AP STATS SUMMER WORK

Greetings!!!

Welcome to AP Stats. The summer work will take a few hours. You'll need a few days to do it.

Below you find 3 sections to complete before the start of the school year. This is one document. The filled in notes are also provided with these at the end. Please take time this summer and review all the material below.

WHEN WE START SCHOOL IN THE FALL YOU WILL BE ASSESSED ON THIS CONTENT.

Unit 1 – Exploring One-Variable Data
Notes 1 – Categorical Data: Tables and Bar Graphs

What are Statistics?

- Statistics is _____
- Data are observations that have been measured, recorded, collected, analyzed, and reported for use
- Data contains information about a group of _____
    - Individuals are objects described by a set of data
    - These might be people, animals, or inanimate objects
- The information is organized using _____

Types of Variables

<table>
<tr><td></td><td></td></tr>
<tr><td>

Data that places individuals into specific groups
Some examples include:

</td><td>

Data that takes on numerical values, where performing arithmetic operations makes sense.
These can be broken down into two types:

<table>
<tr><td></td></tr>
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This is numerical data where whole numbers make sense to describe the data.
Think of variables that you would count, and decimals don’t make sense to describe them
Some examples include:

</td></tr>
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This is numerical data where decimals would make sense to describe the data.
Think of variables where measuring makes sense and a certain number of decimal places or intervals are used to report the values.
Some examples include:

</td></tr>
</table>
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</table>

Things to remember:

- Just because it is a number DOES NOT automatically make it quantitative. Can you think of an example of a number that is categorical?
    -
- The difference between discrete and continuous isn't always clear: For instance, is age continuous or discrete?
    - You use whole numbers to describe it, but it can be measured with a decimal.
- If it is not obvious if it is discrete or continuous, like age, it depends on how you use the data.
    - For age, we rarely say "I'm 16.4 years old", so we treat age like a _____ variable.

Frequency Table

- A frequency table is a way to display how many individuals fall into each category of a categorical variable
- Frequency is also referred to as _____
- Below is the "raw data" of a sample of teacher's favorite pizza toppings
- The term "raw data" is used when referring to data that is _____

Pepperoni	Canadian Bacon	Mushrooms	Black Olives	Pepperoni
Sausage	Pepperoni	Onions	Sausage	Canadian Bacon
Sausage	Pepperoni	Black Olives	Pepperoni	Canadian Bacon
Pepperoni	Black Olives	Mushrooms	Pineapple	Sausage
Sausage	Onions	Pepperoni	Mushrooms	Black Olives

- While the raw data gives us the information, it is difficult to find counts, patterns, or observe what the data is trying to tell us
- We will organize this information in a _____ table

Category	Pepperoni	Sausage	Canadian Bacon	Black Olives	Onions	Mushrooms	Pineapple
Frequency							

- A frequency table shows the counts in each of the categories.
- We can also make a _____ table (or relative counts) that displays the percentage in each category instead
- To find the relative frequency, you take the frequency in each category and divide it by the total. The resulting decimal is written as a percentage.
- The total number of teachers in our sample is _____

Category	Pepperoni	Sausage	Canadian Bacon	Black Olives	Onions	Mushrooms	Pineapple
Relative Frequency							

Bar Graph

- A bar graph is used to visually show the distribution of data
- Distribution is a term used to describe the visual display of data that shows the variable and how often the data takes each value.
- To create a bar graph that displays data from a one-way frequency table or a relative frequency table:

  1. Draw your axes and label the x-axis with your categories and your y-axis with your counts or percentages.
  2. Draw a bar for each category, starting at the x-axis and going up to the corresponding value on the y-axis.
  3. Make sure the bars DO NOT TOUCH.
  4. The order of the categories does not matter, but you can put them in order of their frequency if you prefer.

Example: Create a bar graph showing the distribution of favorite pizza toppings among the teachers.

Category	*Frequency (Count)*
Pepperoni	7
Sausage	5
Canadian Bacon	3
Black Olives	4
Onions	2
Mushrooms	3
Pineapple	1

Unit 1 – Exploring One-Variable Data
Notes 2 – Histograms and Ogives

Displaying Quantitative Data

- Quantitative variables can be described with numerical data, where operations like averaging make sense
- Quantitative variables can be broken down into two types:
  - Discrete – _____
  - Continuous – _____
- We can use a frequency table to organize both of these data types and a _____ to display them

Discrete Quantitative Data

- A frequency table for discrete data looks very similar to the frequency tables for categorical data.
- A histogram for this type of data is create similarly to a bar graph, with some key differences:
  - The bars will touch, to communicate that this is quantitative data
  - The x-axis must go in order from _____
  - The x-axis will be labeled with values _____ the bars
  - These values communicate what values are included in the bar, up to but not including, the upper boundary

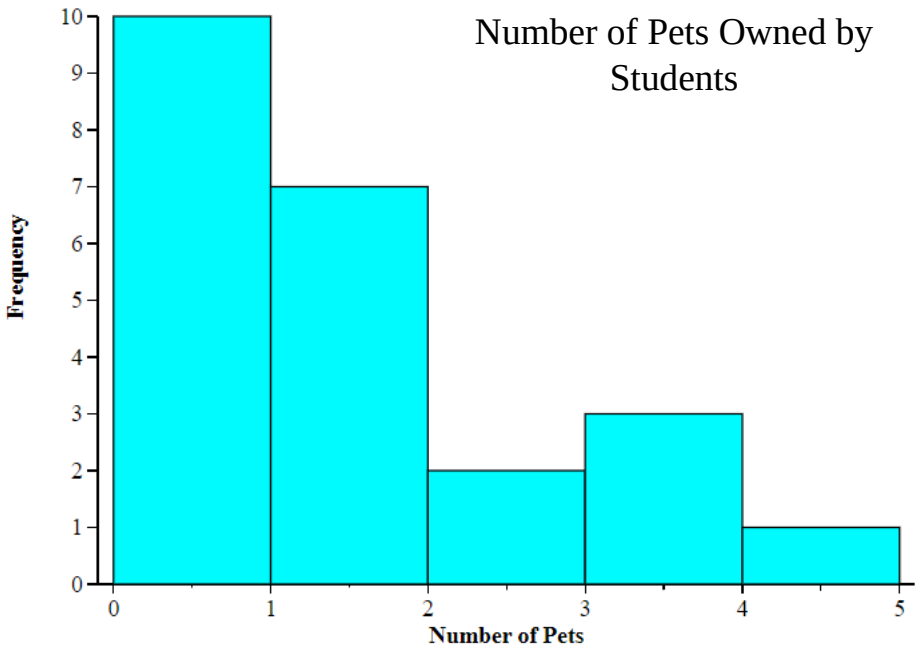
Example: A survey was given in a class. They were asked "how many pets do you own" and here are the results as a frequency table and as a histogram.

Number of Pets	Frequency
0	10
1	7
2	2
3	3
4	1

Notice how the first bar, with a frequency of 10, goes from 0 to 1.

What data is this corresponding to?

The lower boundary is always included, but the upper boundary is not.



Example: For your high school football team, you looked at how many points were scored in each of the games they played in the past 5 years. Here is a list of the data:

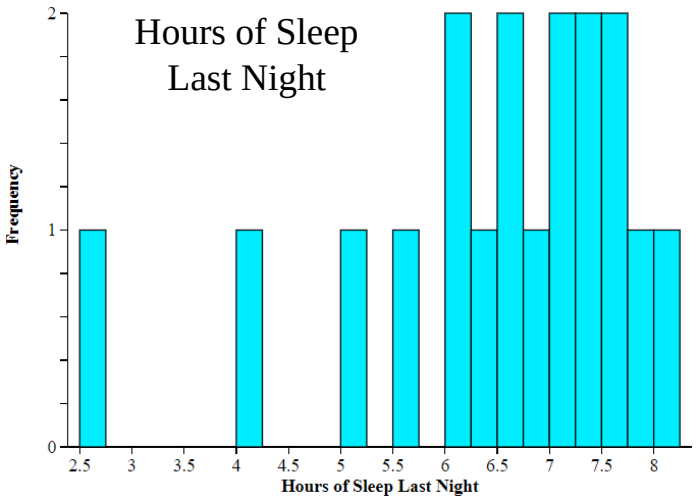
24, 27, 17, 27, 22, 10, 24, 31, 30, 34, 13, 28, 20, 24, 20, 27, 26, 7, 27, 14, 27, 22, 24, 21, 13, 17, 10, 31, 28, 19, 24, 26, 41, 20, 3, 35, 30, 27, 25, 24, 24, 27, 13, 17, 31, 36, 30, 45, 31, 24, 37, 43, 42, 37, 30, 10, 35, 28, 22, 34, 24, 34, 41, 30, 24, 40, 26, 35, 10, 21, 27, 27, 34, 23, 42, 31, 24, 11, 37, 8, 31, 20, 21, 23, 13

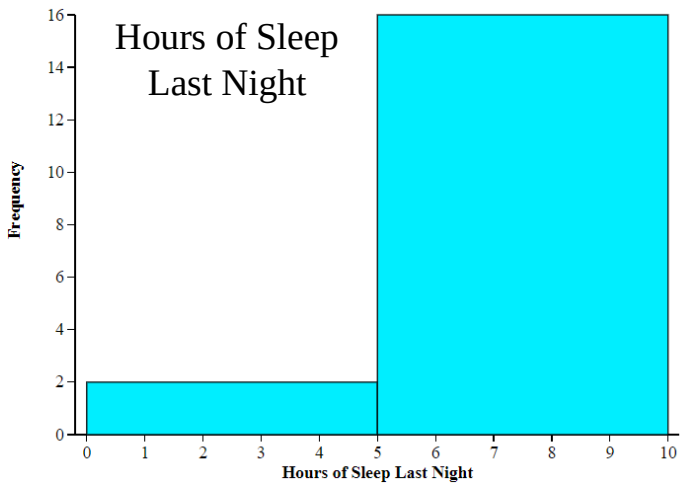
Fill in the frequency table below, and create a histogram with the data.

Scores	Frequency
0 to 9	
10 to 19	
20 to 29	
30 to 39	
40 to 49	

Continuous Quantitative Data

- Constructing a frequency table for continuous data looks a little different because we need to make sure we don't have too many bars or too few:





- These graphs look silly because we do not get a good, clear visual of our data.
- To avoid having two many or too few, we try to get 5 to 7 bars with each data set

To determine the intervals needed to get the appropriate number of bars, we follow these steps:

1. Calculate the range of your data set: _____
2. Calculate the bar (called "class") size:
    a. Divide range by desired number of bars (usually between 5 and 7)
    b. If you get a decimal, round it!
3. Set up each class (Note: the lowest value is _____, the highest is not)
    a. 1st Class: start with the minimum value, add class size to get the next value on your x-axis
    b. 2nd Class: start with that value, add the class size again to get the next value
    c. Repeat for all your classes
    d. Last Class: The last class does not have to end at your maximum value, but it should go over it!

Example: When asked how many hours of sleep students got last night, the data was reported as follows:

2.5, 4.0, 5.2, 5.5, 6.0, 6.1, 6.3, 6.5, 6.7, 6.8, 7.0, 7.2, 7.3, 7.4, 7.5, 7.6, 7.8, 8.0

Create a frequency table and a histogram to display the data. Use a class size of 6.

Percentiles

- A percentile can be represented as a whole number percent (_____) or as a rank (_____).
- The number represents the approximate percent of data in a set that is below a single data point.

Calculating percentiles is not an exact science and there is not a universal agreement on a single procedure for calculating them. Here is an example of how we will calculate the percentiles of a small data set:

Example: In Disney World®, the Seven Dwarf's Mine train is known for having a long wait time. On trill-data.com, they have the average daily wait time for every day at the park last year. The data below is the average wait time for the ride for every day in September 2024.

What is the percentile of the wait time of 66 minutes?

83	98	94	93	92	93	76	68	73	82
75	69	69	66	46	64	65	60	49	52
51	48	59	49	50	45	48	50	43	42

Ogives

- Ogives (pronounced o-jives) or _____ graphs, display the percentiles of an interval of variables.
- These graphs allow us to visually see percentiles and answer questions involving them.
- To create an ogive, you first must make a relative frequency table of the quantitative data

Hours of Sleep a Night	Frequency	Relative Frequency
0 – 2	1	
2 – 4	4	
4 – 6	4	
6 – 8	7	
8 – 10	2	

"Cumulative relative frequency" <u>ACCUMULATES</u> the percentages as you increase your x variable.

Think of it like a snowball rolling down a snowy hill.

Hours of Sleep a Night	Cumulative Relative Frequency
0 – 2	
2 – 4	
4 – 6	
6 – 8	
8 – 10	

Creating an Ogive

- The first interval is 0 – 2, with a cumulative relative frequency of _____%. Since 0 is the starting interval, that starts at 0 and _____% is graphed at 2.
- The next interval is 2 – 4, with a cumulative relative frequency of _____%. At 2, _____% is graphed, so at 4, the _____% will be graphed.
- This pattern continues until _____% is graphed at 10.

Example: Create an ogive of the number of hours of sleep a student got last night.

1) How many hours is the 30^{th} percentile? What does this mean in the context of the problem?

2) George got 7 hours of sleep last night. What is his approximate percentile and what does it mean in the context of the problem?

Unit 1 – Exploring One-Variable Data
Notes 3 – Stemplots and Dotplots

Stemplots

- Stemplots (sometimes called a stem and leaf plot) are an alternate way of illustrating data
- They are similar to a histogram but the individual data values are still able to be seen
- An example stemplot is shown, and it represents the ages of a random selection of teachers in the building
- The "stem" is to the left of the line and represents the age digit in the tens place
- The "leaf" is to the right of the line and represents the age digit in the ones place
- Write down the 18 ages of the teachers:

Ages of Teachers

2	2 5 9 9
3	0 4 5 7 8 8
4	3 4 4 8
5	1 7
6	5 8

Ages

KEY: 6|8 = 68

Things to note:

- The stem can be one digit or multiple digits
- Leaves are lined up by their stem and go in order from smallest to largest
- Repeat values are listed
- Between each stem, the leaves are aligned together

Example: The follow data represents the lowest temperature recorded each day in October of 2024 for a town in the US:

25, 26, 29, 32, 33, 36, 36, 36, 37, 38, 38, 38, 39, 40, 40, 41, 42, 42, 44, 45, 48, 51, 52, 54, 55, 55, 58, 58, 59, 61, 63

Create a stemplot of the data.

Back-to-Back Stemplots

- You can create a back-to-back stemplot when you can separate the quantitative data into two categories.
- The stem will go in the middle of the graph, with each set of leaves branching out.
- The data should still go in order from smallest to largest, with the smaller leaves being closer to the stem.

Example: The table below shows the pulses of a randomly selected group of students. Create a back-to-back stemplot of the data.

Males	46	69	61	61	68	72	55			
Females	63	88	50	68	66	76	65	70	52	90

Split Stemplot

- Split Stemplots are helpful if you have a lot of values in a single stem.
- If you have many values, it can be helpful to "split the stem" to be able to visualize the data better.
- The first stem digit is for the leaf digits 0 to 4
- The second stem digit is for the leaf digits 5 to 9

Height

KEY: 19|3 = 193

Regular Stemplot of the heights of US presidents

16	3 8 8
17	0 0 1 3 3 3 3 3 5 7 8 8 8 9
18	0 0 2 2 2 3 3 3 3 3 3 5 5 8 8 8 8 8 9
19	1 2 3

Split Stem Plot of the heights of US presidents

Dotplot

- A dotplot is a simple type of graph that involves plotting the data values, with dots, above the corresponding values on a number line.
- To construct a dotplot:
    1. Draw a horizontal line and label your axis with the name of your variable
    2. Scale the axis based on the values of the variable
    3. Mark a dot above the number on the horizontal axis corresponding to each data value

Example: Students at a high school were asked how many books they read over the summer. The data is shown in the table below. Create a dotplot to display the data.

0	2	3	8	5	2	3	4	1	2	0	1	3
7	0	1	5	1	2	1	6	1	2	4	1	0

Choosing the Right Graph

Which graph is the best? It depends on the data! Some graphs are better suited to data sets, while some data sets can be used with any graphs! Here is a general run down of the differences.

	Works Best With	*Best Features*	*Examples*
Histograms	• Continuous & discrete data • Large data sets or data with a large range	Shows the shape of a distribution very well	• Heights of students • Daily temperatures • Annual rainfall amounts
Ogives	• Continuous data • Small or large data sets	Easy to identify and interpret percentiles	• Exam scores • Income levels • Age distributions
Stemplots	• Discrete data • Medium range of values; you don't want too many or too few stems	Shows the shape of a distribution while maintaining the original data values	• Test scores • Weights
Dotplots	• Discrete data • Small range of values	Emphasizes individual data values	• Number of books read • Number of goals scored

Unit 1 – Exploring One-Variable Data
Notes 1 – Categorical Data: Tables and Bar Graphs

What are Statistics?

- Statistics is the study of data
- Data are observations that have been measured, recorded, collected, analyzed, and reported for use
- Data contains information about a group of individuals
    - Individuals are objects described by a set of data
    - These might be people, animals, or inanimate objects
- The information is organized using variables

Types of Variables

<table>
<tr><th>Categorical Variables</th><th>Quantitative Variables</th></tr>
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Data that places individuals into specific groups
Some examples include:

Gender
Colors
Size (S, M, L, XL)
Grades (A, B, C)
Political Party

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Data that takes on numerical values, where performing arithmetic operations makes sense.
These can be broken down into two types:

<table>
<tr><th>Discrete Variables</th></tr>
<tr><td>

This is numerical data where whole numbers make sense to describe the data.
Think of variables that you would count, and decimals don’t make sense to describe them
Some examples include:

number of siblings
number of pets
systolic blood pressure

</td></tr>
<tr><th>Continuous Variables</th></tr>
<tr><td>

This is numerical data where decimals would make sense to describe the data.
Think of variables where measuring makes sense and a certain number of decimal places or intervals are used to report the values.
Some examples include:

height
weight
time

</td></tr>
</table>
</td>
</tr>
</table>

Things to remember:

- Just because it is a number DOES NOT automatically make it quantitative. Can you think of an example of a number that is categorical?
  - Zip codes, area codes
- The difference between discrete and continuous isn't always clear: For instance, is age continuous or discrete?
  - You use whole numbers to describe it, but it can be measured with a decimal.
- If it is not obvious if it is discrete or continuous, like age, it depends on how you use the data.
  - For age, we rarely say "I'm 16.4 years old", so we treat age like a discrete variable.

Frequency Table

- A frequency table is a way to display how many individuals fall into each category of a categorical variable
- Frequency is also referred to as count
- Below is the "raw data" of a sample of teacher's favorite pizza toppings
- The term "raw data" is used when referring to data that is unorganized

Pepperoni	Canadian Bacon	Mushrooms	Black Olives	Pepperoni
Sausage	Pepperoni	Onions	Sausage	Canadian Bacon
Sausage	Pepperoni	Black Olives	Pepperoni	Canadian Bacon
Pepperoni	Black Olives	Mushrooms	Pineapple	Sausage
Sausage	Onions	Pepperoni	Mushrooms	Black Olives

- While the raw data gives us the information, it is difficult to find counts, patterns, or observe what the data is trying to tell us
- We will organize this information in a one-way frequency table

Category	Pepperoni	Sausage	Canadian Bacon	Black Olives	Onions	Mushrooms	Pineapple
Frequency	7	5	3	4	2	3	1

- A frequency table shows the counts in each of the categories.
- We can also make a relative frequency table (or relative counts) that displays the percentage in each category instead
- To find the relative frequency, you take the frequency in each category and divide it by the total. The resulting decimal is written as a percentage.
- The total number of teachers in our sample is 25

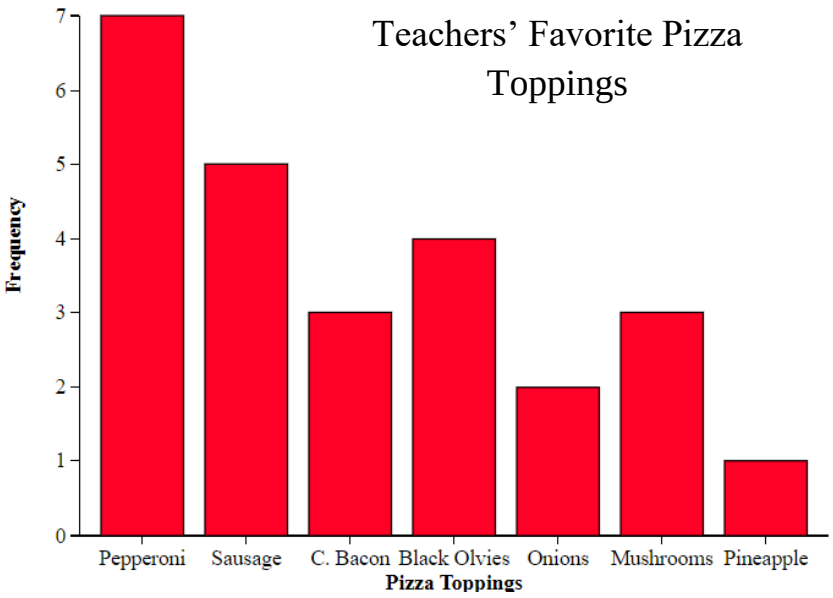
Category	Pepperoni	Sausage	Canadian Bacon	Black Olives	Onions	Mushrooms	Pineapple
Relative Frequency	$\frac{7}{25} =$ 28%	$\frac{5}{25} =$ 20%	$\frac{3}{25} =$ 12%	$\frac{4}{25} =$ 16%	$\frac{2}{25} =$ 8%	$\frac{3}{25} =$ 12%	$\frac{1}{25} =$ 4%

Bar Graph

- A bar graph is used to visually show the distribution of data
- Distribution is a term used to describe the visual display of data that shows the variable and how often the data takes each value.
- To create a bar graph that displays data from a one-way frequency table or a relative frequency table:
  1. Draw your axes and label the x-axis with your categories and your y-axis with your counts or percentages.
  2. Draw a bar for each category, starting at the x-axis and going up to the corresponding value on the y-axis.
  3. Make sure the bars DO NOT TOUCH.
  4. The order of the categories does not matter, but you can put them in order of their frequency if you prefer.

Example: Create a bar graph showing the distribution of favorite pizza toppings among the teachers.

Category	*Frequency (Count)*
Pepperoni	7
Sausage	5
Canadian Bacon	3
Black Olives	4
Onions	2
Mushrooms	3
Pineapple	1



Unit 1 – Exploring One-Variable Data
Notes 2 – Histograms and Ogives

Displaying Quantitative Data

- Quantitative variables can be described with numerical data, where operations like averaging make sense
- Quantitative variables can be broken down into two types:
  - Discrete – counting
  - Continuous – measuring
- We can use a frequency table to organize both of these data types and a histogram to display them

Discrete Quantitative Data

- A frequency table for discrete data looks very similar to the frequency tables for categorical data.
- A histogram for this type of data is create similarly to a bar graph, with some key differences:
  - The bars will touch, to communicate that this is quantitative data
  - The x-axis must go in order from least to greatest
  - The x-axis will be labeled with values between the bars
  - These values communicate what values are included in the bar, up to but not including, the upper boundary

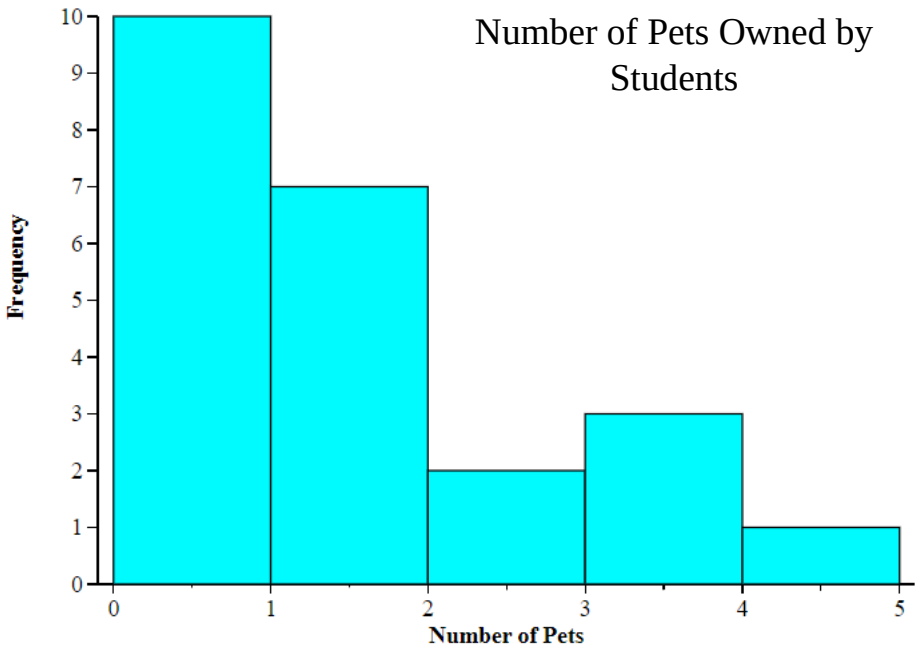
Example: A survey was given in a class. They were asked "how many pets do you own" and here are the results as a frequency table and as a histogram.

Number of Pets	Frequency
0	10
1	7
2	2
3	3
4	1

Notice how the first bar, with a frequency of 10, goes from 0 to 1.

What data is this corresponding to?
Students who have 0 pets

The lower boundary is always included, but the upper boundary is not.

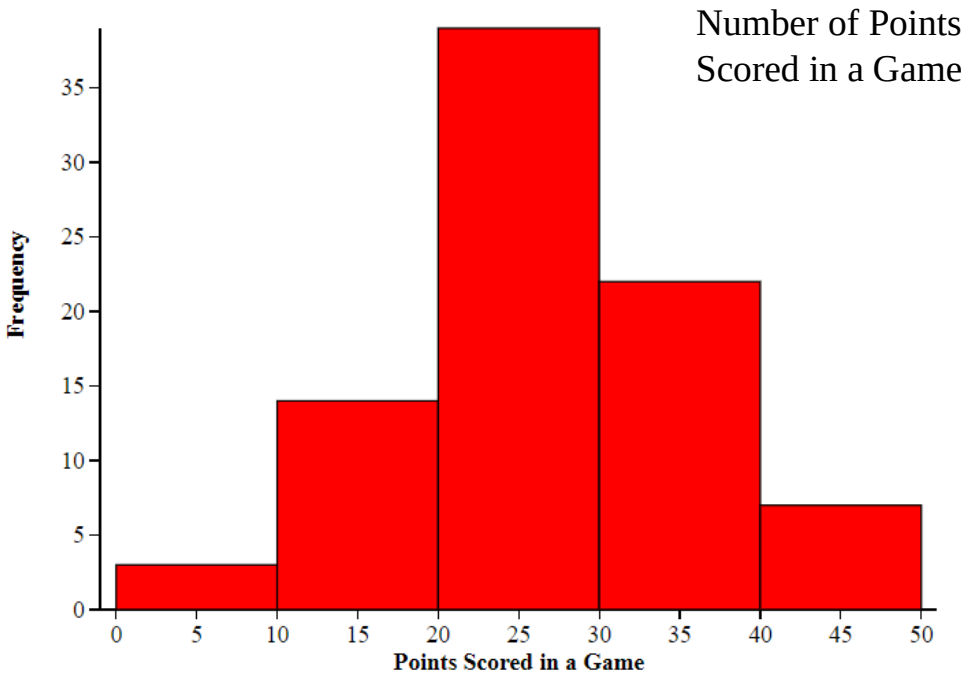


Example: For your high school football team, you looked at how many points were scored in each of the games they played in the past 5 years. Here is a list of the data:

24, 27, 17, 27, 22, 10, 24, 31, 30, 34, 13, 28, 20, 24, 20, 27, 26, 7, 27, 14, 27, 22, 24, 21, 13, 17, 10, 31, 28, 19, 24, 26, 41, 20, 3, 35, 30, 27, 25, 24, 24, 27, 13, 17, 31, 36, 30, 45, 31, 24, 37, 43, 42, 37, 30, 10, 35, 28, 22, 34, 24, 34, 41, 30, 24, 40, 26, 35, 10, 21, 27, 27, 34, 23, 42, 31, 24, 11, 37, 8, 31, 20, 21, 23, 13

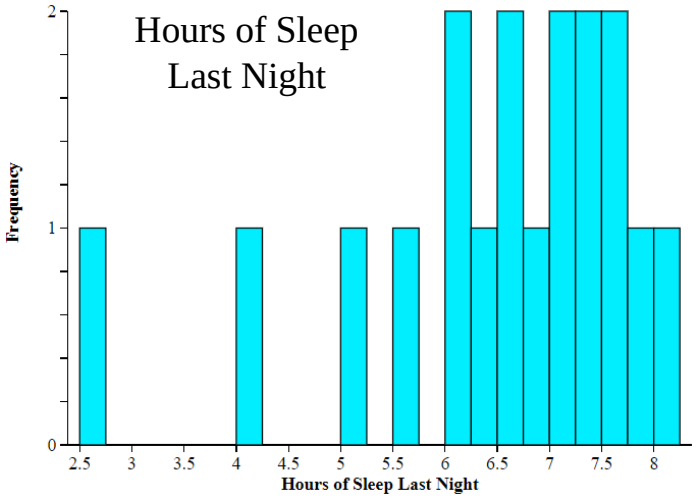
Fill in the frequency table below, and create a histogram with the data.

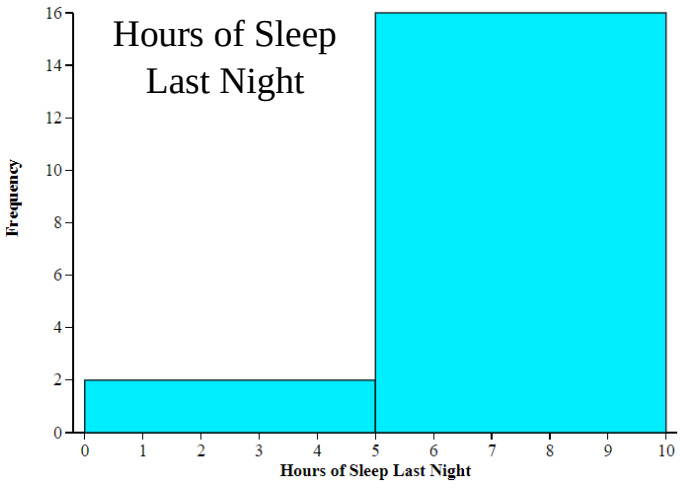
Scores	Frequency
0 to 9	3
10 to 19	14
20 to 29	39
30 to 39	22
40 to 49	7



Continuous Quantitative Data

- Constructing a frequency table for continuous data looks a little different because we need to make sure we don't have too many bars or too few:





- These graphs look silly because we do not get a good, clear visual of our data.
- To avoid having two many or too few, we try to get 5 to 7 bars with each data set

To determine the intervals needed to get the appropriate number of bars, we follow these steps:

Teacher Note: These are guidelines for creating a histogram, but not the only way. On the AP Exam, the calculator will be the best way to make this.

1. Calculate the range of your data set: MAXIMUM – MINIMUM
2. Calculate the bar (called "class") size:
    a. Divide range by desired number of bars (usually between 5 and 7)
    b. If you get a decimal, round it!
3. Set up each class (Note: the lowest value is inclusive, the highest is not)
    a. 1st Class: start with the minimum value, add class size to get the next value on your x-axis
    b. 2nd Class: start with that value, add the class size again to get the next value
    c. Repeat for all your classes
    d. Last Class: The last class does not have to end at your maximum value, but it should go over it!

Example: When asked how many hours of sleep students got last night, the data was reported as follows:

2.5, 4.0, 5.2, 5.5, 6.0, 6.1, 6.3, 6.5, 6.7, 6.8, 7.0, 7.2, 7.3, 7.4, 7.5, 7.6, 7.8, 8.0

Create a frequency table and a histogram to display the data. Use a class size of 6.

Range: 8 – 2.5 = 5.5

5.5 ÷ 6 = 0.92 ≈ 1 as our interval width

Hours of Sleep	Frequency
2 – 3	1
3 – 4	0
4 – 5	1
5 – 6	2
6 – 7	6
7 – 8	7
8 – 9	1

Percentiles

- A percentile can be represented as a whole number percent (80%) or as a rank (80^{th}).
- The number represents the approximate percent of data in a set that is below a single data point.

Calculating percentiles is not an exact science and there is not a universal agreement on a single procedure for calculating them. Here is an example of how we will calculate the percentiles of a small data set:

$$\text{Percentile of value x} = \frac{\text{number of values} \le \text{x}}{\text{total number of values}} \cdot 100$$

Example: In Disney World®, the Seven Dwarf's Mine train is known for having a long wait time. On trill-data.com, they have the average daily wait time for every day at the park last year. The data below is the average wait time for the ride for every day in September 2024.

83	98	94	93	92	93	76	68	73	82
75	69	69	66	46	64	65	60	49	52
51	48	59	49	50	45	48	50	43	42

What is the percentile of the wait time of 66 minutes?

How many wait times are less than or equal to 66 minutes? 17 values out of 30 total observations.

$\text{percentile} = \frac{17}{30} \cdot 100 = 56.67\% \approx 56^{th}$ percentile

Ogives

- Ogives (pronounced o-jives) or cumulative relative frequency graphs, display the percentiles of an interval of variables.
- These graphs allow us to visually see percentiles and answer questions involving them.
- To create an ogive, you first must make a relative frequency table of the quantitative data

Hours of Sleep a Night	Frequency	Relative Frequency
0 – 2	1	$\frac{1}{18} = 5.6\%$
2 – 4	4	$\frac{4}{18} = 22.2\%$
4 – 6	4	$\frac{4}{18} = 22.2\%$
6 – 8	7	$\frac{7}{18} = 38.9\%$
8 – 10	2	$\frac{2}{18} = 11.1\%$

"Cumulative relative frequency" ACCUMULATES the percentages as you increase your x variable.

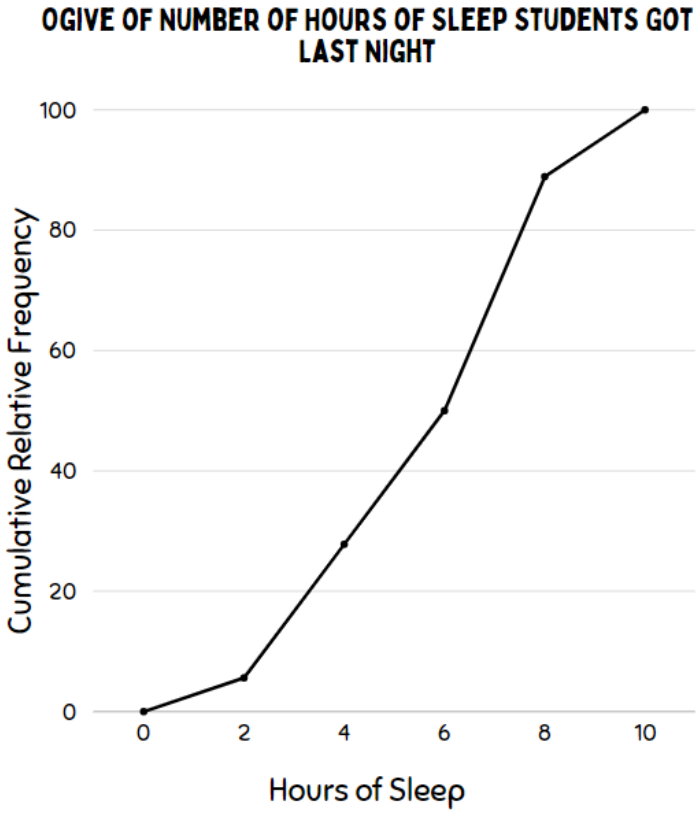
Think of it like a snowball rolling down a snowy hill.

Hours of Sleep a Night	Cumulative Relative Frequency
0 – 2	5.6%
2 – 4	5.6 + 22.2 = 27.8%
4 – 6	27.8 + 22.2 = 50%
6 – 8	50 + 38.9 = 88.9%
8 – 10	88.9 + 11.1 = 100%

Creating an Ogive

- The first interval is 0 – 2, with a cumulative relative frequency of 5.6%. Since 0 is the starting interval, that starts at 0 and 5.6% is graphed at 2.
- The next interval is 2 – 4, with a cumulative relative frequency of 27.8%. At 2, 5.6% is graphed, so at 4, the 27.8% will be graphed.
- This pattern continues until 100% is graphed at 10.

Example: Create an ogive of the number of hours of sleep a student got last night.



1) How many hours is the 30th percentile? What does this mean in the context of the problem?

At the 30th percentile, there is approximately 4.2 hours of sleep. This means that about 30% of the class only got 4.2 hours of sleep or less.

2) George got 7 hours of sleep last night. What is his approximate percentile and what does it mean in the context of the problem?

7 hours is approximately at the 65th percentile. This means that 65% of the class got 7 hours of sleep or less.

Unit 1 – Exploring One-Variable Data
Notes 3 – Stemplots and Dotplots

Stemplots

- Stemplots (sometimes called a stem and leaf plot) are an alternate way of illustrating data
- They are similar to a histogram but the individual data values are still able to be seen
- An example stemplot is shown, and it represents the ages of a random selection of teachers in the building
- The "stem" is to the left of the line and represents the age digit in the tens place
- The "leaf" is to the right of the line and represents the age digit in the ones place
- Write down the 18 ages of the teachers:

Ages of Teachers

2	2 5 9 9
3	0 4 5 7 8 8
4	3 4 4 8
5	1 7
6	5 8

Ages

KEY: 6 | 8 = 68

22, 25, 29, 29, 30, 34, 35, 37, 38, 38, 43, 44, 44, 48, 51, 57, 65, 68

Things to note:

- The stem can be one digit or multiple digits
- Leaves are lined up by their stem and go in order from smallest to largest
- Repeat values are listed
- Between each stem, the leaves are aligned together

Example: The follow data represents the lowest temperature recorded each day in October of 2024 for a town in the US:

25, 26, 29, 32, 33, 36, 36, 36, 37, 38, 38, 38, 39, 40, 40, 41, 42, 42, 44, 45, 48, 51, 52, 54, 55, 55, 58, 58, 59, 61, 63

Create a stemplot of the data.

2	5 6 9
3	2 3 6 6 6 7 8 8 8 9
4	0 0 1 2 2 4 5 8
5	1 2 4 5 5 8 8 9
6	1 3

Low Temperature

KEY: 6 | 3 = 63

Back-to-Back Stemplots

- You can create a back-to-back stemplot when you can separate the quantitative data into two categories.
- The stem will go in the middle of the graph, with each set of leaves branching out.
- The data should still go in order from smallest to largest, with the smaller leaves being closer to the stem.

Example: The table below shows the pulses of a randomly selected group of students.

Males	46	69	61	61	68	72	55			
Females	63	88	50	68	66	76	65	70	52	90

Create a back-to-back stemplot of the data.

Males		Females
6	**4**	
5	**5**	0 2
9 8 1 1	**6**	3 5 6 8
2	**7**	0 6
	8	8
	9	0

Pulses

KEY: 9|0 = 90

Split Stemplot

- Split Stemplots are helpful if you have a lot of values in a single stem.
- If you have many values, it can be helpful to "split the stem" to be able to visualize the data better.
- The first stem digit is for the leaf digits 0 to 4
- The second stem digit is for the leaf digits 5 to 9

Height

KEY: 19|3 = 193

Regular Stemplot of the heights of US presidents

16	3 8 8
17	0 0 1 3 3 3 3 3 5 7 8 8 8 9
18	0 0 2 2 2 3 3 3 3 3 3 5 5 8 8 8 8 8 9
19	1 2 3

Split Stem Plot of the heights of US presidents

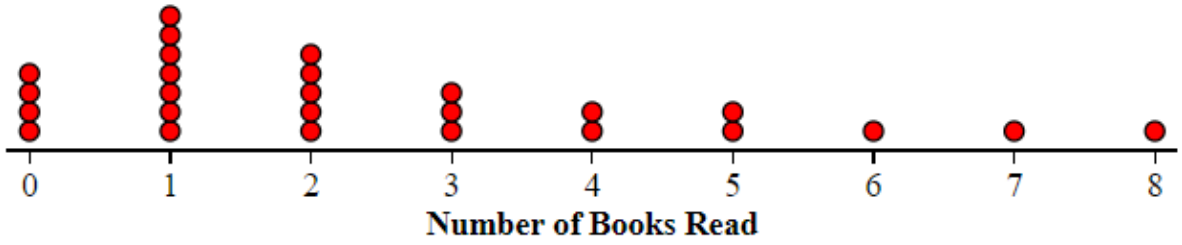
16	3
16	8 8
17	0 0 1 3 3 3 3 3
17	5 7 8 8 8 9
18	0 0 2 2 2 3 3 3 3 3 3
18	5 5 8 8 8 8 8 9
19	1 2 3

Dotplot

- A dotplot is a simple type of graph that involves plotting the data values, with dots, above the corresponding values on a number line.
- To construct a dotplot:
    1. Draw a horizontal line and label your axis with the name of your variable
    2. Scale the axis based on the values of the variable
    3. Mark a dot above the number on the horizontal axis corresponding to each data value

Example: Students at a high school were asked how many books they read over the summer. The data is shown in the table below. Create a dotplot to display the data.

0	2	3	8	5	2	3	4	1	2	0	1	3
7	0	1	5	1	2	1	6	1	2	4	1	0



Choosing the Right Graph

Which graph is the best? It depends on the data! Some graphs are better suited to data sets, while some data sets can be used with any graphs! Here is a general run down of the differences.

	Works Best With	*Best Features*	*Examples*
Histograms	• Continuous & discrete data • Large data sets or data with a large range	Shows the shape of a distribution very well	• Heights of students • Daily temperatures • Annual rainfall amounts
Ogives	• Continuous data • Small or large data sets	Easy to identify and interpret percentiles	• Exam scores • Income levels • Age distributions
Stemplots	• Discrete data • Medium range of values; you don't want too many or too few stems	Shows the shape of a distribution while maintaining the original data values	• Test scores • Weights
Dotplots	• Discrete data • Small range of values	Emphasizes individual data values	• Number of books read • Number of goals scored