

Algebra 1B

7-8 Standard deviation and Normal Distribution

MEASURES OF DISPERSION

define dispersion: How data is spread out about the mean.

**Standard
Deviation**

Shows how data deviates from
the mean - used with the bell
curve.

$$\sigma = \sqrt{\frac{\sum_{i=1}^n (x_i - \mu)^2}{n}}$$

For the following sets of data, calculate the mean and standard deviation of the data. Describe the mean and standard deviation in words after calculating it.

1. The data set below gives the numbers of home runs for the 10 batters who hit the most home runs during the 2005 Major League Baseball regular season.

51, 48, 47, 46, 45, 43, 41, 40, 40, 39

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NORMAL FLOAT AUTO REAL DEGREE MP
1-Var Stats
x̄=44
Σx=440
Σx²=19506
Sx=4.027681991
σx=3.820994635
n=10
minX=39
↓Q1=40
```

$$\bar{x} \text{ (mean)} = 44$$

$$\sigma \text{ (Stan. Dev.)} = 3.8$$

44 represents the average number of home runs the top 10 batters hit.

3.8 represents the Stand. Dev. So, every 3.8 hits a batter is either more above or below the average.

2. The data set below gives the waiting times (in minutes) of several people at a department of motor vehicles service center.

11, 7, 14, 2, 8, 13, 3, 6, 10, 3, 8, 4, 8, 4, 7

```
1-Var Stats
x̄=7.2
Σx=108
Σx²=966
Sx=3.66839786
σx=3.544009029
n=15
minX=2
↓Q1=4
```

$$\bar{x} = 7.2$$

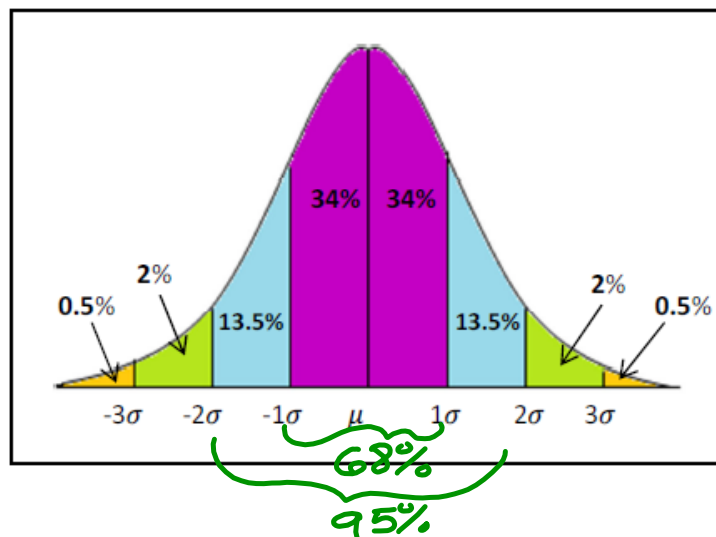
$$\sigma = 3.5$$

7.2 represents average time you would wait at Motor Vehicle.

3.5 represents the Stand. Dev. So, every 3.5 minutes is either more above or below the average wait time.

Normal Distribution

★ Normal Distribution: A bell curve that shows how data is distributed from the mean.



Important Facts: About 68 % of the data falls within one standard deviation of the mean.

About 95 % of the data falls within two standard deviations of the mean.

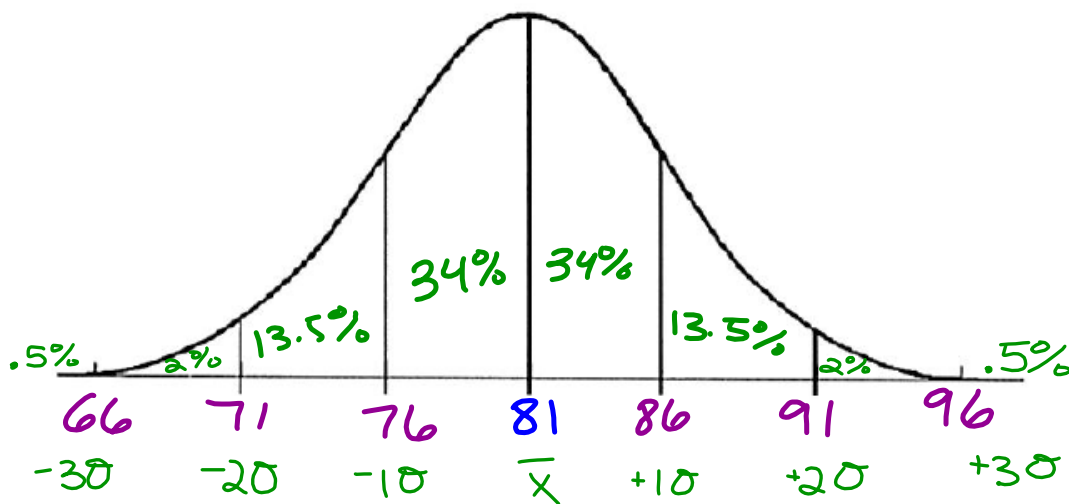
About 99 % of the data falls within three standard deviations of the mean.

<https://www.youtube.com/watch?v=MRqtXL2WX2M>

Example 1:

The grades on a statistics midterm are normally distributed with a mean of 81 and a standard deviation of 5.

a) Draw and label the normal distribution curve.



(b) What percent of the data falls between 76 and 86?

68%

(c) What percent of the data falls between 71 and 91?

95%

(d) What percent of the data falls between 81 and 91?

47.5%

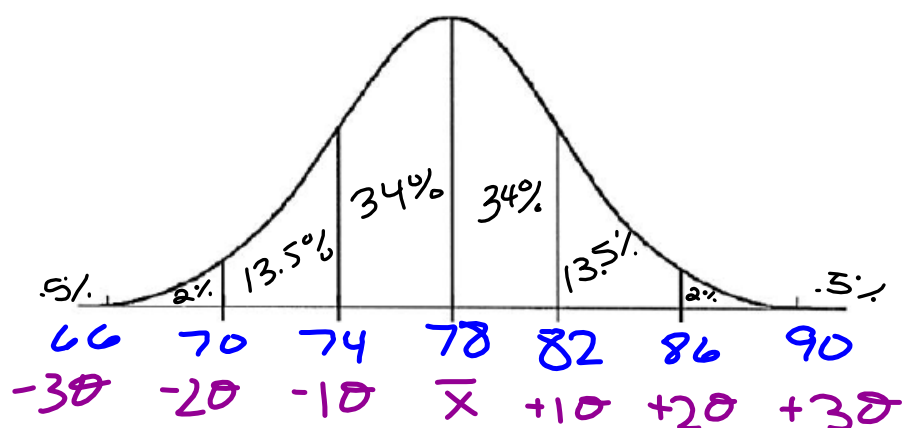
(e) What percent of the data is less than 86?

84%

Example 2:

The temperatures for the month of May are normally distributed with a mean of 78 and a standard deviation of 4.

a) Draw and label the normal distribution curve.



b) What percent of the data falls between 74 and 82?

68%

c) What percent of the data falls between 70 and 82?

81.5%

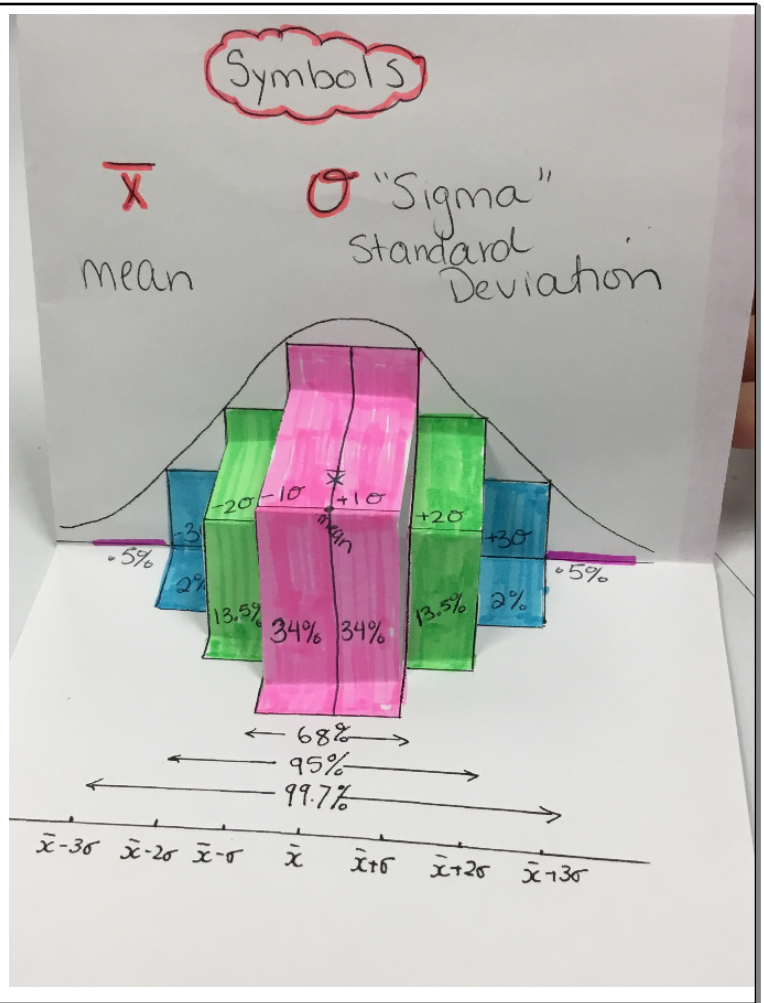
d) What percent of the data is less than 82?

84%

e) What percent of the data falls between 66 and 78?

49.5%

Normal Distribution Foldable



Symbols

\bar{x}
"mean"

σ Sigma
"Standard Deviation"

