Example 18

Self Tutor

Calculate the standard deviation of the data set: 2, 5, 4, 6, 7, 5, 6.

$$\overline{x} = \frac{2+5+4+6+7+5+6}{7} = 5$$

$$s = \sqrt{\frac{\sum(x-\overline{x})^2}{n}}$$

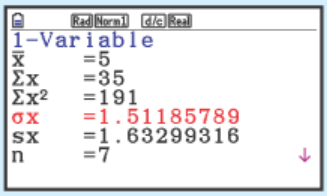
$$= \sqrt{\frac{16}{7}} \approx 1.51$$

Score (x)	$x - \overline{x}$	$(x-\overline{x})^2$
2	-3	9
4	-1	1
5	0	0
5	0	0
6	1	1
6	1	1
7	2	4
35		16

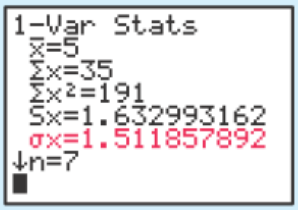
Make sure you always use the standard deviation of the **population** as highlighted in the screenshots.

The following screendumps indicate the result when we calculate the standard deviation for this data set:

Casio fx-CG20



TI-84 Plus



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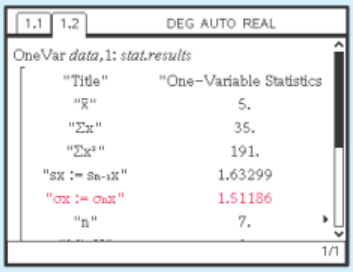


Example 19

Self Tutor

Use technology to estimate the standard deviation for this distribution of examination scores:

Mark	*Frequency*
0 - 9	1
10 - 19	1
20 - 29	2
30 - 39	4
40 - 49	11

Mark	*Frequency*
50 - 59	16
60 - 69	24
70 - 79	13
80 - 89	6
90 - 99	2

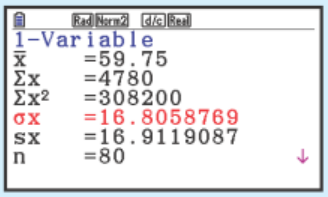
In order to estimate the standard deviation of already grouped data, the mid-interval values are used to represent all data in that interval.

We then use technology to estimate the standard deviation.

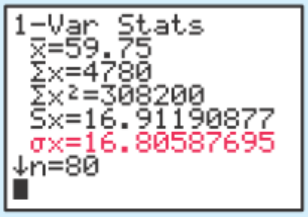
Class interval	*Mid-interval value*	*Frequency*
0 - 9	4.5	1
10 - 19	14.5	1
20 - 29	24.5	2
30 - 39	34.5	4
40 - 49	44.5	11

Class interval	*Mid-interval value*	*Frequency*
50 - 59	54.5	16
60 - 69	64.5	24
70 - 79	74.5	13
80 - 89	84.5	6
90 - 99	94.5	2

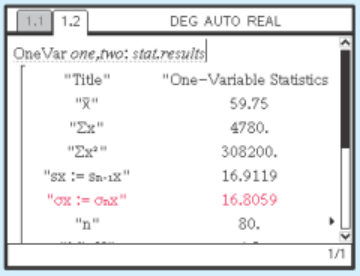
Casio fx-CG20



TI-84 Plus



TI-*n*spire



The standard deviation $s \approx 16.8$.

Example 20

Self Tutor

The following exam results were recorded by two classes of students studying Spanish:

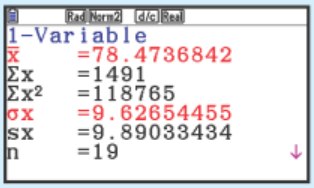
Class A: 64 69 74 67 78 88 76 90 89 84 83 87 78 80 95 75 55 78 81

Class B: 94 90 88 81 86 96 92 93 88 72 94 61 87 90 97 95 77 77 82 90

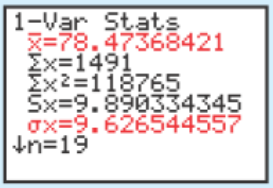
Compare the results of the two classes including their spread.

Class A:

Casio fx-CG20



TI-84 Plus



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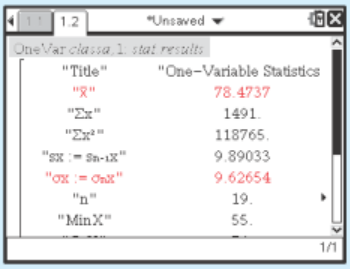
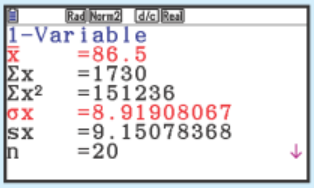
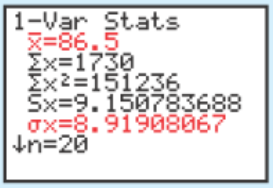
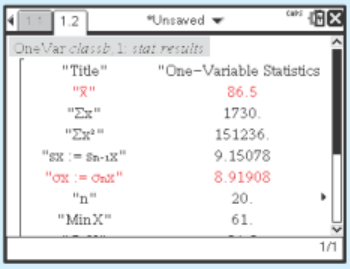


Class B:







	Mean	*Standard deviation*
Class A	78.5	9.63
Class B	86.5	8.92

Class B has a higher mean than class A, indicating that the students in class B generally performed better in the exam.

Class A has a higher standard deviation than class B, indicating that the results in class A were more dispersed.