Inspiring Greatness

ISD

INDEPENDENCE SCHOOL DISTRICT

Math Virtual Learning

Probability and Statistics

April 20, 2020

Probability and Statistics
Lesson: April 20, 2020

Objective/Learning Target:

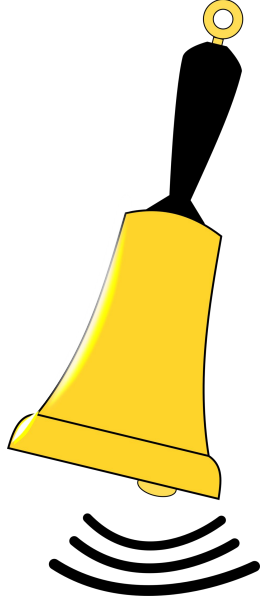
Students will be able to use the empirical rule to calculate the intervals of the data's distribution

Decimals to Percents...

If I ate 3 slices of a pizza that was cut into 8 slices and I wanted to know what % of the pizza I ate, you would probably know that you simply take your calculator and type in 3 ÷ 8.

The answer you get would be .375, but do you know how to change that number into a percentage?

What is the percentage for .375?



Decimals to Percents...

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The answer you get would be .375, but do you know how to change that number into a percentage?

What is the percentage for .375? **37.5%**

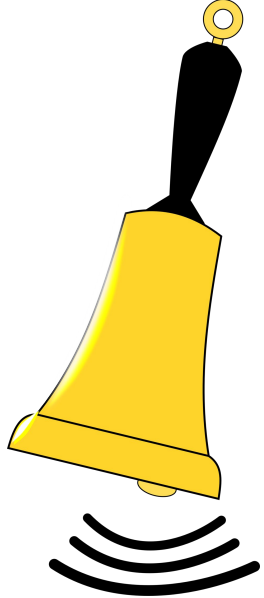
You can either multiply .375 times 100 OR move the decimal 2 places to the right.

Either way you will end up with 37.5 which is then your percentage.

Decimals to Percents...

Can you convert these decimals into % ???

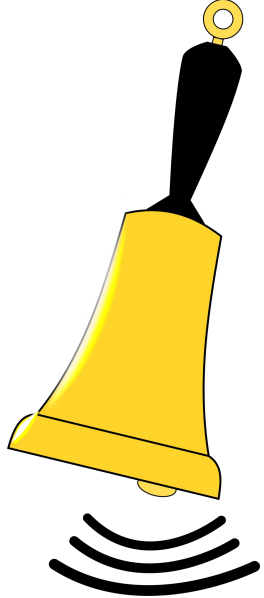
1. .23
2. .135
3. .025
4. 1.75
5. .6



Decimals to Percents...

Can you convert these decimals into % ???

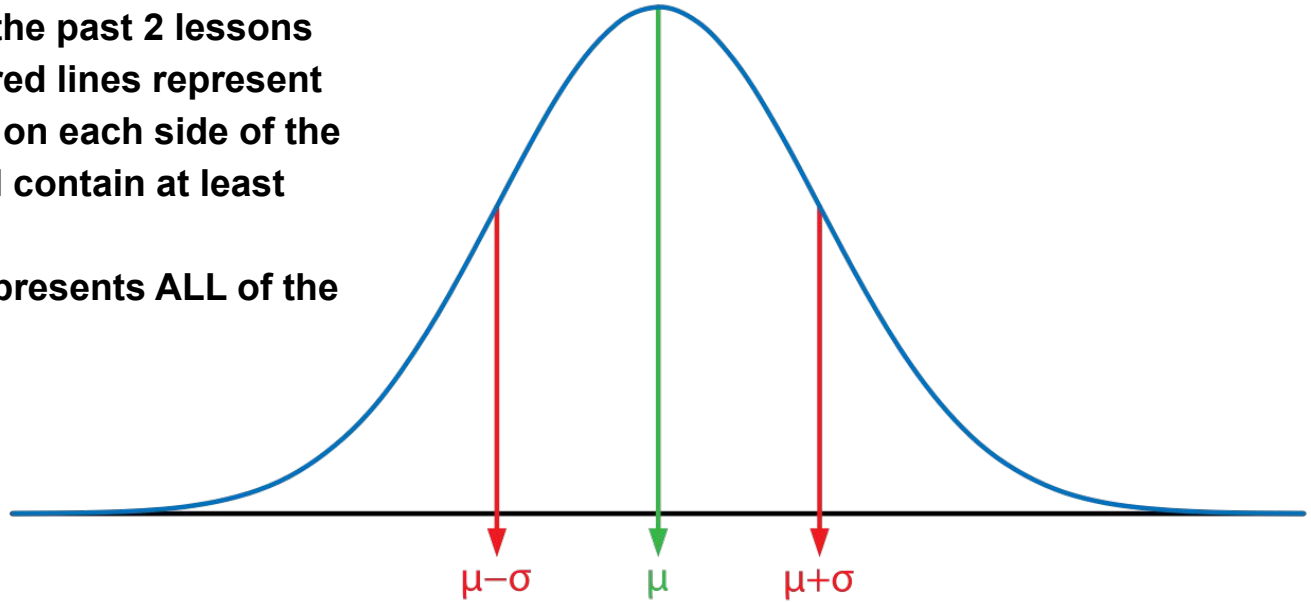
1. .23 = **23%**
2. .135 = **13.5%**
3. .025 = **2.5%**
4. 1.75 = **175%**
5. .6 = **60%**



Empirical Rule:

Before we can learn about the Empirical Rule we must first evaluate the bell curve in more detail:

- **We already know from the past 2 lessons on 4/15 & 4/16 that the red lines represent one standard deviation on each side of the mean and that it should contain at least 68% of the data**
- **The blue curved line represents ALL of the data, 100%**

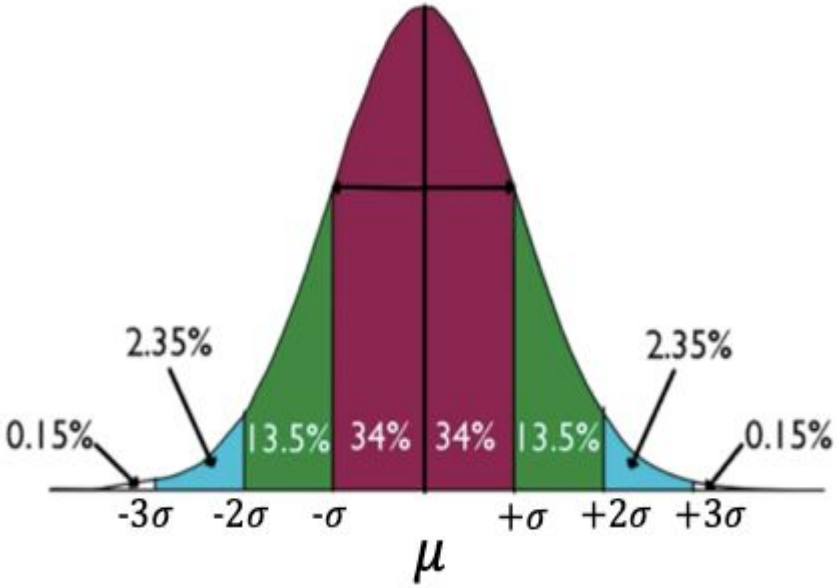


Empirical Rule

The bell curve is actually broken down into 4 parts. (the color choices do not make any difference, that is just the colors on this picture)

- Purple - this is the one we already know
- Green
- Blue
- White

Each color represents one more standard deviation away from the mean.



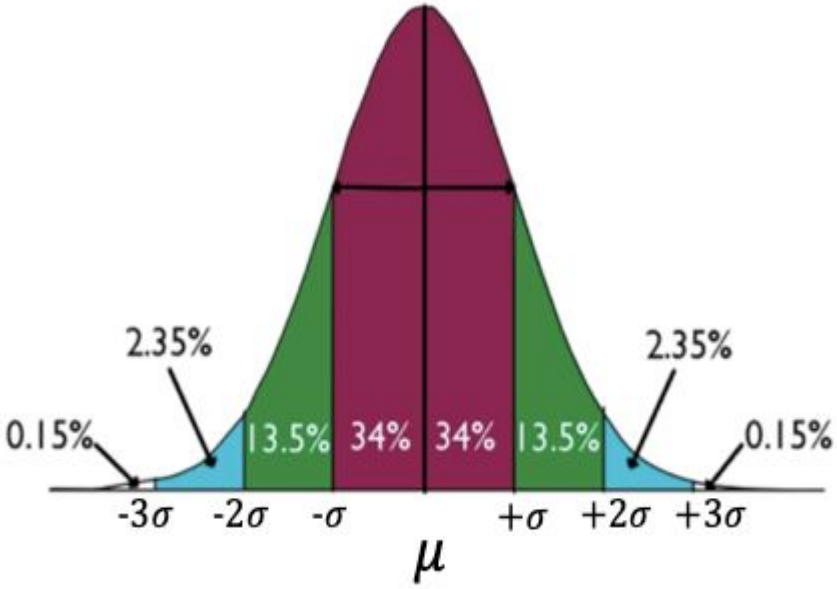
Where did the %'s in this picture come from?

You will notice that as we go outwards from the mean, the curve of the graph gets smaller and smaller so that the amount of data in each section gets smaller and smaller.

IF the data is normal, we can assume some statistical %'s.

- Purple: will always be 68% of the data
- Green & Purple (together): will always be 95% of the data
- Blue, Green, & Purple (together): will always be 99.7% of the data
- White, Blue, Green & Purple (together): will always be 100% of the data

Each color represents one more standard deviation away from the mean.

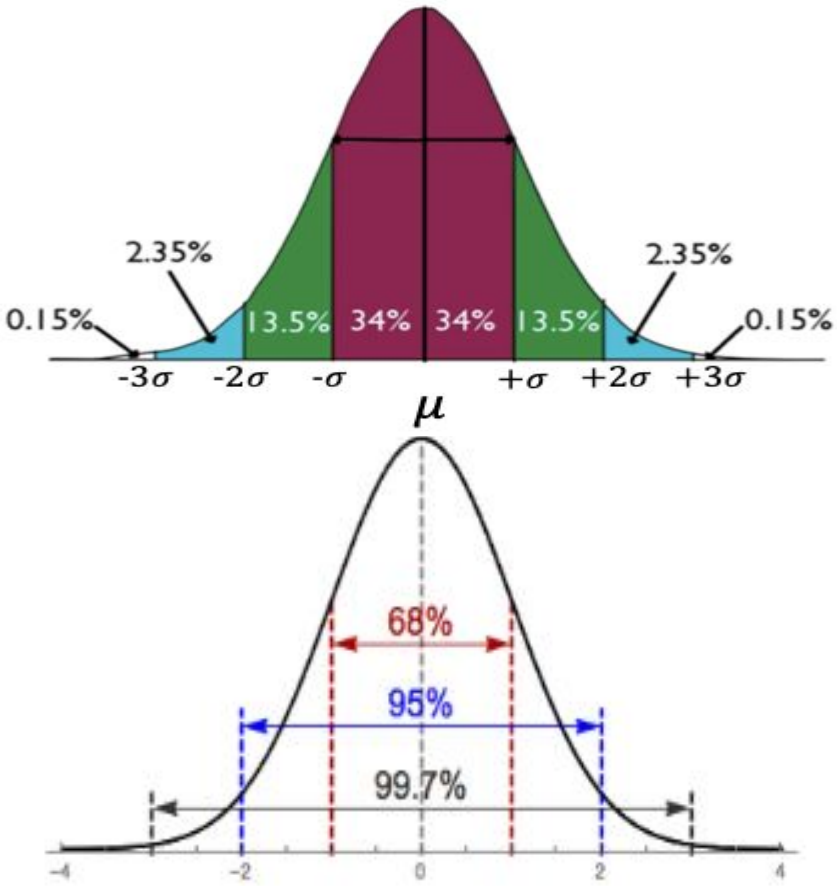


Comparing…

If you compare these 2 graphs you will see that

- The Purple section is 68% of the data under the curve
- Then if you go to the 2nd standard deviation you get 95% of the data under the curve
- Then if you go out to the 3rd standard deviation you get 99.7% of the data under the curve

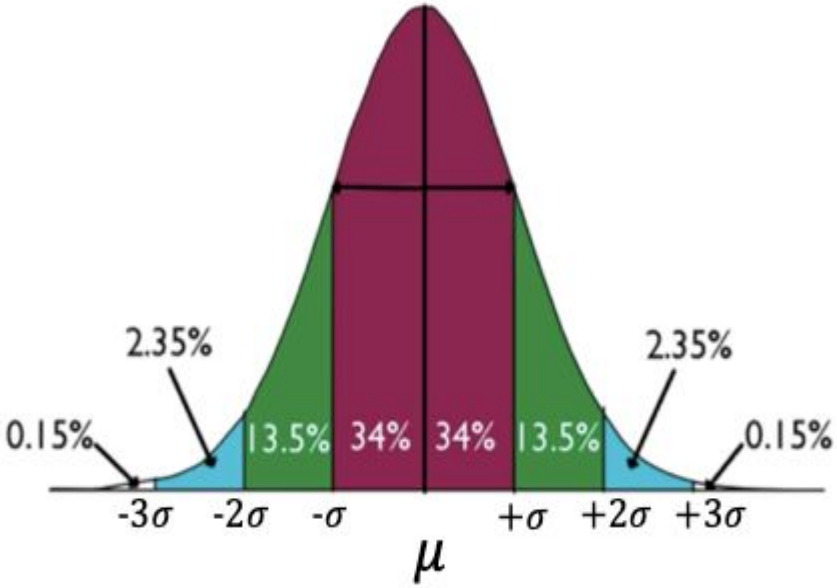
This is why the **Empirical Rule** is also called the **68 - 95 - 99.7** Rule & the idea is that if you go out 3 standard deviations you will capture almost all of your data (99.7%)



Percentages...

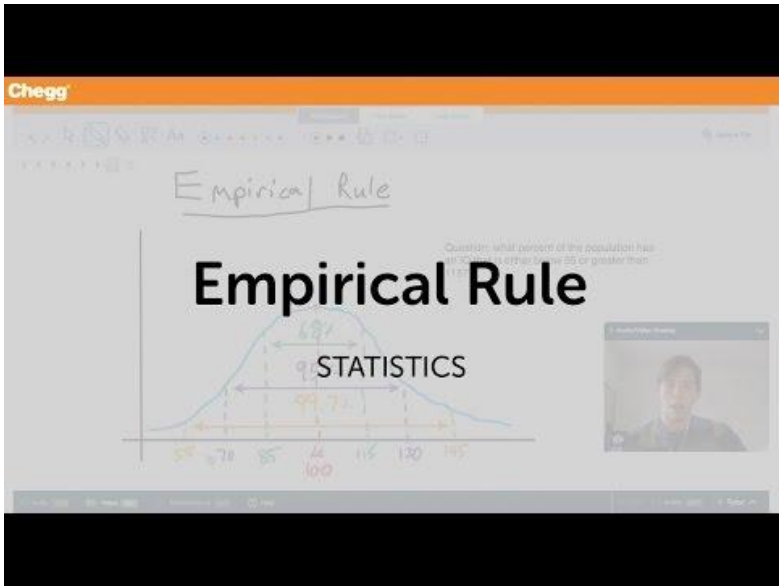
These percentages are distributed symmetrically because the bell curve is symmetrical. As long as the data is “Normal” then these percentages never change no matter what the problem is about.

What **DOES** change are numbers underneath the graph depending on the problem you are working on.



Video 1 on Empirical Rule and Normal Distribution

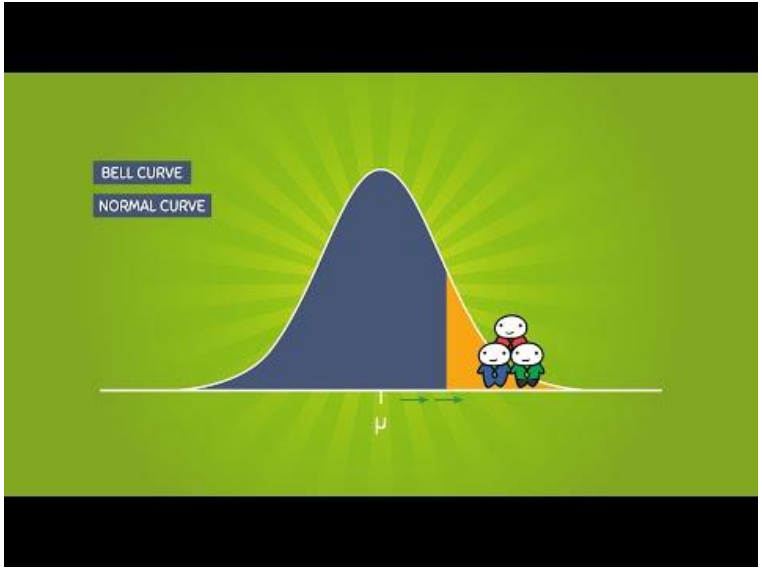
Watch the video about Empirical Rule to learn how we use Standard Deviation to find the bottom numbers and the percentages.



Video 2 on Empirical Rule and Normal Distribution

Now watch this video about Empirical Rule to learn how we use Standard Deviation to find the bottom numbers and the percentages.

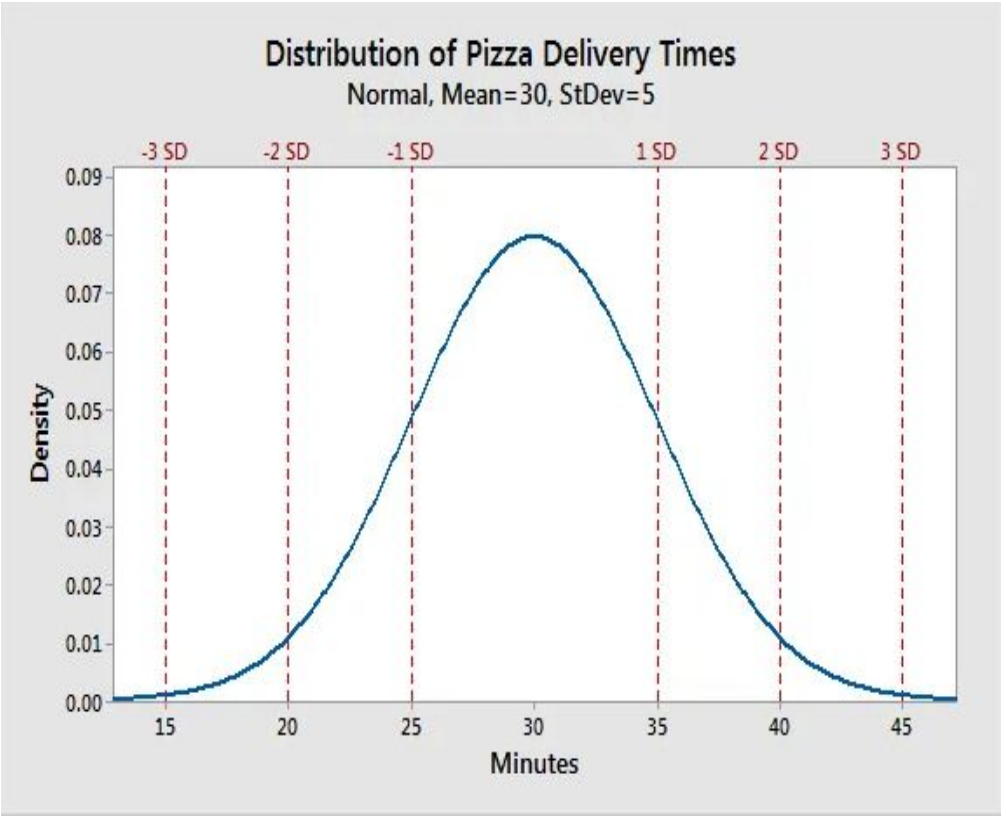
Be especially sure to watch the practice problems at the end of the video!



Let’s see what you think….

So from the video, try to answer these questions about Pizza Delivery Times:

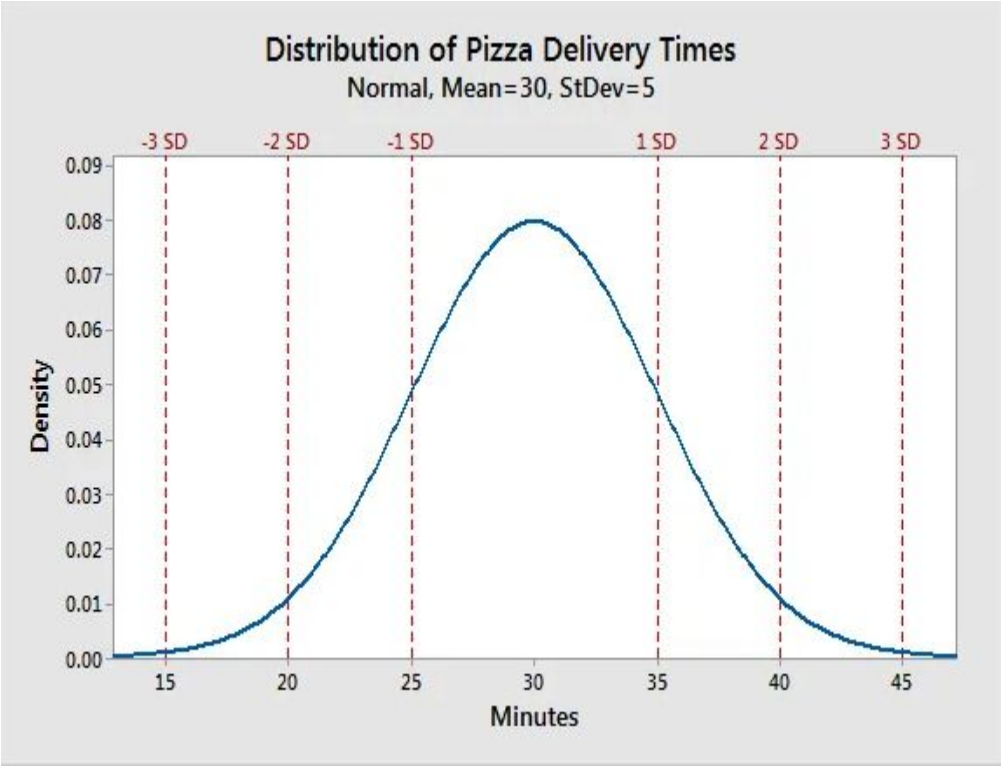
1. What is the average time it takes to deliver a pizza?
2. Between what 2 times does about 68% of the pizzas get delivered?
3. Between what 2 times does about 95% of the pizzas get delivered?
4. Between what 2 times does about 99.7% of the pizzas get delivered?
5. What percent of the deliveries times were between 20 and 30 minutes?



Let's see what you think….

So from the video, try to answer these questions about Pizza Delivery Times:

1. What is the average time it takes to deliver a pizza? **30 min**
2. Between what 2 times does about 68% of the pizzas get delivered? **25 - 35 min**
3. Between what 2 times does about 95% of the pizzas get delivered? **20 - 40 min**
4. Between what 2 times does about 99.7% of the pizzas get delivered? **15 - 45 min**
5. What percent of the deliveries times were between 20 and 30 minutes? **47.5%**



Practice:

Go to this website to practice a few more:

[Interactive Practice on Empirical Rule]

Tomorrow we will practice more!

Feel free to Google more videos on Empirical Rule if you are still confused or would like to see it in other scenarios.

Extra Video

You can also email your teacher if you need more explanations.