

9.2 Normal Distribution

SWBAT graph the distribution of a normal bell curve.

Normal distribution: Has data that vary randomly about the mean; has a "normal curve," also known as the bell curve.

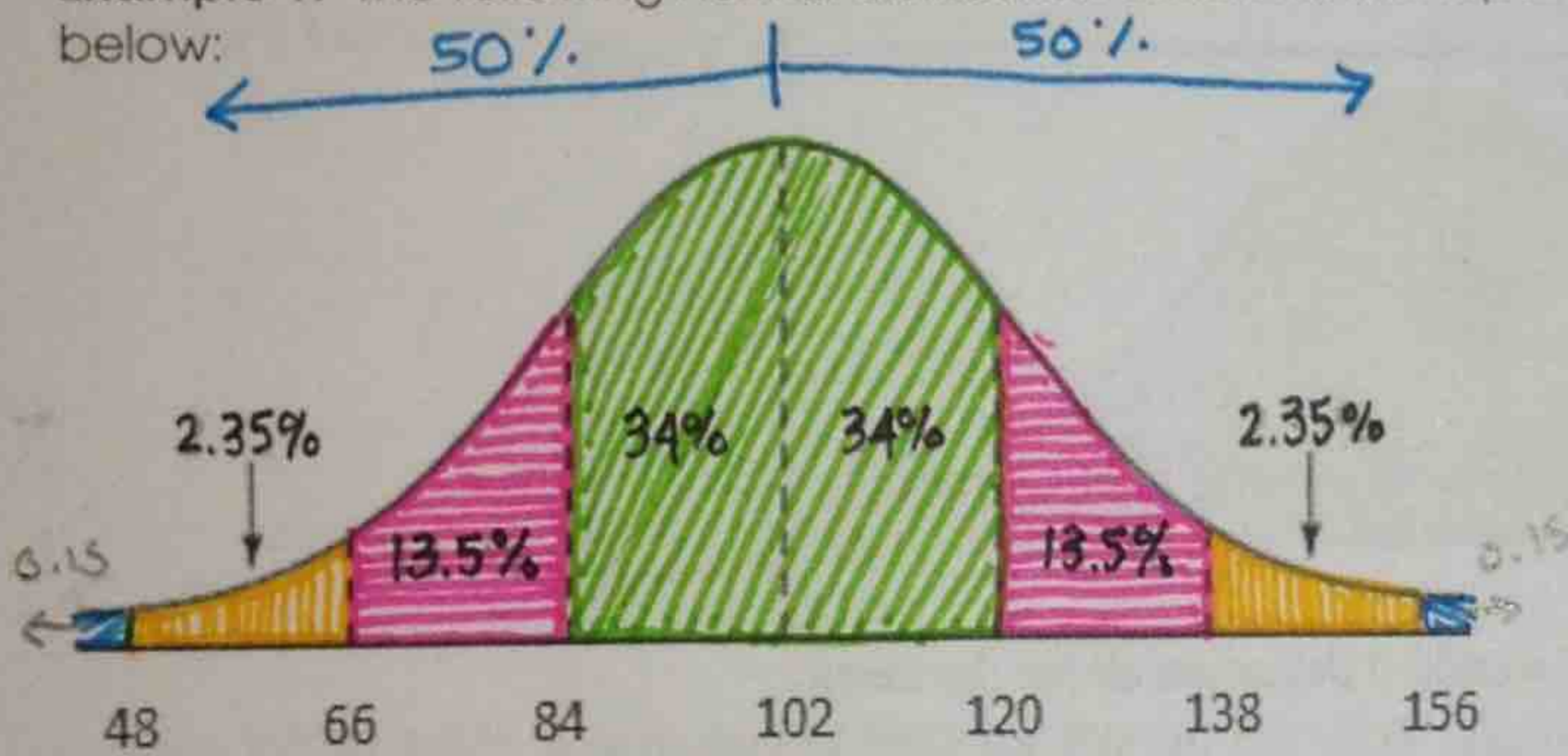
Empirical Rule

A normal distribution has a symmetric bell shape centered on the mean.

In a normal distribution,

- 68% of data fall within one standard deviation of the mean
- 95% of data fall within two standard deviations of the mean
- 99.7% of data fall within three standard deviations of the mean

Example 1: The following normal distribution describes the repair times for a local auto shop. Answer the questions below:



a) What is the mean repair time for the auto shop?
102 minutes

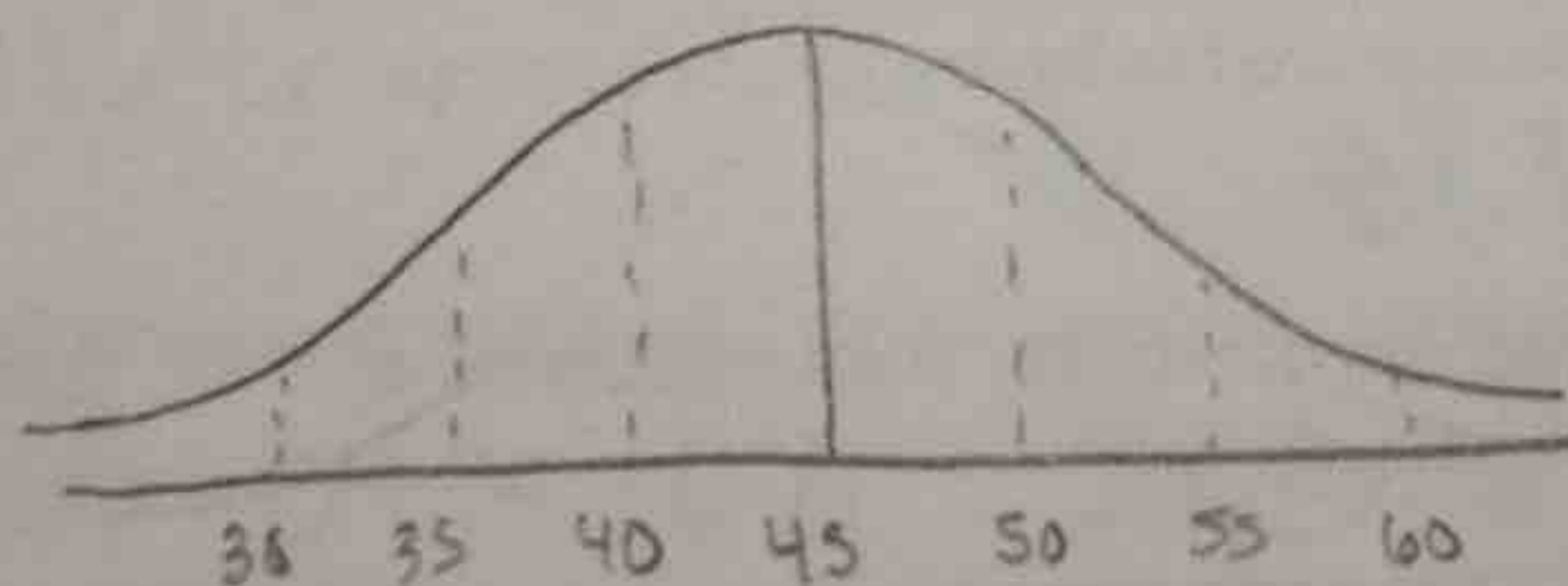
b) What percentage of repairs take between 84 and 120 minutes?
68%

c) What percentage of the repairs take less than 2 hours?
84%

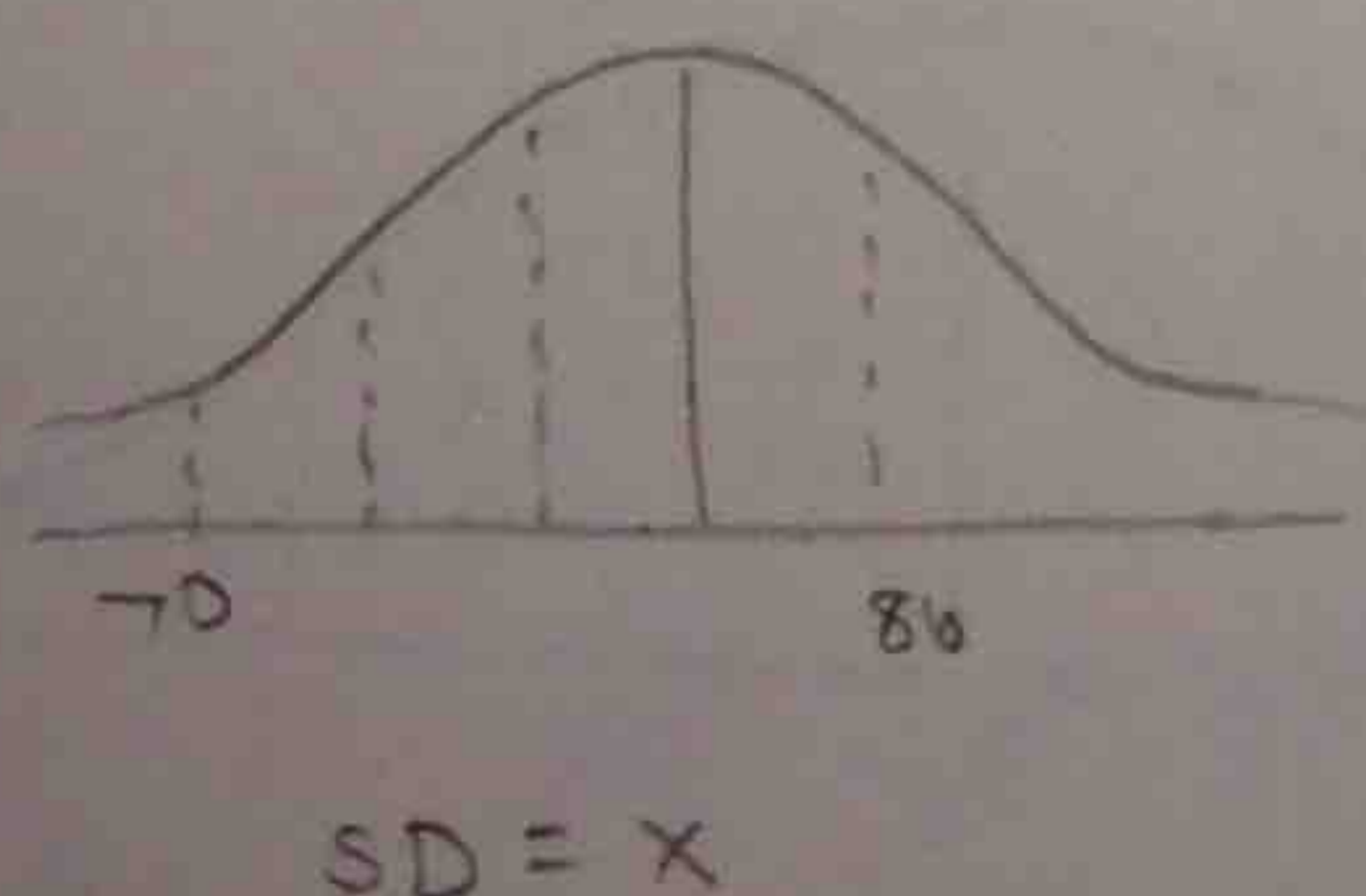
d) What percentage of repairs are between 84 minutes and 138 minutes?
81.5%

e) If the shop did 200 repairs this week, approximately how many of them took more than 2 hours? (120 min)
50 - 34 = 16% *200(0.16) = 32 repairs*

Example 2: Sketch a normal curve for the following distribution: mean = 45, standard deviation = 5



Example 3: In a set of test scores that are normally distributed, a test score of 70 is 3 standard deviations below the mean. A score of 86 is 1 standard deviation above the mean. What is the mean of the data?



$$70 + 4x = 86$$

$$4x = 16$$

$$x = 4$$

Stand. Dev. = 4

$$\bar{x} = 86 - 4 = 82$$

$$\bar{x} = 82$$

The Bell Curve

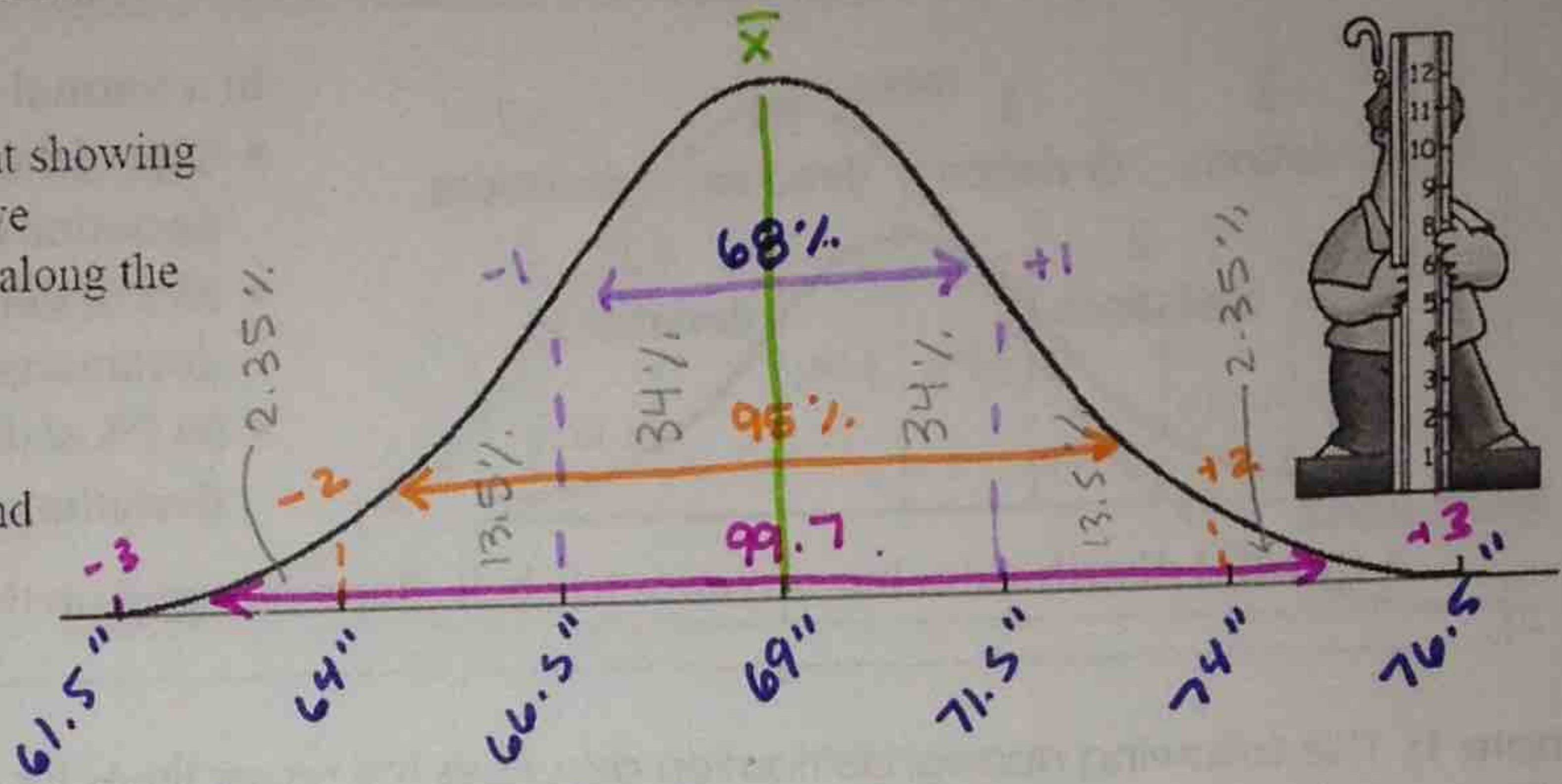
Name _____

Directions: Answer the following questions pertaining to the heights of adult males.

In the United States, the average height of an adult male is 5' 9" (69 inches). Male height is distributed according to a normal distribution curve with a standard deviation of approximately 2.5 inches.

1. Label the graph at the right showing the mean and the respective standard deviation values along the bottom.

2. Indicate on the graph, the locations of 68%, 95% and 99.7% of the population, referred to as the "empirical rule".



3. What percent of heights falls below 66.5" ?

16%

4. What percent of the population falls below 69" ?

50%

5. What percent of the heights lies within 2 standard deviations of the mean? 95%

6. What percent of the heights lies within 1 standard deviation above the mean? 34%

7. A male with a height of 71.5" is taller than what percent of the population? 84%

8. According to the empirical rule, 95% of heights fall between what two values?

64" and 74"

9. Of 200 males, how many men can be expected to have a height between 69" and 71.5"?

$$200(0.34) = 68 \text{ males}$$

10. Of 100 males, how many men can be expected to have a height between 71.5" and 74"?

$$100(13.5) = 13.5 \text{ Between 13 and 14}$$

11. The tallest living man in the US is Igor Vovkovinskiy from Minnesota at 7' 8". Between which two standard deviation values does his height lie?

$$7'8" = 92"$$

Between 9 and 10 standard Deviations