Question ID 3a05154a

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: 3a05154a

Weight (pounds)	Frequency
13	12
14	8
15	5
16	7
17	9
18	10
19	13
20	7

The frequency table summarizes a data set of the weights, rounded to the nearest pound, of 71 tortoises. A weight of 39 pounds is added to the original data set, creating a new data set of the weights, rounded to the nearest pound, of 72 tortoises. Which statement best compares the mean and median of the new data set to the mean and median of the original data set?

A. The mean of the new data set is greater than the mean of the original data set, and the median of the new data set is greater than the median of the original data set.

B. The mean of the new data set is greater than the mean of the original data set, and the medians of the two data sets are equal.

C. The mean of the new data set is less than the mean of the original data set, and the median of the new data set is less than the median of the original data set.

D. The mean of the new data set is less than the mean of the original data set, and the medians of the two data sets are equal.

ID: 3a05154a Answer

Correct Answer: B

Rationale

Choice B is correct. The mean of a data set is the sum of the values in the data set divided by the number of values in the data set. The new data set consists of the weights of the 71 tortoises in the original data set and one additional weight, 39. Since the additional weight, 39, is greater than any of the values in the original data set, the mean of the new data set is greater than the mean of the original data set. If a data set contains an odd number of data values, the median is represented by the middle data value in the list when the data values are listed in ascending or descending order. Since

the original data set consists of the weights of 71 tortoises and is in ascending order, the median of the original data set is represented by the middle value, or the 36th value. Based on the frequencies shown in the table, the 36th value in this data set is 17. If a data set contains an even number of data values, the median is between the two middle data values when the values are listed in ascending or descending order. Since the new data set consists of the weights of 72 tortoises, the median of the new data set is between the 36th and 37th data values when the values are arranged in ascending order. To keep the data in ascending order, the additional value of 39 would be placed at the bottom of the frequency table with a frequency of 1. Therefore, based on the frequencies in the table, the 36th and 37th values in the new data set are both 17. It follows that the median of the new data set is 17, which is the same as the median of the original data set. Therefore, the mean of the new data set is greater than the mean of the original data set, and the medians of the two data sets are equal.

Choice A 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

Question ID 41fd4b9f

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: 41fd4b9f

The table shows the frequency of values in a data set.

Value	Frequency
19	7
21	1
23	7
25	4

What is the minimum value of the data set?

ID: 41fd4b9f Answer

Correct Answer: 19

Rationale

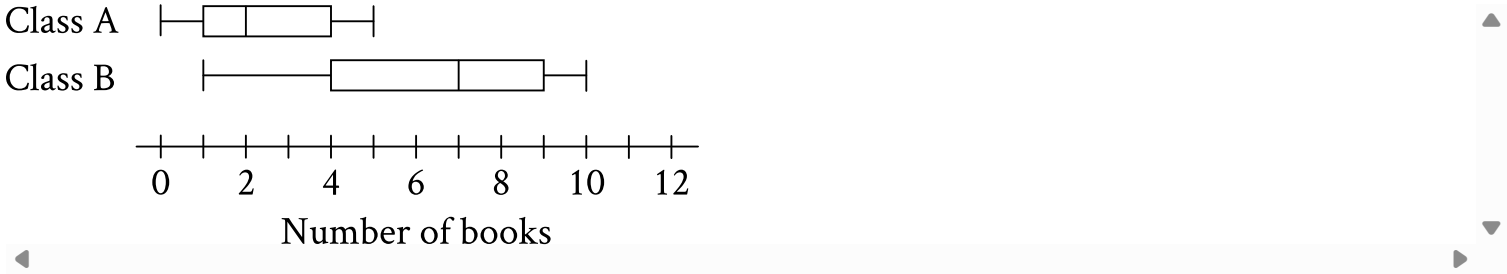
The correct answer is 19. The minimum value of a data set is the least value in the data set. The frequency refers to the number of times a value occurs. The given table shows that for this data set, the value 19 occurs 7 times, the value 21 occurs 1 time, the value 23 occurs 7 times, and the value 25 occurs 4 times. Therefore, of the values 19, 21, 23, and 25 given in the data set, the minimum value of the data set is 19.

Question Difficulty: Hard

Question ID c59942a1

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: c59942a1



The two box plots show the distribution of number of books read over the summer by the students in two different English classes. What is the positive difference between the ranges of number of books read over the summer for the two classes?

ID: c59942a1 Answer

Correct Answer: 4

Rationale

The correct answer is 4. It's given that the two boxplots show the distribution of number of books read over the summer by the students in two different English classes. In a boxplot, the first vertical line represents the minimum value of the data set and the last vertical line represents the maximum value of the data set. The range of a data set is the difference between its maximum value and its minimum value. In class A, the maximum number of books read is 5 and the minimum number of books read is 0. The difference between those values is $5 - 0$, or 5. Therefore, the range of the number of books read in class A is 5. In class B, the maximum number of books read is 10 and the minimum number of books read is 1. The difference between those values is $10 - 1$, or 9. Therefore, the range of the number of books read in class B is 9. To find the positive difference between the ranges of the number of books read for the two classes, the smaller range must be subtracted from the larger range. Therefore, the positive difference between the ranges of number of books read over the summer for the two classes is $9 - 5$, or 4.

Question Difficulty: Hard

Question ID 2731baec

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: 2731baec

The list gives the mass, in grams, of 5 alpine marmots.

$4{,}010;\ 4{,}010;\ 3{,}030;\ 4{,}050;\ 3{,}050$

What is the mean mass, in grams, of these 5 alpine marmots?

ID: 2731baec Answer

Correct Answer: 3630

Rationale

The correct answer is $3{,}630$. The mean of a data set is the sum of the values in the data set divided by the number of values in the data set. The sum of the masses, in grams, of these alpine marmots is $4{,}010 + 4{,}010 + 3{,}030 + 4{,}050 + 3{,}050$, or $18{,}150$ grams. The number of alpine marmots in the data set is 5. Therefore, the mean mass, in grams, of these 5 alpine marmots is $\frac{18{,}150}{5}$, or $3{,}630$.

Question Difficulty: Hard

Question ID 4be5f7b1

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: 4be5f7b1

$23, 27, 27, 32, 35, 36, 52$

What is the range of the 7 scores shown?

ID: 4be5f7b1 Answer

Correct Answer: 29

Rationale

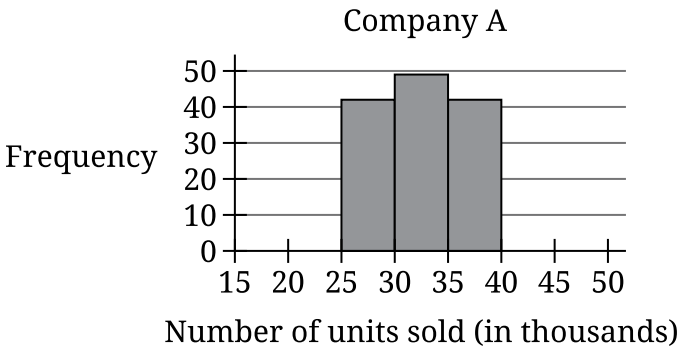
The correct answer is 29. The range of a data set is the difference between its maximum value and its minimum value. For the data set shown, the maximum score is 52 and the minimum score is 23. The difference between those scores is $52 - 23$, or 29. Therefore, the range of the 7 scores shown is 29.

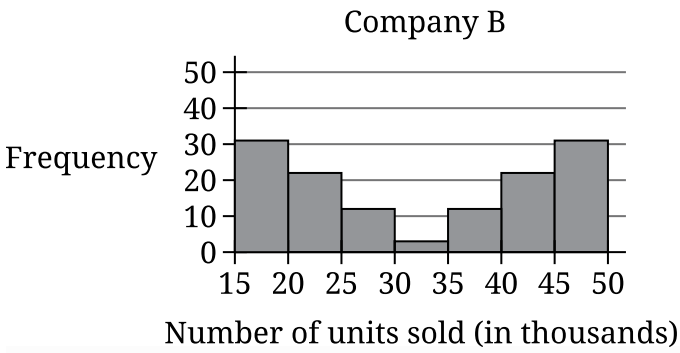
Question Difficulty: Hard

Question ID 59dac82a

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: 59dac82a





The histograms summarize the distributions of number of units sold, in thousands, for company A and company B. Which statement best compares the standard deviations of number of units sold for these companies?

A. The standard deviation of number of units sold for company A is less than the standard deviation of number of units sold for company B.

B. The standard deviation of number of units sold for company A is greater than the standard deviation of number of units sold for company B.

C. The standard deviation of number of units sold for company A is equal to the standard deviation of number of units sold for company B.

D. There is not enough information to compare the standard deviations.

ID: 59dac82a Answer

Correct Answer: A

Rationale

Choice A is correct. Standard deviation measures the spread of a given data set from its mean. In a data set with a smaller standard deviation, there are more values close to the mean. In a data set with a greater standard deviation, there are more values farther from the mean. The two histograms shown have the same scale on the horizontal axis. Therefore, their standard deviations can be compared by visually comparing the spreads of their histograms. The distribution summarized by each histogram is symmetric. Therefore, the mean of the data set for each histogram is a

value in the middle bar of that histogram. The middle bar of each histogram has a value of at least 30 thousand units sold but less than 35 thousand units sold. Therefore, the mean of the data set for each histogram is at least 30 thousand and less than 35 thousand. The histogram for company A shows all the values in that data set are close to the mean. For company B, the histogram shows there are fewer values close to the mean and more values farther from the mean. Therefore, the standard deviation of number of units sold for company A is less than the standard deviation of number of units sold for company B.

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

Question ID df13ee3e

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: df13ee3e

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: df13ee3e 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

Question ID ce27ef4f

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: ce27ef4f

Data set A consists of 10 positive integers less than 60. The list shown gives 9 of the integers from data set A.

$$43, 45, 44, 43, 38, 39, 40, 46, 40$$

The mean of these 9 integers is 42. If the mean of data set A is an integer that is greater than 42, what is the value of the largest integer from data set A?

ID: ce27ef4f Answer

Correct Answer: 52

Rationale

The correct answer is 52. The mean of a data set is calculated by dividing the sum of the data values by the number of values. It's given that data set A consists of 10 values, 9 of which are shown. Let x represent the 10th data value in data set A, which isn't shown. The mean of data set A can be found using the expression $\frac{43+45+44+43+38+39+40+46+40+x}{10}$, or $\frac{378+x}{10}$. It's given that the mean of the 9 values shown is 42 and that the mean of all 10 numbers is greater than 42. Consequently, the 10th data value, x, is larger than 42. It's also given that the data values in data set A are positive integers less than 60. Thus, $42 < x < 60$. Finally, it's given that the mean of data set A is an integer. This means that the sum of the 10 data values, $378 + x$, is divisible by 10. Thus, $378 + x$ must have a ones digit of 0. It follows that x must have a ones digit of 2. Since $42 < x < 60$ and x has a ones digit of 2, the only possible value of x is 52. Since 52 is larger than any of the integers shown, the largest integer from data set A is 52.

Question Difficulty: Hard

Question ID 21da05e5

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: 21da05e5

Value	Data set A frequency	Data set B frequency
30	2	9
34	4	7
38	5	5
42	7	4
46	9	2

Data set A and data set B each consist of 27 values. The table shows the frequencies of the values for each data set. Which of the following statements best compares the means of the two data sets?

A. The mean of data set A is greater than the mean of data set B.

B. The mean of data set A is less than the mean of data set B.

C. The mean of data set A is equal to the mean of data set B.

D. There is not enough information to compare the means of the data sets.

ID: 21da05e5 Answer

Correct Answer: A

Rationale

Choice A is correct. The mean value of a data set is the sum of the values of the data set divided by the number of values in the data set. When a data set is represented in a frequency table, the sum of the values in the data set is the sum of the products of each value and its frequency. For data set A, the sum of products of each value and its frequency is $30(2) + 34(4) + 38(5) + 42(7) + 46(9)$, or $1{,}094$. It's given that there are 27 values in data set A. Therefore, the mean of data set A is $\frac{1{,}094}{27}$, or approximately 40.52. Similarly, the mean of data B is $\frac{958}{27}$, or approximately 35.48. Therefore, the mean of data set A is greater than the mean of data set B.

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

Question ID 52161aeb

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: 52161aeb

The table shown summarizes the number of employees at each of the 17 restaurants in a town.

Number of employees	Number of restaurants
2 to 7	2
8 to 13	4
14 to 19	2
20 to 25	7
26 to 31	2

Which of the following could be the median number of employees for the restaurants in this town?

A. 2

B. 9

C. 15

D. 21

ID: 52161aeb Answer

Correct Answer: D

Rationale

Choice D is correct. If a data set contains an odd number of data values, the median is represented by the middle data value in the list when the data values are listed in ascending or descending order. Since the numbers of employees are given as ranges of values rather than specific values, it's only possible to determine the range in which the median falls, rather than the exact median. Since there are 17 restaurants included in the data set and the numbers of employees are listed in ascending order, it follows that the median number of employees will be represented by the ninth restaurant in the list. Since the first 2 restaurants each have 2 to 7 employees, numbers of employees in the 2 to 7 range would be represented by the first and second restaurants in the list. The next 4 restaurants each have 8 to 13 employees. Therefore, numbers of employees in the 8 to 13 range will be represented by the third through sixth restaurants in the list. The next 2 restaurants each have 14 to 19 employees. Therefore, numbers of employees in the 14 to 19 range will be represented by the seventh and eighth restaurants in the list. Since the next 7 restaurants each have 20 to 25 employees, numbers of employees in the 20 to 25 range will be represented by the ninth through fifteenth restaurants in the list. This means that the ninth restaurant in the list, which has the median number of employees for the restaurants in this town, has a number of employees in the 20 to 25 range. Of the given choices, the only number of employees in the 20 to 25 range is 21.

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

Choice B is incorrect. This is the position of the median in the list, not the value of the median.

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

Question Difficulty: Hard

Question ID 7b61ae2a

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: 7b61ae2a

$4, 10, 18, 4, 4, 5, 6, 5$

What is the median of the data set shown?

A. 4

B. 5

C. 7

D. 14

ID: 7b61ae2a Answer

Correct Answer: B

Rationale

Choice B is correct. If a data set contains an even number of data values, when the data values are listed in ascending or descending order, the median is between the two middle values. The given data set contains 8 values. When listed in ascending order, the data set is $4, 4, 4, 5, 5, 6, 10, 18$ and the two middle values are 5 and 5. Since the two middle values are the same, the median must be 5.

Choice A is incorrect. This value is between the two middle values in the list shown, not the two middle values when the data values are listed in ascending or descending order.

Choice C is incorrect. This is the mean, not the median, of the data set.

Choice D is incorrect. This is the range, not the median, of the data set.

Question Difficulty: Hard

Question ID 9265f4de

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: 9265f4de

The dot plot represents the 15 values in data set A. Data set B is created by adding 56 to each of the values in data set A. Which of the following correctly compares the medians and the ranges of data sets A and B?

A. The median of data set B is equal to the median of data set A, and the range of data set B is equal to the range of data set A.

B. The median of data set B is equal to the median of data set A, and the range of data set B is greater than the range of data set A.

C. The median of data set B is greater than the median of data set A, and the range of data set B is equal to the range of data set A.

D. The median of data set B is greater than the median of data set A, and the range of data set B is greater than the range of data set A.

ID: 9265f4de Answer

Correct Answer: C

Rationale

Choice C is correct. The median of a data set with an odd number of values, in ascending or descending order, is the middle value of the data set, and the range of a data set is the positive difference between the maximum and minimum values in the data set. Since the dot plot shown gives the values in data set A in ascending order and there are 15 values in the data set, the eighth value in data set A, 23, is the median. The maximum value in data set A is 26 and the minimum value is 22, so the range of data set A is $26 - 22$, or 4. It's given that data set B is created by adding 56 to each of the values in data set A. Increasing each of the 15 values in data set A by 56 will also increase its median value by 56 making the median of data set B 79. Increasing each value of data set A by 56 does not change the range, since the maximum value of data set B is $26 + 56$, or 82, and the minimum value is $22 + 56$, or 78, making the range of data set B $82 - 78$, or 4. Therefore, the median of data set B is greater than the median of data set A, and the range of data set B is equal to the range of data set A.

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

Question Difficulty: Hard

Question ID e96c77a6

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: e96c77a6

Data value	Frequency
6	3
7	3
8	8
9	8
10	9
11	11
12	9
13	0
14	6

The frequency table summarizes the 57 data values in a data set. What is the maximum data value in the data set?

ID: e96c77a6 Answer

Correct Answer: 14

Rationale

The correct answer is 14. The maximum value is the largest value in the data set. The frequency refers to the number of times a data value occurs. The given frequency table shows that for this data set, the data value 6 occurs three times, the data value 7 occurs three times, the data value 8 occurs eight times, the data value 9 occurs eight times, the data value 10 occurs nine times, the data value 11 occurs eleven times, the data value 12 occurs nine times, the data value 13 occurs zero times, and the data value 14 occurs six times. Therefore, the maximum data value in the data set is 14.

Question Difficulty: Hard

Question ID 553eb498

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: 553eb498

The dot plot represents a data set of the number of bursts for 13 eruptions of a steam vent. If an additional eruption with 11 bursts is added to this data set to create a new data set of 14 eruptions, which of the following measures will be greater for the new data set than for the original data set?

I. The median number of bursts

II. The mean number of bursts

A. I and II

B. I only

C. II only

D. Neither I nor II

ID: 553eb498 Answer

Correct Answer: C

Rationale

Choice C is correct. It's given that the dot plot represents a data set of the number of bursts for 13 eruptions of a steam vent. The median of a data set with an odd number of elements is the middle element when the elements are in numerical order. For 13 elements in numerical order, this is the 7th element. For this data set, the first 4 elements have a value of 1, and the next 5 elements have a value of 2. Thus, the 7th element in the ordered data set is 2 and the median number of bursts for the original data set is 2. If an additional eruption with 11 bursts is added to this data set to create a new data set of 14 eruptions, the median of the new data set will be between the 7th and 8th elements in the ordered set, which will also be 2. Therefore, the median number of bursts for the new data set will be the same as the median number of bursts for the original data set. The mean number of bursts for the original data set is found by adding the values of all 13 elements and dividing that sum by the number of elements, 13. Since the data is shown in a dot plot, the sum of the values of the elements can be found by multiplying each element's value by its frequency: $1(4) + 2(5) + 3(2) + 4(1) + 5(1)$, or 29. Therefore, the mean number of bursts for the original data set is $\frac{29}{13}$. If an additional eruption with 11 bursts is added to this data set to create a new data set of 14 bursts, the mean number of bursts for the new data set is $\frac{29+11}{14}$, or $\frac{40}{14}$. Since $\frac{40}{14} > \frac{29}{13}$, the mean number of bursts for the new data set is greater than the mean number of bursts for the original data set. Therefore, of the median number of bursts and the mean number of bursts, only the mean number of bursts is greater for the new data set than for the original data set.

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

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

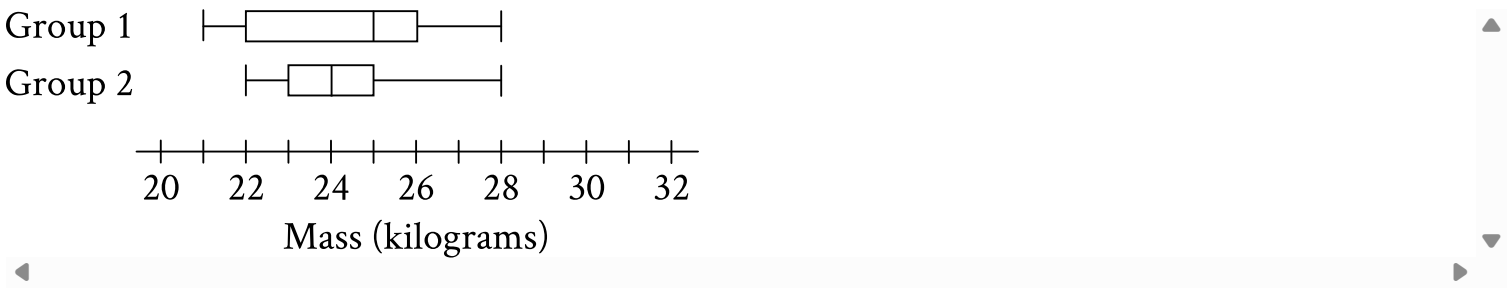
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Hard

Question ID a0db586b

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: a0db586b



The box plots summarize the masses, in kilograms, of two groups of gazelles. Based on the box plots, which of the following statements must be true?

A. The mean mass of group 1 is greater than the mean mass of group 2.

B. The mean mass of group 1 is less than the mean mass of group 2.

C. The median mass of group 1 is greater than the median mass of group 2.

D. The median mass of group 1 is less than the median mass of group 2.

ID: a0db586b Answer

Correct Answer: C

Rationale

Choice C is correct. The median of a data set represented in a box plot is represented by the vertical line within the box. It follows that the median mass of the gazelles in group 1 is 25 kilograms, and the median mass of the gazelles in group 2 is 24 kilograms. Since 25 kilograms is greater than 24 kilograms, the median mass of group 1 is greater than the median mass of group 2.

Choice A is incorrect. The mean mass of each of the two groups cannot be determined from the box plots.

Choice B is incorrect. The mean mass of each of the two groups cannot be determined from the box plots.

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

Question Difficulty: Hard

Question ID 7ecea565

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: 7ecea565

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: 7ecea565 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

Question ID 081070c7

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: 081070c7

Data set A consists of the heights of 75 buildings and has a mean of 32 meters. Data set B consists of the heights of 50 buildings and has a mean of 62 meters. Data set C consists of the heights of the 125 buildings from data sets A and B. What is the mean, in meters, of data set C?

ID: 081070c7 Answer

Correct Answer: 44

Rationale

The correct answer is 44. The mean of a data set is computed by dividing the sum of the values in the data set by the number of values in the data set. It's given that data set A consists of the heights of 75 buildings and has a mean of 32 meters. This can be represented by the equation $\frac{x}{75} = 32$, where x represents the sum of the heights of the buildings, in meters, in data set A. Multiplying both sides of this equation by 75 yields $x = 75(32)$, or $x = 2{,}400$ meters. Therefore, the sum of the heights of the buildings in data set A is $2{,}400$ meters. It's also given that data set B consists of the heights of 50 buildings and has a mean of 62 meters. This can be represented by the equation $\frac{y}{50} = 62$, where y represents the sum of the heights of the buildings, in meters, in data set B. Multiplying both sides of this equation by 50 yields $y = 50(62)$, or $y = 3{,}100$ meters. Therefore, the sum of the heights of the buildings in data set B is $3{,}100$ meters. Since it's given that data set C consists of the heights of the 125 buildings from data sets A and B, it follows that the mean of data set C is the sum of the heights of the buildings, in meters, in data sets A and B divided by the number of buildings represented in data sets A and B, or $\frac{2{,}400+3{,}100}{125}$, which is equivalent to 44 meters. Therefore, the mean, in meters, of data set C is 44.

Question Difficulty: Hard

Question ID f0af2609

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: f0af2609

Data set A consists of the heights of 75 objects and has a mean of 25 meters. Data set B consists of the heights of 50 objects and has a mean of 65 meters. Data set C consists of the heights of the 125 objects from data sets A and B. What is the mean, in meters, of data set C?

ID: f0af2609 Answer

Correct Answer: 41

Rationale

The correct answer is 41. The mean of a data set is computed by dividing the sum of the values in the data set by the number of values in the data set. It's given that data set A consists of the heights of 75 objects and has a mean of 25 meters. This can be represented by the equation $\frac{x}{75} = 25$, where x represents the sum of the heights of the objects, in meters, in data set A. Multiplying both sides of this equation by 75 yields $x = 75(25)$, or $x = 1{,}875$ meters. Therefore, the sum of the heights of the objects in data set A is $1{,}875$ meters. It's also given that data set B consists of the heights of 50 objects and has a mean of 65 meters. This can be represented by the equation $\frac{y}{50} = 65$, where y represents the sum of the heights of the objects, in meters, in data set B. Multiplying both sides of this equation by 50 yields $y = 50(65)$, or $y = 3{,}250$ meters. Therefore, the sum of the heights of the objects in data set B is $3{,}250$ meters. Since it's given that data set C consists of the heights of the 125 objects from data sets A and B, it follows that the mean of data set C is the sum of the heights of the objects, in meters, in data sets A and B divided by the number of objects represented in data sets A and B, or $\frac{1{,}875+3{,}250}{125}$, which is equivalent to 41 meters. Therefore, the mean, in meters, of data set C is 41.

Question Difficulty: Hard

Question ID a4acdfcb

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: a4acdfcb

Data set A has 15 values and is represented by the dot plot shown. Data set B is created by adding 46 to each of the values in data set A. Which of the following correctly compares the medians and the ranges of data sets A and B?

A. The median of data set B is greater than the median of data set A, and the range of data set B is equal to the range of data set A.

B. The median of data set B is greater than the median of data set A, and the range of data set B is greater than the range of data set A.

C. The median of data set B is equal to the median of data set A, and the range of data set B is greater than the range of data set A.

D. The median of data set B is equal to the median of data set A, and the range of data set B is equal to the range of data set A.

ID: a4acdfcb Answer

Correct Answer: A

Rationale

Choice A is correct. The median is the middle value in a data set when the data are arranged in order from least to greatest. Since there are 15 values in data set A, the median is the 8th value. The 8th value is 23, so the median of data set A is 23. The range is found by subtracting the minimum value in a data set from the maximum value. The minimum value in data set A is 22 and the maximum value is 26. Therefore, the range of data set A is $26 - 22$, or 4. It's given that data set B is created by adding 46 to each of the values in data set A. Therefore, the 8th value in data set B is $23 + 46$, or 69, so the median of data set B is 69. The minimum value in data set B is $22 + 46$, or 68, and the maximum value is $26 + 46$, or 72. Therefore, the range of data set B is $72 - 68$, or 4. Since the median of data set A is 23, and the median of data set B is 69, the median of data set B is greater than the median of data set A. Since the ranges of data sets A and B are both 4, the range of data set B is equal to the range of data set A.

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

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

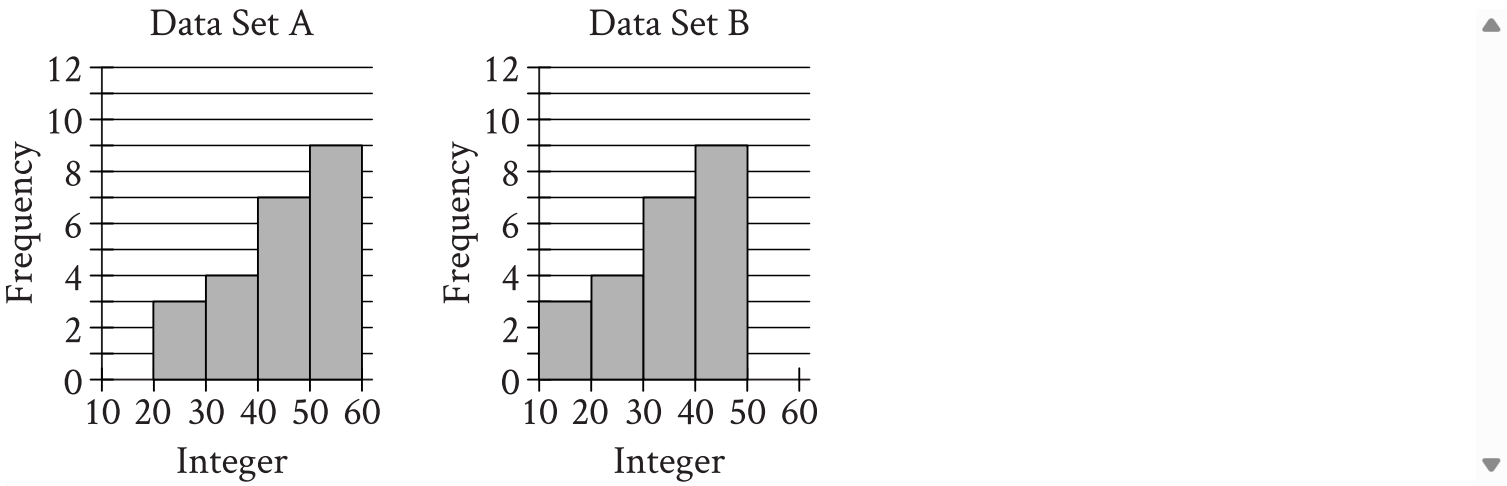
Choice D is incorrect and may result from conceptual or calculation errors.

Question Difficulty: Hard

Question ID 3248a2ce

Assessment	Test	Domain	Skill	Difficulty
PSAT 8/9	Math	Problem-Solving and Data Analysis	One-variable data: Distributions and measures of center and spread	Hard

ID: 3248a2ce



Two data sets of 23 integers each are summarized in the histograms shown. For each of the histograms, the first interval represents the frequency of integers greater than or equal to 10, but less than 20. The second interval represents the frequency of integers greater than or equal to 20, but less than 30, and so on. What is the smallest possible difference between the mean of data set A and the mean of data set B?

A. 0

B. 1

C. 10

D. 23

ID: 3248a2ce Answer

Correct Answer: B

Rationale

Choice B is correct. The histograms shown have the same shape, but data set A contains values between 20 and 60 and data set B contains values between 10 and 50. Thus, the mean of data set A is greater than the mean of data set B. Therefore, the smallest possible difference between the mean of data set A and the mean of data set B is the difference between the smallest possible mean of data set A and the greatest possible mean of data set B. In data set A, since there are 3 integers in the interval greater than or equal to 20 but less than 30, 4 integers greater than or equal to 30 but less than 40, 7 integers greater than or equal to 40 but less than 50, and 9 integers greater than or equal to 50 but less than 60, the smallest possible mean for data set A is $\frac{(3\cdot 20)+(4\cdot 30)+(7\cdot 40)+(9\cdot 50)}{23}$. In data set B, since there are 3 integers greater than or equal to 10 but less than 20, 4 integers greater than or equal to 20 but less than 30, 7 integers greater than or equal to 30 but less than 40, and 9 integers greater than or equal to 40 but less than 50, the largest possible mean for data set B is $\frac{(3\cdot 19)+(4\cdot 29)+(7\cdot 39)+(9\cdot 49)}{23}$. Therefore, the smallest possible difference between the mean of data set A and the mean of data set B is $\frac{(3\cdot 20)+(4\cdot 30)+(7\cdot 40)+(9\cdot 50)}{23} - \frac{(3\cdot 19)+(4\cdot 29)+(7\cdot 39)+(9\cdot 49)}{23}$, which is equivalent to

$\frac{(3 \cdot 20) - (3 \cdot 19) + (4 \cdot 30) - (4 \cdot 29) + (7 \cdot 40) - (7 \cdot 39) + (9 \cdot 50) - (9 \cdot 49)}{23}$. This expression can be rewritten as $\frac{3(20-19)+4(30-29)+7(40-39)+9(50-49)}{23}$, or $\frac{23}{23}$, which is equal to 1. Therefore, the smallest possible difference between the mean of data set A and the mean of data set B is 1.

Choice A is incorrect. This is the smallest possible difference between the ranges, not the means, of the data sets.

Choice C is incorrect. This is the difference between the greatest possible mean, not the smallest possible mean, of data set A and the greatest possible mean of data set B.

Choice D is incorrect. This is the smallest possible difference between the sum of the values in data set A and the sum of the values in data set B, not the smallest possible difference between the means.

Question Difficulty: Hard