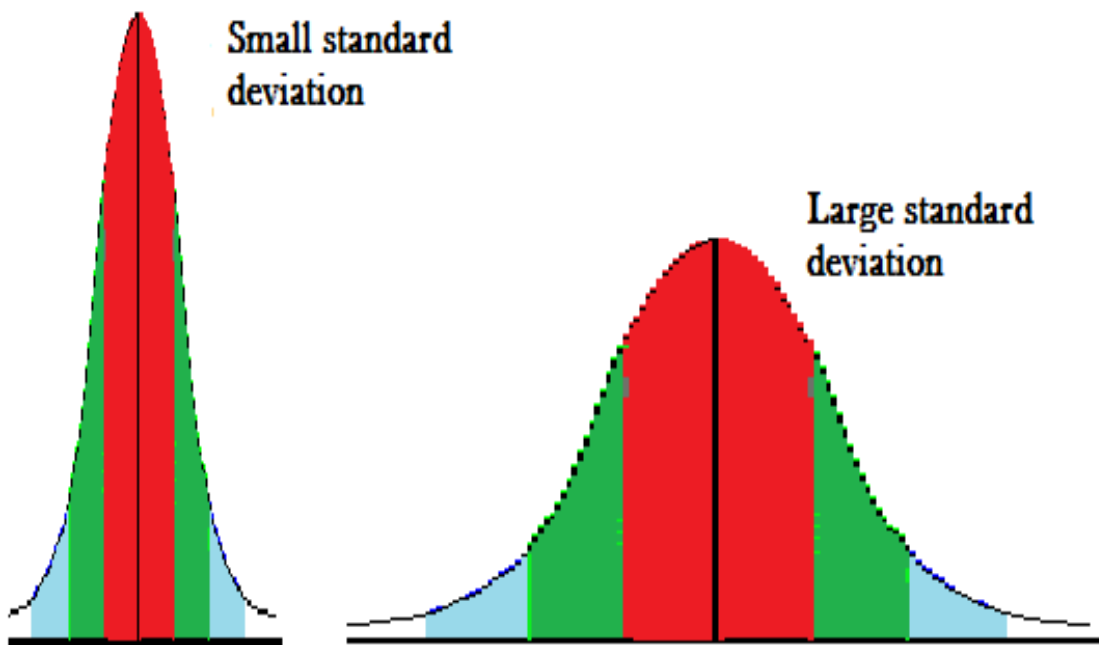


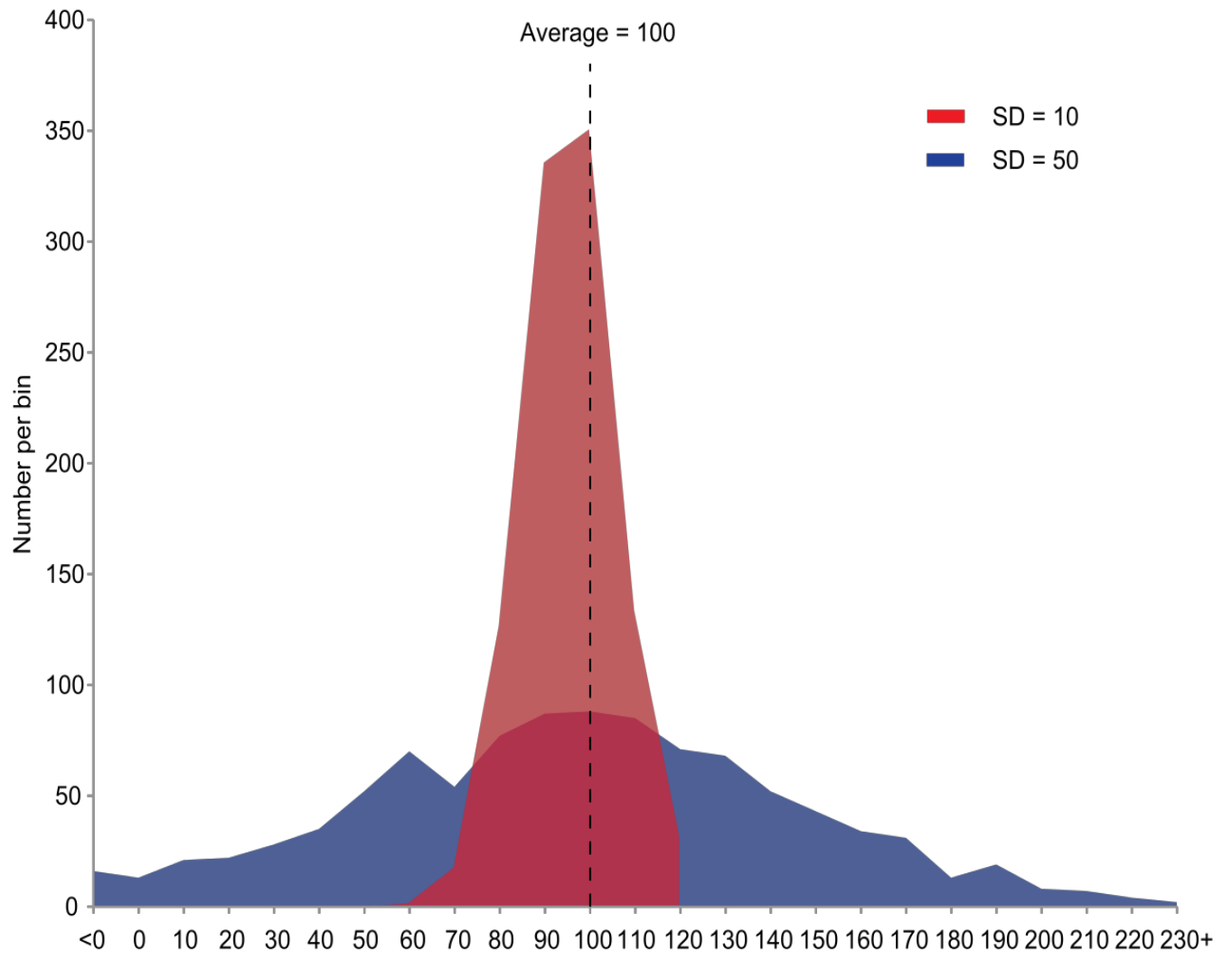
### **5.3 Standard Deviation**

1. Give some examples of measures of central tendency? What kind of information they give about the data.

2. Give some examples of measures of dispersion? What kind of information they give about the data.

3. What is a standard deviation?





4. How can it be calculated?

$$\sigma = \sqrt{\frac{\sum (x - \bar{x})^2}{n}}$$

$\sigma$  = standard deviation

$\sum$  = sum of

$x$  = each value in the data set

$\bar{x}$  = mean of all values in the data set

$n$  = number of value in the data set

<https://www.easycalculation.com/statistics/standard-deviation.php> (For ungrouped data)

<http://knowpapa.com/sd-freq/> (For grouped data)

6. Is it a better measure of dispersion than range? Why or why not?

Ex. Brendon works part-time in the canteen at his local community centre. One of his tasks is to unload delivery trucks. He wondered about the accuracy of the mass measurements given on two cartons that contained sunflower seeds. He decided to measure the masses of the 20 bags in the two cartons. One carton contained 227 g bags, and the other carton contained 454 g bags.

Masses of 227 g Bags				Masses of 454 g Bags			
228	218	236	227	458	445	457	463
230	227	221	229	452	457	445	452

a) Use measures of dispersion to determine if the accuracy of measurement is the same for both bag sizes?

Masses of 227 g Bags	Masses of 454 g Bags
Range =	Range =
S D = (go to <a href="https://www.easycalculation.com/statistics/standard-deviation.php">https://www.easycalculation.com/statistics/standard-deviation.php</a> )	S D = (go to <a href="https://www.easycalculation.com/statistics/standard-deviation.php">https://www.easycalculation.com/statistics/standard-deviation.php</a> )

b) How might standard deviation be used by the company that sells the sunflower seeds for the quality control in packaging process?

c) Explain why the standard deviation for the masses of the two sizes of bag are different, even though the ranges of the masses are the same.

Ex. 2. Helen conducted a survey to determine the number of hours per week that Grade 11 males in her school play video games. She determined that the mean was 12.84 h, with a standard deviation of 2.16 h. Jane conducted a similar survey of Grade 11 females in her school. She organised her results in this frequency table. Compare the results of the two surveys.

Gaming Hours per week for Grade 11 Females

Hours	3-5	5-7	7-9	9-11	11-13	13-15
Frequency	7	11	16	19	12	5

Sol.

Hours	Hours (Mid Points)	Frequency
3-5	4	7
5-7	6	11
7-9	8	16
9-11	10	19
11-13	12	12
13-15	14	5

Standard Deviation = 2.782

(go to <http://knowpapa.com/sd-freq/> )

Comparison

Males	Females
Mean = 12.84h	Mean = 8.943h
SD = 2.16h	SD = 2.782h

The males played nearly 4 h more per week than the females, on average.

The standard deviation for males is lower than the standard deviation for females. It means that the males' playing times are closer to their mean (almost 1.3h) and don't vary as much.