GK- Mathematics

Resources for Some Math Questions:
Kaplan et al (2015). Cliff Notes FTCE General Knowledge Test, 3rd Edition
Mander, E. (2015). FTE General Knowledge Test with Online Practice, 3rd Edition

GK- Math Review Overview

Session	Competency/Skill	%	#	Target
1	Pre-Test 15 Questions			
1 & 2	Number Sense	17	8	6
3 & 4	Algebraic Thinking	29	13	9
5 & 6	Geometry	21	9	6
7 & 8	Probability & Statistics	33	15	11
8	Post-Test 15 Questions			
8 Sessions	Total	100	45	32

Probability, Statistics, and Data Interpretation

- Analyze data presented in various forms (e.g., histograms, bar graphs, circle graphs, pictographs, line plots, tables) to solve problems.
- Analyze and evaluate how the presentation of data can lead to different or inappropriate interpretations in the context of a real-world situation.
- Calculate range, mean, median, and mode of data sets.
- Interpret the meaning of measures of central tendency (i.e., mean, median, mode) and dispersion (i.e., range, standard deviation) in the context of a real-world situation.
- Analyze and evaluate how the selection of statistics (e.g., mean, median, mode) can lead to different or inappropriate interpretations in the context of a real-world situation.
- Solve and interpret real-world problems involving probability using counting procedures, tables, and tree diagrams.
- Infer and analyze conclusions from sample surveys, experiments, and observational studies.

33% or Approximately 15 questions

Target: 11

# Suggestions for Interpreting Graphical Information (Cliff Notes page 211)

- Understand the graph's title

- Read graph labels to understand what is being represented

- Examine carefully the graph's scale

- Look for trends (increases or decreases) or periods of inactivity

- Be sure to understand what each picture in the graph represents

- Use only the information from the graph

Scatterplots

1. The positive scatterplot rises from left to right.
2. The negative scatterplot falls from left to right.
3. Linear means that it makes what could be viewed as a line.
4. The further away the points are, the more variation and the weaker the relationship between whatever variables are being compared.
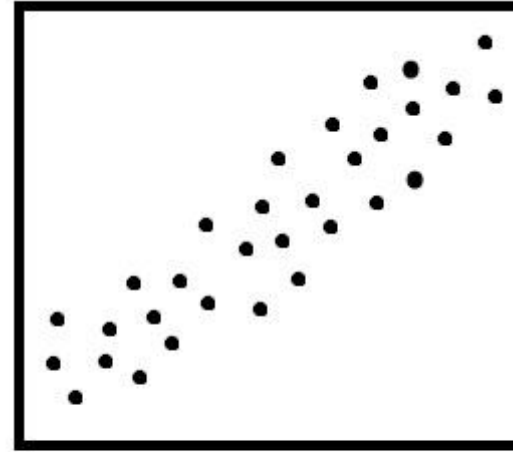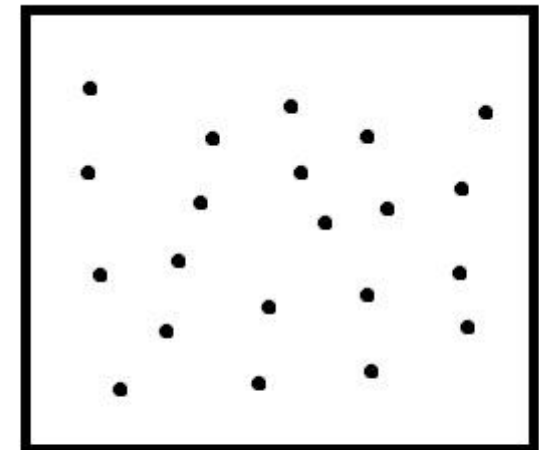
positive linear association
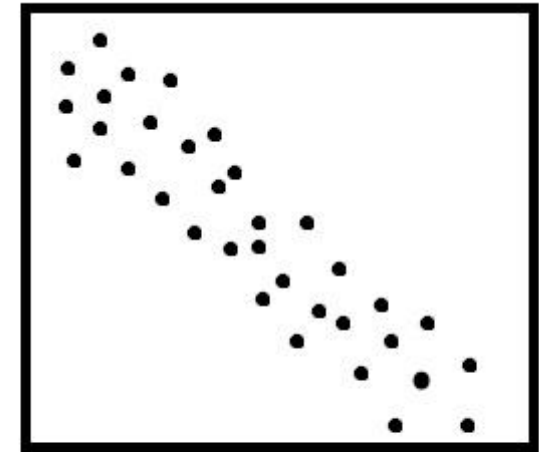
negative linear association
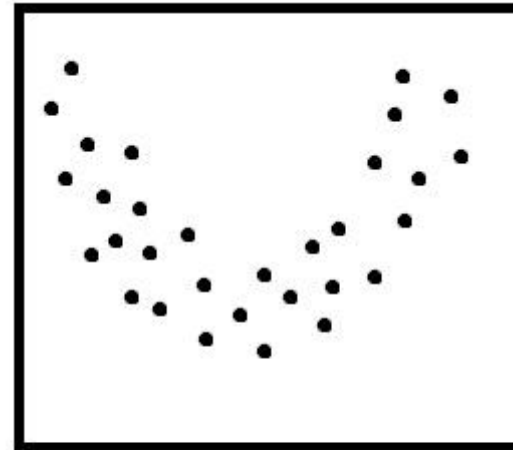
nonlinear association

no association

Analyze Data in Various Forms

If the monthly salary is $3600, how much money is budgeted for savings and rent?
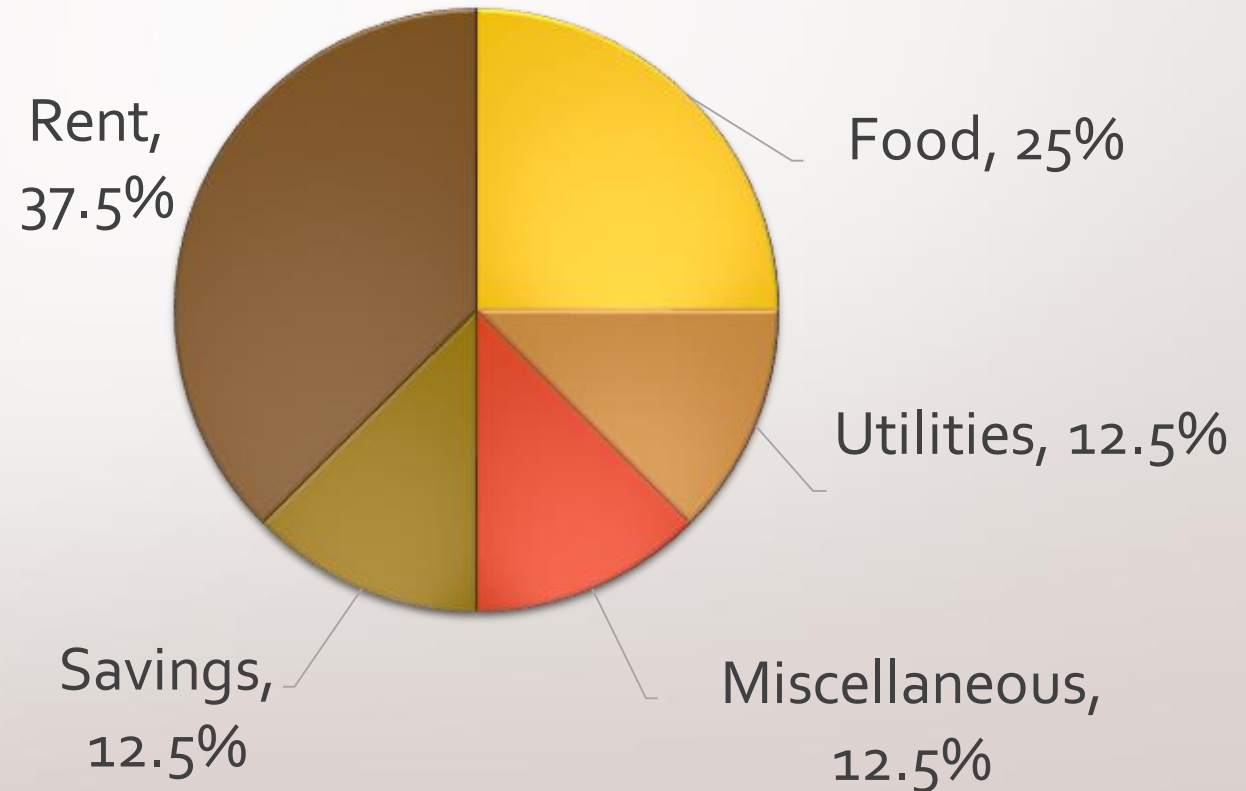
Answer:
Savings: ($3600)(.125) = $450
Rent: ($3600)(.375) = $1350
Total: $1800.

Monthly Budget

Rent, 37.5%

Food, 25%

Utilities, 12.5%
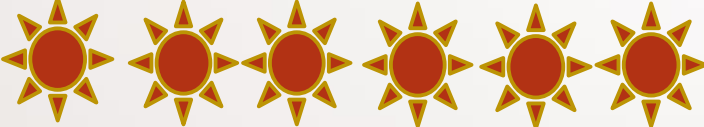
Savings, 12.5%

Miscellaneous, 12.5%

Measures of Central Tendency

- Measures used to describe a typical value in a data set.

- Mean: Average

- Median: Middle. Order numbers first.
(if two are in the middle, average them)

- Mode: Most frequent
(if none of the numbers repeat, there is no mode. If 2 numbers appear most frequently, they both are the mode; called bimodal.)

Analyzing Pictographs

What is the problem with the pictograph?

Clouds:

Sun:

 = 4   = 2

Answer:
The number of clouds appear greater than the number of suns. If we use the legend, we see clearly that this is faulty. There are 8(2) = 16 clouds and 6(4) =24 Suns. This is what is meant by "inappropriate interpretations".

Measure of Central Tendency

- Is the mean, median, or mode the best measure of central tendency for the set 135, 135, 137, and 190?

Step 1: Compare the mean, median, and mode, find each measure.

Mean: $(135 + 135 + 137 + 190) ÷ 4 = 149.25$

Median: (Middle): 2 values are in the middle: 135 and 137. The median is the average of these two values: 136.

Mode: (Frequency): 135

Step 2: Now analyze these values in terms of the numbers in the actual set.

Answer: The median or mode is better because these values are closer to the actual values in the set than the mean.

Measures of Dispersion

- Different from Measures of Central Tendency.

- A numerical value that describes the spread, variability, or dispersion of the data.

- Range - the difference between the largest and smallest values.

- Standard deviation - a measure of how far numbers in a data set deviate from the mean.

Probability & Stats

Mean, Median, Mode and Range

Tony's light bills for the last 8 months are as follows:

$210, $315, $ 125, $212, $175, $245,$175, $284.

Find the mean, median, mode, and range for that time period.

- Mode: $175

- Median: In order to find the median, you must place values in order:

$125, $175, $175, $210, $212, $245, $284, $315

The average of the two in the middle is $211 (median).

- Mean: Add everything together and divide by 8: $217.625.

- Range: $315-125 = $190.

Mean-Question

Terry has received the following scores on tests in Algebra: 75, 87, 72, 90. What score does he need to make on the fifth test to maintain an 80 percent in the course?

- There are 5 possible scores; 4 known and 1 unknown (x).

- To find the average, sum the numbers (including the unknown x), and divide by the number of scores. Set this equal to the expected percent.

- $\frac{75+87+72+90+x}{5} = 80 \rightarrow \frac{324+x}{5} = 80 \rightarrow (5)\frac{324+x}{5} = 80(5)$.

- 324 + x = 400. Subtract 324 from both sides: x = 76.

- Or, use the answer choices and find the mean one option at a time.

Stem-Leaf Plot Question

Stem	Leaf				
1	1	2	5	5	
2	0	1	3	5	7
3	1	5	6	6	8

Legend 3|6 = 36

Find the median, mode, and range.

Range: 38-11= 27
Mode: 15 and 36 Bimodal!
Median: There are 14 values so there is not 1 middle number.
Average 23 and 25 to find the median. (48/2) 24.

Counting Principle

- If there are two distinct events in a sequence, they will have a unique set of outcomes each. Multiply the number of outcomes of the events to determine the possible number of outcomes for the sequence.

Joseph's WingShack has three types of flavored wings and each flavor comes in 4 different types of heat. How many types of wings are available at Joseph's?

Step 1: What are the distinct events? Flavors (3) and Heat (4)
Answer: (3)(4) = 12. There are 12 different types of wings.

Counting Principle Continued

- A code consists of two numbers followed by two letters. Find the possible number-letter combinations for the code.

    A) repetition of letters and digits is not allowed

    B) repetition of letters and digits is allowed

    Questions:

    1) How many digits and letters are possible?

   **2) What is meant by "repetition"?**

    Answer:
    A. (10)(9)(26)(25) = 58,500 B. (10)(10)(26)(26) = 67,600

Probability

- With probability, you want to find the chance of a single event out of the total number of possibilities.

- With these type questions, you either find a single probability, or you find the probability that one thing happens (even if multiple things take place at one time), or you find the probability of more than one thing taking place, one at a time.

Tree Diagram
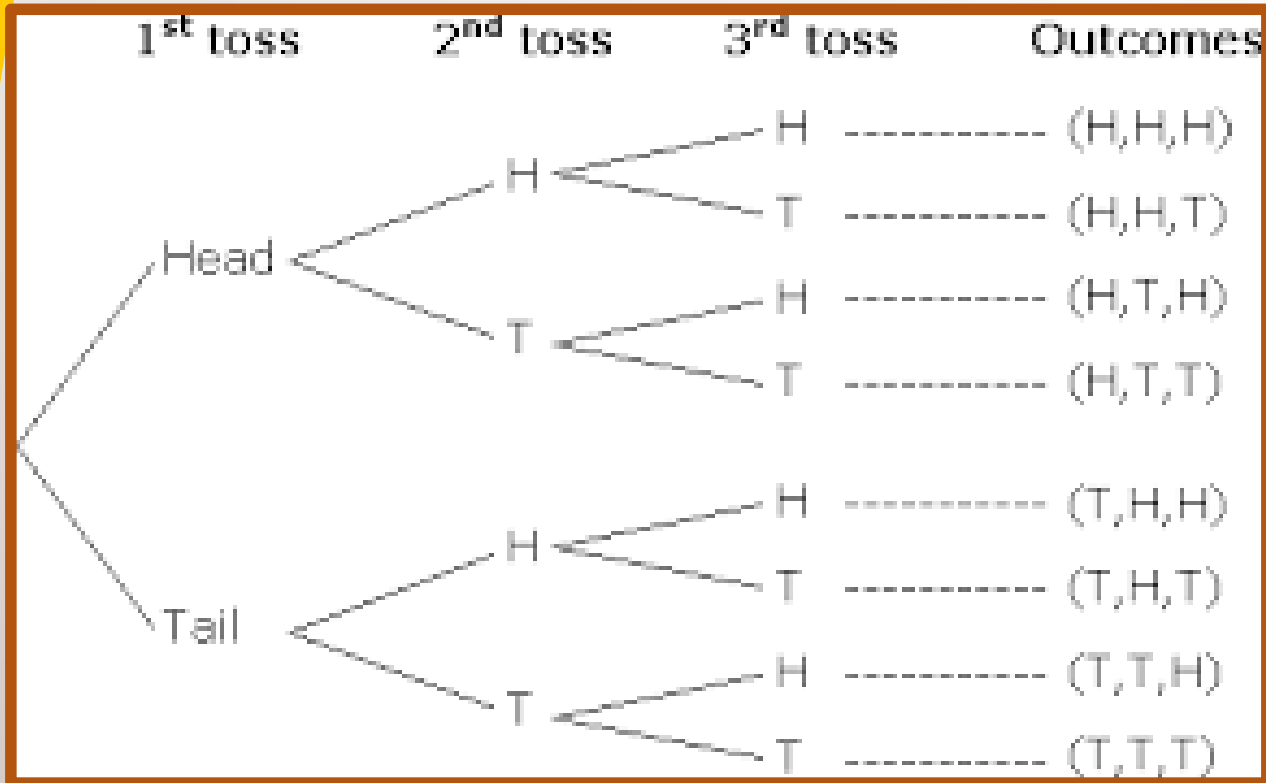
Robyn tossed three coins.
A) Use the tree diagram on the left to find the probability that only one of the three coins will land on heads.

B) Find the probability that at least one coin will be heads.

Answers: A) 3/8 and B) 7/8

Probability Example

A spinner for a board game has 4 red sections, 3 yellow sections, 2 blue sections, and 1 green section. The sections are all of equal size.

1. What is the probability of the spinner landing on the blue section on the first spin?

2. What is the probability of the spinner landing on the red, yellow or blue sections on the first spin?

3. What is the probability of spinning yellow on the first spin and green on the second spin?

Answer for Question 1

A spinner for a board game has 4 red sections, 3 yellow sections, 2 blue sections, and 1 green section. The sections are all of equal size.

1. What is the probability of the spinner landing on the blue section on the first spin?

What is the total number of sections? 10

Answer: 2/10 or 1/5

Answer to Question 2

A spinner for a board game has 4 red sections, 3 yellow sections, 2 blue sections, and 1 green section. The sections are all of equal size.

2. What is the probability of the spinner landing on the red, yellow or blue sections on the first spin?

- **Answer:** $\dfrac{Red+Yellow+Blue}{Total\ number}=\dfrac{4+3+2}{10}=\dfrac{9}{10}$

Answer to Question 3

A spinner for a board game has 4 red sections, 3 yellow sections, 2 blue sections, and 1 green section. The sections are all of equal size.
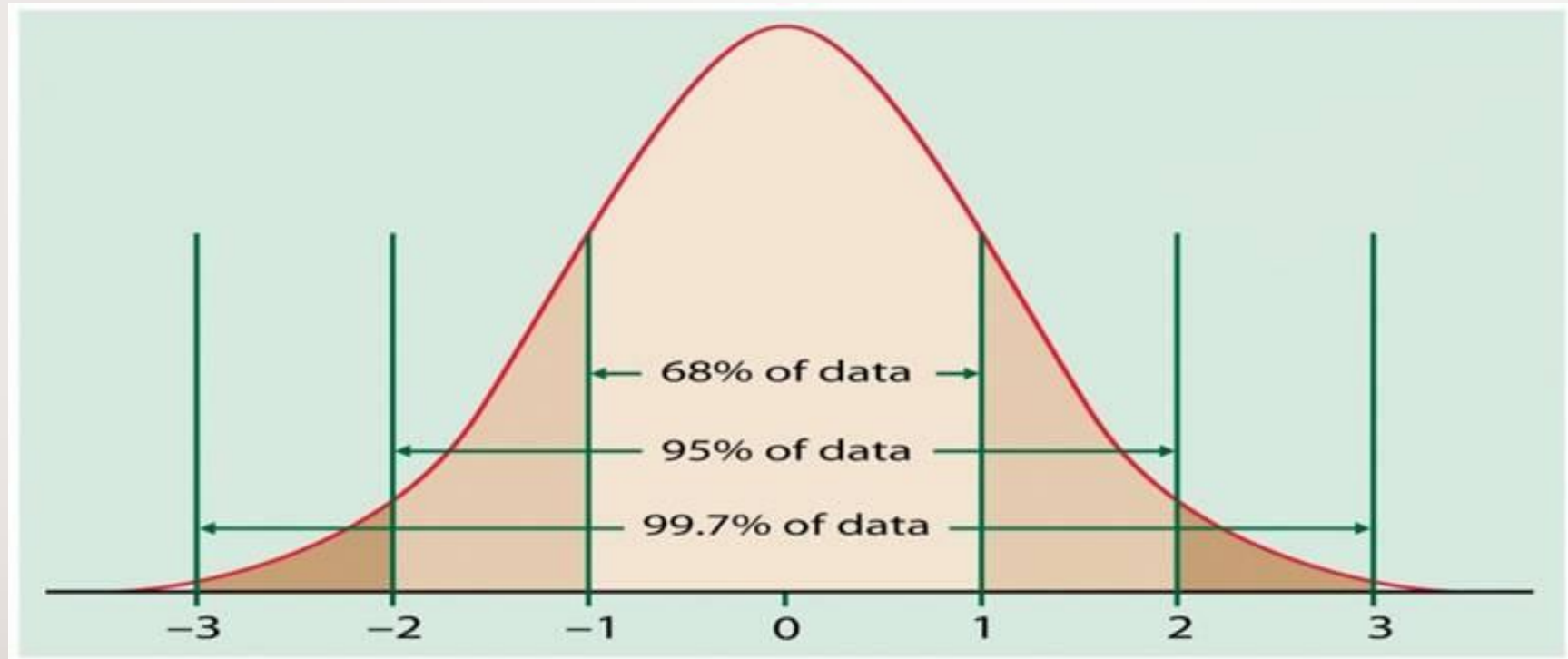
3. What is the probability of spinning yellow on the first spin and green on the second spin?

Probability of Yellow $\frac{3}{10}$ and Probability of Green $\frac{1}{10}$

When there are two different spins, you must multiply the probabilities:
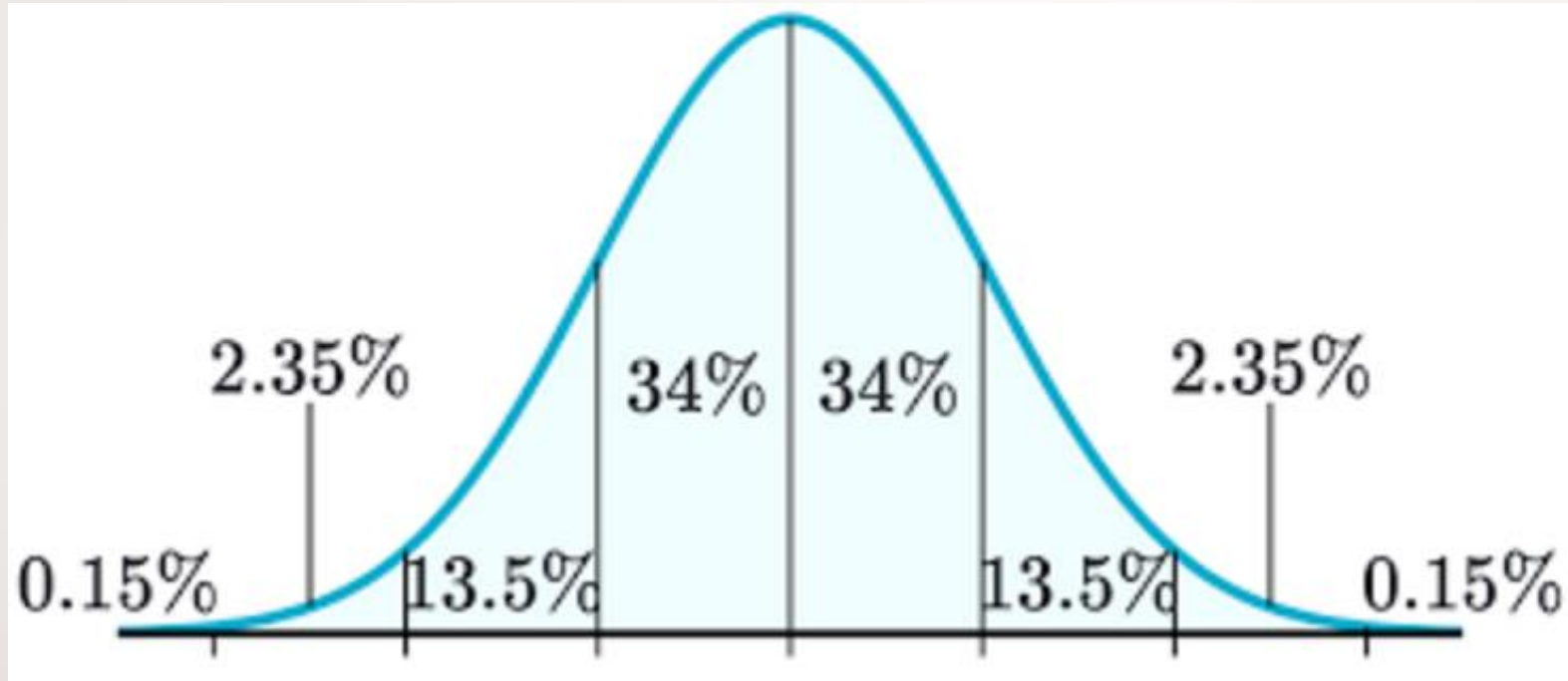
Answer: $(\frac{3}{10})(\frac{1}{10})=\frac{3}{100}$

Normal Distributions

- ± 1 represents 1 standard deviation from the mean.
- ± 2 represents 2 standard deviation from the mean.
- ± 3 represents 3 standard deviation from the mean.
- 0 is where the mean would be placed.

Normal Distributions

- 68% of the data fall within one standard deviation of the mean.
- 95% of the data fall within two standard deviations of the mean.
- 99.7% of the data all within three standard deviations of the mean.
- 50% of the data are to the left of the mean and 50% are to the right of the mean.

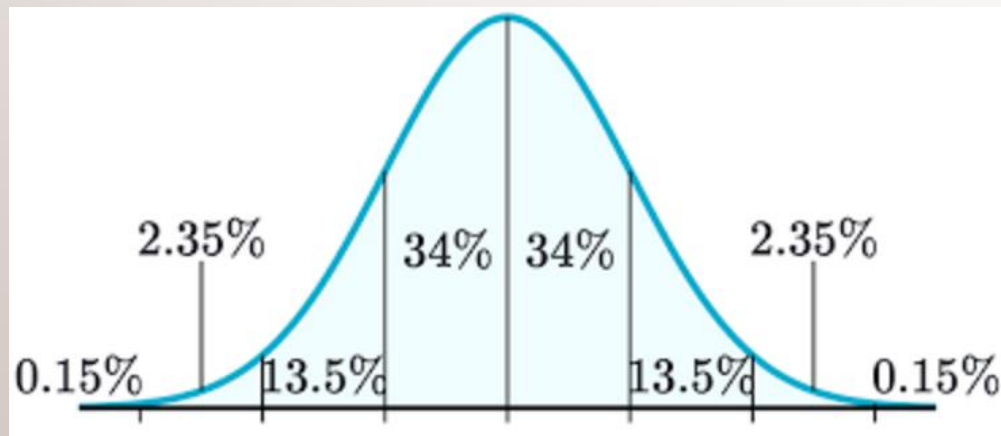Probability & Stats

How we use normal distributions

- The mean IQ score for 1,500 students is 100, with a standard deviation of 15. Assuming a normal curve distribution, how many students have an IQ between 85 and 115?

   A) 750   B) 1,020   C) 1,275   D) 1,425

Mean = 100 and would be placed at 0. Add and subtract the standard deviation at least twice. (-1 Mark): 100-15 = 85 and (1 Mark): 100+15 = 115. Since 68% of the data must fall between these two values, multiply this percent by the total number of students: 0.68(1500) = 1,020.

Complete the Probability and Stats Worksheet

Use the Cliff Notes text for additional practice.