SAT Released Test 8 Problem #28

28.) The 22 students in a health class conducted an experiment in which they each recorded their pulse rates, in beats per minute, before and after completing a light exercise routine. The dot plots below display the results.



Beats Per Minute After Exercise

Let s_1 and r_1 be the standard deviation and range respectively, of the data before exercise, and let s_2 and r_2 be the standard deviation and range, respectively, of the data after exercise. Which of the following is true?

- A.) $s_1 = s_2$ and $r_1 = r_2$
- B.) $s_1 < s_2$ and $r_1 < r_2$
- C.) $s_1 > s_2$ and $r_1 > r_2$
- D.) $s_1 \neq s_2$ and $r_1 = r_2$

The two data sets have the same range.

88 - 56 = 32

112 - 80 = 32

Therefore, the only answer choices possible are A and D.

In statistics, the standard deviation is a measure that is used to quantify the amount of variation or dispersion of a set of data values. A low standard deviation indicates that the data points tend to be close to the mean of the set, while a high standard deviation indicates that the data points are spread out over a wider range of values.

We are normally interested in knowing the population standard deviation because our population contains all the values we are interested in. Therefore, you would normally calculate the population standard deviation if (1) you have the entire population or (2) you have a sample of a larger population, but you are only interested in this sample and do not wish to generalize your findings to the population.

The two data sets have different standard deviations. Both dot plots show distributions that have a mean near the center value of the dot plot. The first dot plot shows most values clustered near the mean, while the second dot plot shows most values farther from the mean. Therefore, the standard deviations of the two data sets are not equal – the data represented by the second dot plot has a greater standard deviation.

Therefore, answer choice D is the correct answer.

D.) $s_1 \neq s_2$ and $r_1 = r_2$

Just in case you get a problem that is not as obvious in terms of determining the population standard deviation, we will also find the population standard deviation on the TI Nspire.

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Press Enter.

Go to the very top of column A and label it an x.

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Go to the very top of column B and label it y.

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Enter the data from the first dot plot into the spreadsheet.

Press Enter after each data entry.

| <u>x</u> | Y |
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| 64 | 1 |
| 68 | 5 |
| 72 | 8 |
| 76 | 5 |
| 80 | 1 |
| 88 | 1 |

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Select 9: Population Standard Deviation

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| 3: Mean | | | | |
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| 6: Product of Elements | | | | ₽ |
| 7: Sample Standard Deviatio | n | | tions | ₽ |
| 8: Sample Variance | | | ns | ₽ |
| 9: Population Standard Devia | ati | on | e Intervals | ₽ |
| A: Population Variance | | | | ₽ |

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Press the Var Key (which is above the number 9).

Select x.



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Press the comma which is in the alphabet section in the third row.

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X

Press the Var Key.

Select y.

Press Enter.

Press Enter.

The population standard deviation of the first dot plot is approximately 6.03023.



Get a new document and follow the steps again for the second dot plot.

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| 80 | 2 | 1.1 1.2 ► *Unsaved マ | () |
| 84 | 2 | stDevPop(x,y) | 9.72345 |
| 88 | 3 | | |
| 92 | 3 | | |
| 96 | 2 | | |
| 100 | 3 | | |
| 104 | 3 | | |
| 108 | 2 | | |
| 112 | 2 | | |

The second dot plot has a population standard deviation of approximately 9.72345.

The two population standard deviations are not equal, while the two ranges are equal.

Answer choice D is the correct solution.

D.) $s_1 \neq s_2$ and $r_1 = r_2$

TI NSPIRE STEPS: FINDING POPULATION STANDARD DEVIATION

Released Test #4

23

The tables below give the distribution of high temperatures in degrees Fahrenheit (°F) for City A and City B over the same 21 days in March.

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| Temperature (°F) | Frequency |
|------------------|-----------|
| 80 | 3 |
| 79 | 14 |
| 78 | 2 |
| 77 | 1 |
| 76 | 1 |



| Temperature (°F) | Frequency |
|------------------|-----------|
| 80 | 6 |
| 79 | 3 |
| 78 | 2 |
| 77 | 4 |
| 76 | 6 |
| | |

Which of the following is true about the data shown for these 21 days?

- A) The standard deviation of temperatures in City A is larger.
- B) The standard deviation of temperatures in City B is larger.
- C) The standard deviation of temperatures in City A is the same as that of City B.
- D) The standard deviation of temperatures in these cities cannot be calculated with the data provided.

1.) Classroom Session #1 uses question 6 on the calculator portion of the SAT test given on April 10, 2018

TI NSpire Calculator Skill: "Solving Linear Systems" on the TI Nspire

2.) Classroom Session #2 uses question 5 on the calculator portion of the SAT test given on April 10, 2018

TI NSpire Calculator Skill: Boolean Checking on the TI Nspire

3.) Classroom Session #3 uses question 8 on the calculator portion of the SAT test given on April 10, 2018

TI NSpire Calculator Skill: Storing values for variables on the TI Nspire

4.) Classroom Session #4 uses question 6 on the calculator portion of the SAT test given on April 10, 2018

TI NSpire Calculator Skill: "Solving Linear Systems" on the TI Nspire

5.) Classroom Session #5 uses question 17 on the calculator portion of the SAT test given on April 10, 2018

TI NSpire Calculator Skill: Finding Population Standard Deviation on the TI Nspire