



Math Virtual Learning

Probability and Statistics

April 28, 2020



Probability and Statistics

Lesson: April 28, 2020

Objective/Learning Target:

Students will be able to analyze the data from a research question presented in a graph and answer questions about normalcy and percentiles.

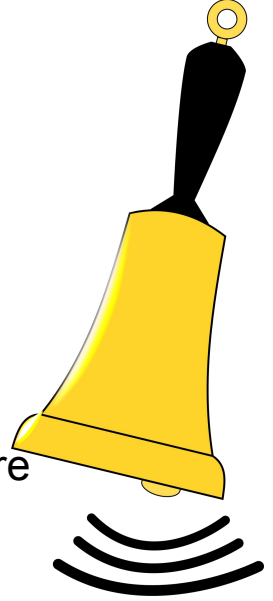
Let's Get Started!

Use the [Z Score to Percentage](#) Conversion Chart to answer the following questions

A teacher gave a Math Benchmark to 50 students, we assume that the results are normally distributed. After grading, the teacher finds that the Mean is 60 out of 100 and the standard deviation is 15.

The teacher has decided that the top 20% of the scores will be moved to Honors Math next year.

One student, Julie, asks the teacher if she has scored 70, is that score high enough to move to Honors?



Let's Get Started! **ANSWER**

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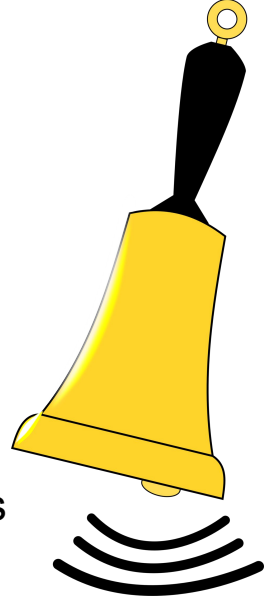
One student, Julie, asks the teacher if she has scored 70, is that score high enough to move to Honors?

Z-Score: .67

% Chart: .7486 = 74.86% scored below Julie

100 - 74.86 = 25.14% scored above Julie

Conclusion: While Julie scored close to the top 25% which is very good, she needed to be in the top 20% to move to Honors. **Julie will NOT be moved to Honors next year.**



Weight of 7th Grade boys

Stem	Leaf
11	1 1 7
12	3 7 7 8
13	3 3 4 4 6 9
14	4 4 5
15	0 1 2 3 7
16	2 2 2 5 8
17	1 6
18	2 8

Key: 12|6 = 126 pounds

To the left is a set of data representing the weight (in pounds) of 30 Seventh grade boys sampled from a middle school on the west coast. Use the Stem and Leaf plot of data to determine the mean and standard deviation of the data.

[CLICK HERE TO CHECK YOUR ANSWER](#)

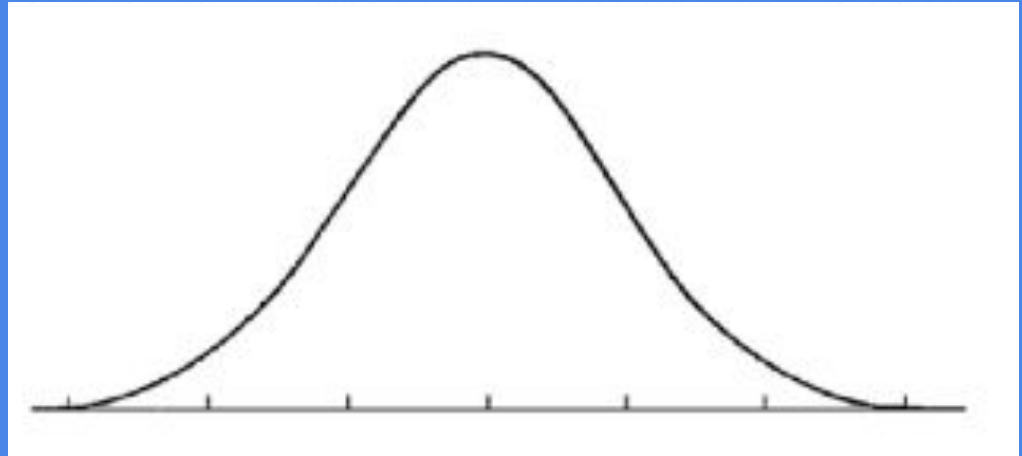
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Key: 12|6 = 126 pounds

PROVE that this data is normal and then label the bell curve below to show the mean and 3 standard deviations on both sides of the mean.

[CLICK HERE TO CHECK YOUR ANSWERS](#)



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$$Z = \frac{x - \mu}{\sigma}$$

Score Mean
SD

Find the z-score for the following weights:

- a. 134
- b. 201
- c. 165

What weight has a z-score of 1.56?

[CLICK HERE TO CHECK YOUR ANSWERS](#)

Weight of 7th Grade boys

Use your z-scores from the previous question & the [Z-Score to Percentile Chart](#) to find the percentile for the following weights.

- a. 134
- b. 201
- c. 165

[CLICK HERE TO CHECK YOUR ANSWERS](#)

Weight of 7th Grade boys

Use your percentiles from the previous questions to answer the following.

- a. What percent of boys weigh less than 134 pounds?
- b. What percent of boys weigh more than 201 pounds?
- c. What percent of boys weigh between 146 and 201 pounds?
- d. What percent of boys weight between 165 and 201 pounds?
- e. What does it mean that a weight of 178 has a percentile of 94?

[CLICK HERE TO CHECK YOUR ANSWERS](#)

Weight of 7th Grade Boys

Mean: 146.2

Standard Deviation: 20.42

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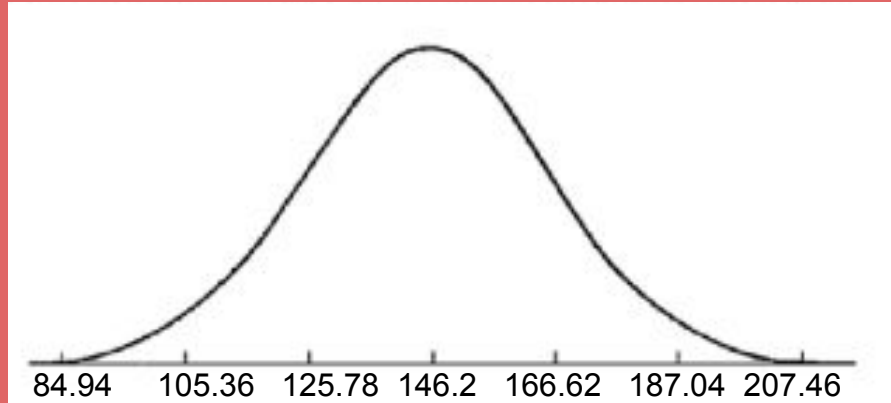
Weight of 7th Grade Boys

Mean: 146.2

Standard Deviation: 20.42

Normalcy Interval: 125.78 - 166.62

- $146.2 - 20.42 = 125.78$
- $146.2 + 20.42 = 166.62$
- 21/30 of the data is in this range = 70% So this data set is NORMAL



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Weight of 7th Grade Boys

Mean: 146.2

Standard Deviation: 20.42

Z-Score of 134: $z = (134 - 146.2) / 20.42 = -0.60$

Z-Score of 201: $z = (201 - 146.2) / 20.42 = 2.68$

Z-Score of 165: $z = (165 - 146.2) / 20.42 = 0.92$

What weight has a z-score of 1.56?

$$1.56 = (x - 146.2) / 20.42$$

$$31.8552 = x - 146.2$$

$$x = 178.06 \text{ pounds}$$

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Weight of 7th Grade Boys

Percentile of 134: 27.43%

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451

Percentile of 201: 99.63%

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964

Percentile of 165: 82.12%

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389

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Weight of 7th Grade Boys

Use your percentiles from the previous questions to answer the following.

- a. What percent of boys weigh less than 134 pounds? 27.43%
- b. What percent of boys weigh more than 201 pounds? 0.37% (100-99.63)
- c. What percent of boys weigh between 146 and 201 pounds? 49.63% (99.63-50)
- d. What percent of boys weight between 165 and 201 pounds? 17.51% (99.63 - 82.12)
- e. What does it mean that a weight of 178 has a percentile of 94?

That 94% of boys weighed less than 178 pounds.

LESSON FINISHED!
GREAT JOB!!!