**, or **85**. When a data set is symmetric around a value, that value is the mean of the data set. Therefore, the data sets represented by the tables in choices B, C, and D each have a mean of **85**. The table in choice A represents a data set where the value **90** has a greater frequency than the value **80** and the value **100** has a greater frequency than the value **70**. It follows that this data set has a mean greater than **85**. Therefore, of the given choices, choice A represents the data set with the greatest mean.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Hard



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	■ ■ ■

ID: 4ff597db

The mean amount of time that the 20 employees of a construction company have worked for the company is 6.7 years. After one of the employees leaves the company, the mean amount of time that the remaining employees have worked for the company is reduced to 6.25 years. How many years did the employee who left the company work for the company?

- A. 0.45
- B. 2.30
- C. 9.00
- D. 15.25

ID: 4ff597db Answer

Correct Answer: D

Rationale

Choice D is correct. The mean amount of time that the 20 employees worked for the company is 6.7 years. This means that the total number of years all 20 employees worked for the company is $(6.7)(20) = 134$ years. After the employee left, the mean amount of time that the remaining 19 employees worked for the company is 6.25 years. Therefore, the total number of years all 19 employees worked for the company is $(6.25)(19) = 118.75$ years. It follows that the number of years that the employee who left had worked for the company is $134 - 118.75 = 15.25$ years.

Choice A is incorrect; this is the change in the mean, which isn't the same as the amount of time worked by the employee who left. Choice B is incorrect and likely results from making the assumption that there were still 20 employees, rather than 19, at the company after the employee left and then subtracting the original mean of 6.7 from that result. Choice C is incorrect and likely results from making the assumption that there were still 20 employees, rather than 19, at the company after the employee left.

Question Difficulty: Hard



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	■ ■ ■

ID: 391ae4b2

Data set F consists of **55** integers between **170** and **290**. Data set G consists of all the integers in data set F as well as the integer **10**. Which of the following must be less for data set F than for data set G?

- I. The mean
 - II. The median
- A. I only
- B. II only
- C. I and II
- D. Neither I nor II

ID: 391ae4b2 Answer

Correct Answer: D

Rationale

Choice D is correct. It's given that data set F consists of **55** integers between **170** and **290** and data set G consists of all the integers in data set F as well as the integer **10**. Since the integer **10** is less than all the integers in data set F, the mean of data set G must be less than the mean of data set F. Thus, the mean of data set F isn't less than the mean of data set G. When a data set is in ascending order, the median is between the two middle values when there is an even number of values and the median is the middle value when there is an odd number of values. It follows that the median of data set F is either greater than or equal to the median of data set G. Therefore, the median of data set F isn't less than the median of data set G. Thus, neither the mean nor the median must be less for data set F than for data set G.

Choice A is incorrect and may result from conceptual or calculation errors.

Choice B is incorrect and may result from conceptual or calculation errors.

Choice C is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Hard



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	■ ■ ■

ID: 9d935bd8

Percent of Residents Who Earned a Bachelor's Degree or Higher

State	Percent of residents
State A	21.9%
State B	27.9%
State C	25.9%
State D	19.5%
State E	30.1%
State F	36.4%
State G	35.5%

A survey was given to residents of all 50 states asking if they had earned a bachelor's degree or higher. The results from 7 of the states are given in the table above. The median percent of residents who earned a bachelor's degree or higher for all 50 states was 26.95%. What is the difference between the median percent of residents who earned a bachelor's degree or higher for these 7 states and the median for all 50 states?

- A. 0.05%
- B. 0.95%
- C. 1.22%
- D. 7.45%

ID: 9d935bd8 Answer

Correct Answer: B

Rationale

Choice B is correct. The median of a set of numbers is the middle value of the set values when ordered from least to greatest. If the percents in the table are ordered from least to greatest, the middle value is 27.9%. The difference between 27.9% and 26.95% is 0.95%.

Choice A is incorrect and may be the result of calculation errors or not finding the median of the data in the table correctly. Choice C is incorrect and may be the result of finding the mean instead of the median. Choice D is incorrect and may be the result of using the middle value of the unordered list.

Question Difficulty: Hard



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	■ ■ ■

ID: 54d93874

	Masses (kilograms)					
Andrew	2.4	2.5	3.6	3.1	2.5	2.7
Maria	x	3.1	2.7	2.9	3.3	2.8

Andrew and Maria each collected six rocks, and the masses of the rocks are shown in the table above. The mean of the masses of the rocks Maria collected is 0.1 kilogram greater than the mean of the masses of the rocks Andrew collected. What is the value of x ?

ID: 54d93874 Answer

Rationale

The correct answer is 2.6. Since the mean of a set of numbers can be found by adding the numbers together and dividing by how many numbers there are in the set, the mean mass, in kilograms, of the rocks Andrew collected is $\frac{2.4+2.5+3.6+3.1+2.5+2.7}{6} = \frac{16.8}{6}$, or 2.8. Since the mean mass of the rocks Maria collected is 0.1 kilogram greater than the mean mass of rocks Andrew collected, the mean mass of the rocks Maria collected is $2.8+0.1 = 2.9$ kilograms. The value of x can be found by writing an equation for finding the mean: $\frac{x+3.1+2.7+2.9+3.3+2.8}{6} = 2.9$. Solving this equation gives $x = 2.6$. Note that 2.6 and $13/5$ are examples of ways to enter a correct answer.

Question Difficulty: Hard



Assessment	Test	Domain	Skill	Difficulty
SAT	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	■ ■ ■

ID: 94237701

For a certain computer game, individuals receive an integer score that ranges from 2 through 10. The table below shows the frequency distribution of the scores of the 9 players in group A and the 11 players in group B.

Score	Score Frequencies	
	Group A	Group B
2	1	0
3	1	0
4	2	0
5	1	4
6	3	2
7	0	0
8	0	2
9	1	1
10	0	2
Total	9	11

The median of the scores for group B is how much greater than the median of the scores for group A?

ID: 94237701 Answer

Rationale

The correct answer is 1. When there are an odd number of values in a data set, the median of the data set is the middle number when the data values are ordered from least to greatest. The scores for group A, ordered from least to greatest, are 2, 3, 4, 4, 5, 6, 6, and 9. The median of the scores for group A is therefore 5. The scores for group B, ordered from least to greatest, are 5, 5, 5, 5, 6, 6, 8, 8, 9, 10, and 10. The median of the scores for group B is therefore 6. The median score for group B is $6 - 5 = 1$ more than the median score for group A.

