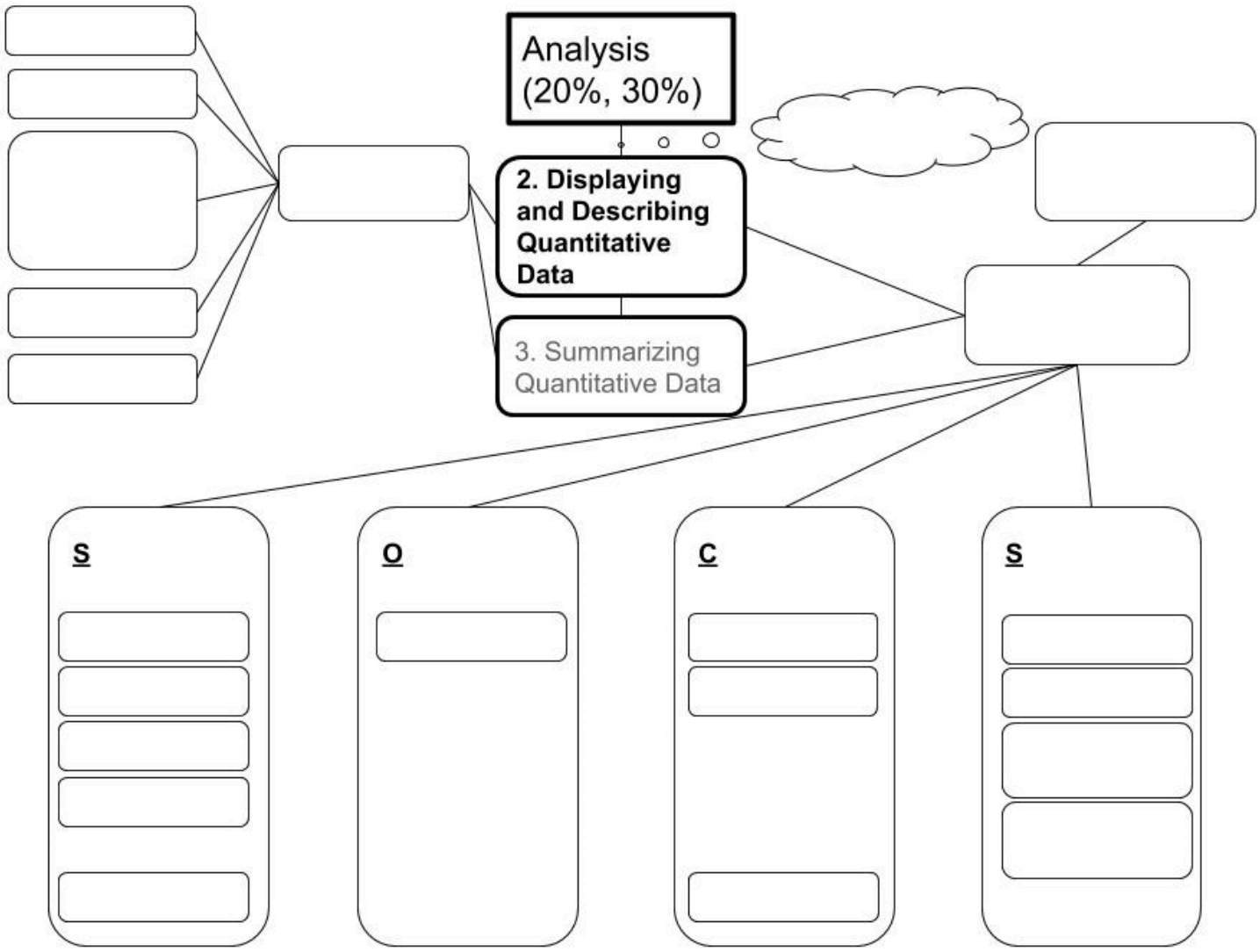
Unit 02: Displaying and Describing Quantitative Data

Unit Objectives

- Draw and read various graphical displays
- Describe distributions' center, shape, and spread in elementary terms



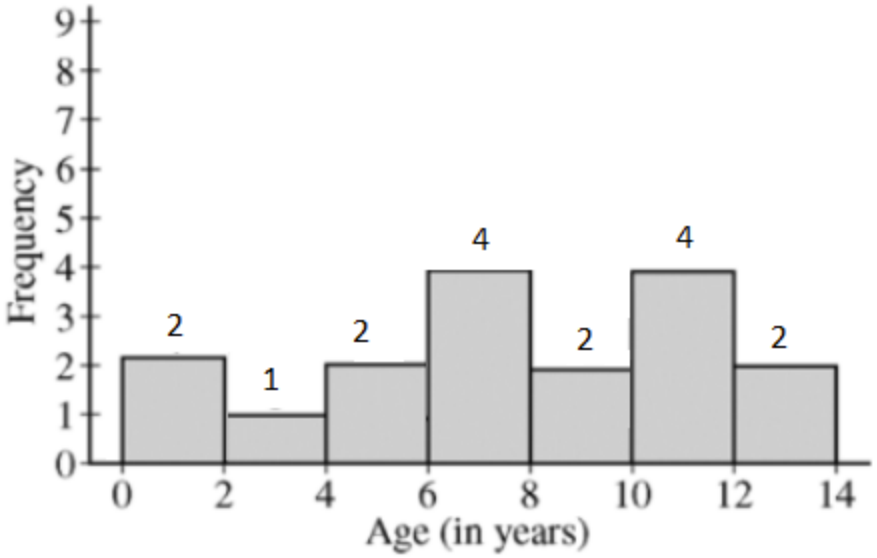
Unit 02 Lesson 01: Review Median and Range

What are some ways to describe the distribution of a quantitative dataset?

- Calculate medians and ranges of data sets

1. Yulissa recorded the amount of time she spent on her precalculus homework for two weeks. The following data points represent the number of minutes she spent each night. Determine the median number of minutes and the range of minutes.
   25, 36, 14, 2, 15, 22, 27, 30, 21, 25

2. **AP**: A random sample of 17 cars from California were surveyed. The age of each car was collected. This graph shows the data collected in the survey.



   In which of the following intervals is the median of these data located? Justify your answer.

A. 0 years old to less than 2 years old
B. 4 years old to less than 6 years old
C. 6 years old to less than 8 years old
D. 8 years old to less than 10 years old
E. 10 years old to less than 12 years old

3. **AP**: Ahmad wants to know the mass of a mysterious rock he found during a recent excavation. Because he's not sure which brand's scale is the most accurate, he buys seven different scales and measures the mass on each of those scales. Ahmad will use the median of the seven measurements as the estimate of the mass. Which of the following statements is NOT a statistical justification for Ahmad's plan?
   (A) The scale reading should be considered a variable when used to measure this mass.
   (B) The median of the seven measurements is more likely to be close to the actual mass than is a single measurement.
   (C) The actual mass should be considered a variable, and taking the five measurements allows Ahmad to estimate the variability in the actual mass.
   (D) If one or two scales give inaccurate readings, the estimate still should be fairly close to the actual mass.
   (E) Ahmad can get some indication of how far off the estimate might be.

~~~U02L01 Classwork~~~

1. Geno recorded the amount of times he didn't put his name on a paper for each month last year. The following data points represent the number of papers turned in each month without a name.

Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
5	19	17	21	9	30	80	52	9000	45	200

Determine the range and median of the data set.

2. **AP**: Christina was interested in the net worth of inhabitants of San Francisco. Net worth, in dollars, for a sample of 200 random people from San Francisco are summarized in the frequency table below.

Net Worth	Frequency
Net Worth < -$10,000	29
-$10,000 ≤ Net Worth < $0	14
$0 ≤ Net Worth < $10,000	38
$10,000 ≤ Net Worth < $50,000	47
Net Worth ≥ $50,000	72

Which of the following statements about the median net worth is true? Justify your answer

A. It is less than -$10,000
B. It is greater than or equal to -$10,000 but less than $0.
C. It is greater than or equal to 0 but less than $10,000.
D. It is greater than or equal to $10,000 but less than $50,000.
E. It is greater than or equal to $50,000.

Unit 02 Lesson 02: Create and Use Dot Plots

What is a quick and simple way to visualize a quantitative distribution? (source: Khan Academy)

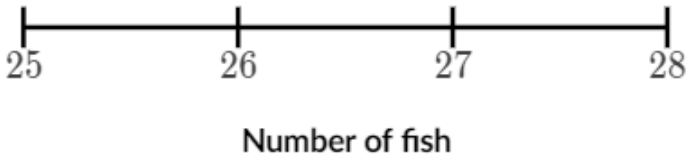
- Draw dot plots given data
- Use dot plots to answer questions about data

1.

Hugo competes in fishing tournaments. The following data points represent how many fish he caught in each tournament.

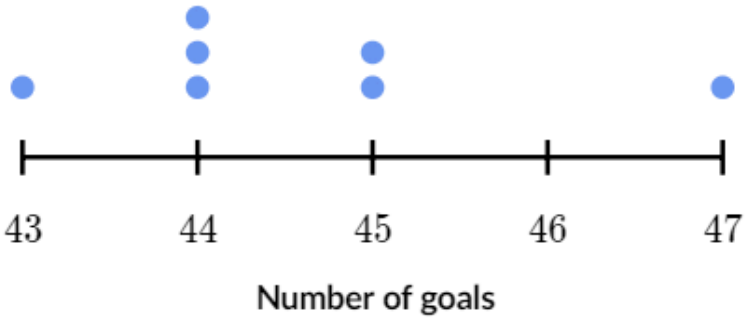
$$27, 27, 28, 28, 25, 26, 27$$

Using this data, create a dot plot where each dot represents a tournament.



2.

The following dot plot shows Hank's lacrosse scoring in each season. Each dot represents a different season.



Hank scored fewer than 45 goals in how many seasons?

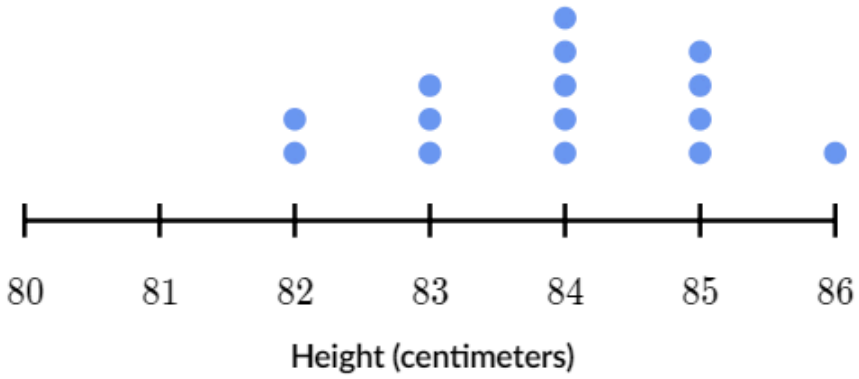
~~~U02L02 Homework~~~

1. Displaying and describing quantitative data: Creating dot plots
2. Displaying and describing quantitative data: Reading dot plots & frequency tables

~~~U02L02 Classwork~~~

1.

The following dot plot shows the height of each toddler at Ms. Cabrera's daycare. Each dot represents a different toddler.



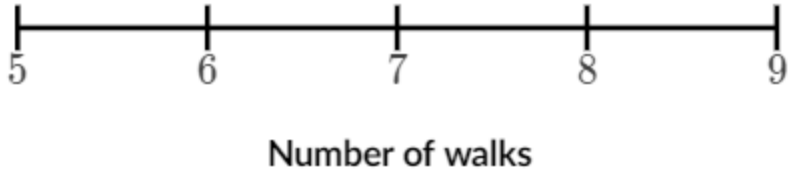
What is the most frequent height of a toddler?

2.

Below are the number of walks that each of Carrie's eight dogs has been on in the last week.

Number of walks	Number of dogs
5	1
6	2
7	3
8	1
9	1

Using this data, create a dot plot where each dot represents a dog.



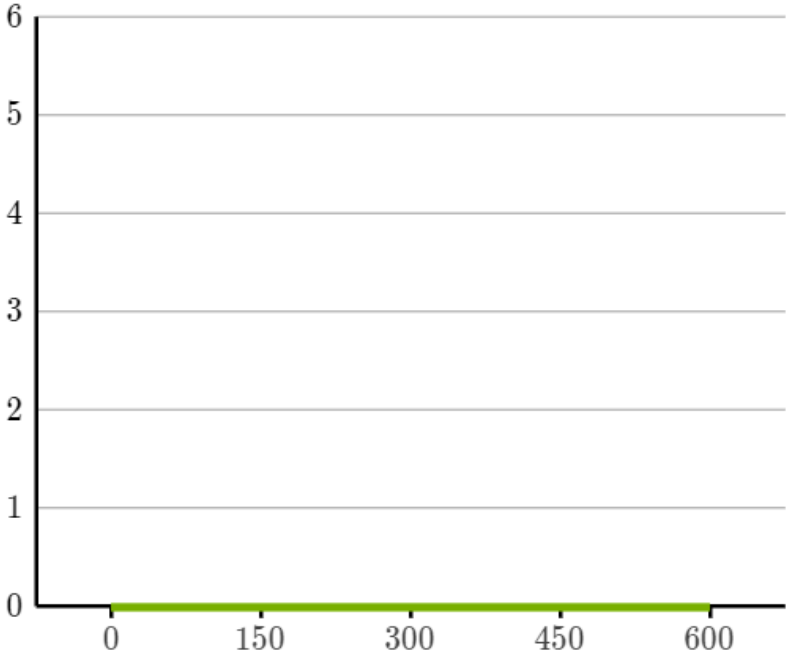
Unit 02 Lesson 03: Create and Use Histograms

What is a way to visualize a quantitative distribution when counts are too big for dotplots?

- Draw histograms given data
- Use dot plots to answer questions about data

1. Rowan recorded the amount of pages in each book she read last year. Create a histogram using the bins provided.

   71 431 149 222 113 352 582 144 289 450



2. AP: Mr. Rose recorded the amount of papers he printed each week for the first 12 weeks of school

   720 550 340 450 380 700 75 1650 800 1050 400 350

   Construct an appropriate graphical display of the number of pages printed during a week.

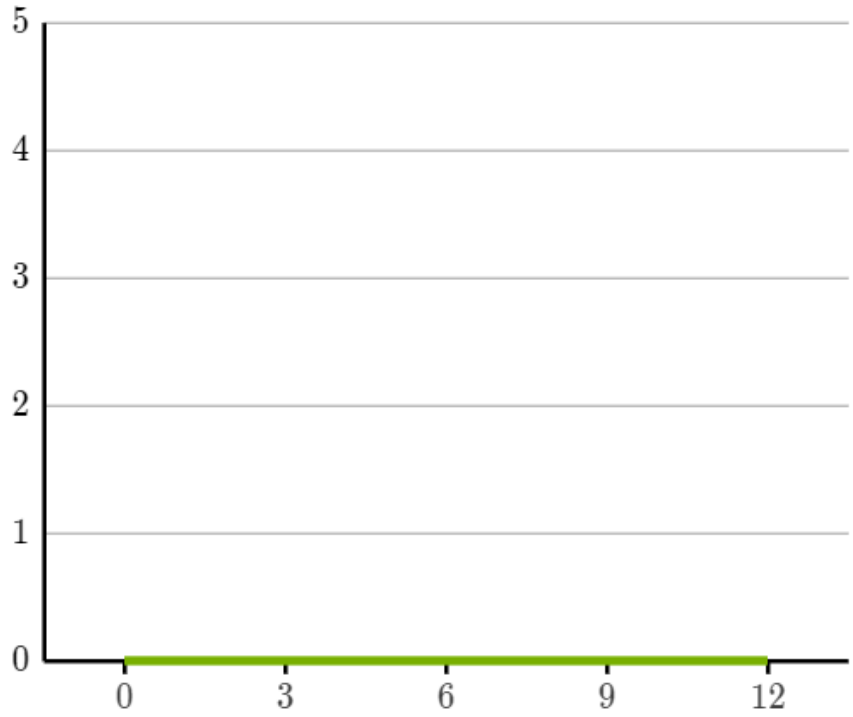
~~~U02L03 Homework~~~

1. Displaying and describing quantitative data: Creating histograms
2. Displaying and describing quantitative data: Reading histograms

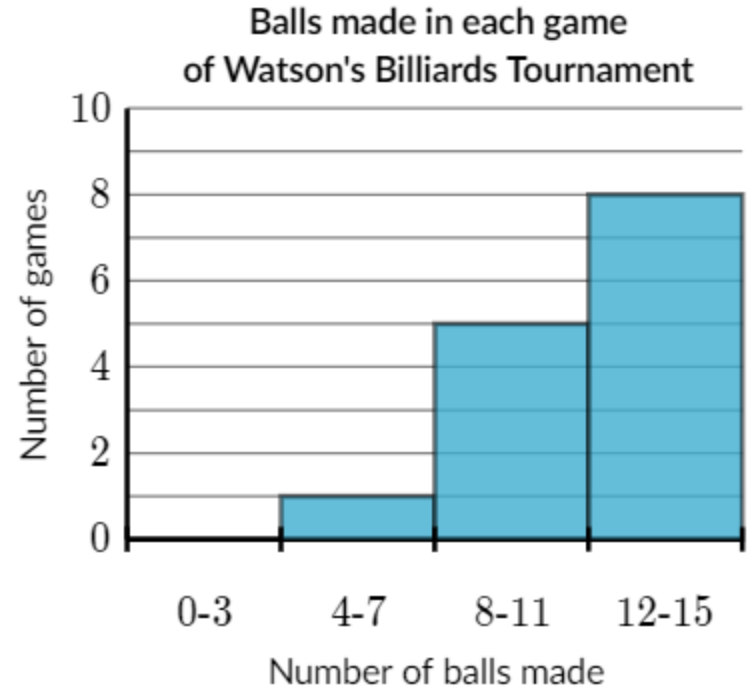
~~~U02L03 Classwork~~~

1. The following numbers represent the number of students who have passed the AP Chemistry test for the past 7 years at Walmart High School. Create a histogram and label appropriately

   4, 7, 11, 11, 2, 5, 8



2.



How many games had 11 or fewer balls made?

Unit 02 Lesson 04: Create and Use Stem and Leaf Plots

What is a way to visualize a quantitative distribution when one wants to also see the actual numbers?

- Draw stemplots given data
- Use stemplots to answer questions about data

1.

The government published the following stem-and-leaf plot showing the number of bears at each major zoo in the country:

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

Key: $4 \mid 1 = 41$ bears

How many zoos have more than 35 bears?

2. Mrs. Cameron teaches AP Statistics at GHI High School. She wrote down the class marks for her 2018 class and compared it to the previous year. The data can be found below. Construct a two-sided stem-and-leaf plot for the data.

2018
70 70 70 71 72 74 74 74 74 75 76 76 77 78 79 80 81 82 82 82 83 84 85 85 86 87 93 98 100

2017
76 76 76 76 77 78 78 78 79 80 80 82 82 83 83 83 85 85 88 91 95

~~~U02L04 Homework~~~ 1. Displaying and describing quantitative data: Reading stem and leaf plots

1.

A zookeeper created the following stem-and-leaf plot showing the number of tigers at each major zoo in the country:

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

Key: $2 \mid 5 = 25$ tigers

What was the smallest number of tigers at any one zoo?

2.

A zookeeper created the following stem-and-leaf plot showing the number of sloths at each major zoo in the country:

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

Key: $4 \mid 1 = 41$ sloths

How many zoos have exactly 17 sloths?

3. **AP**: A market researcher is looking into the spending habits of 83 men and women. He wants to know how many dollars were spent on entertainment in one month.

Women		Men
	15	
3	14	
	13	9
	12	
9	11	1 2
	10	3
7	9	
	8	7 8 9
4	7	
8 4 1	6	0 1 2 3 6 7 7 8
7 5 1 0	5	3 8 9 9 5
7 6 5 5 5 3 1	4	2 5
9 8 6 5 3 2 1	3	1 4 5 9 9 9
8 7 6 6 4 3 2 1	2	2 3 4 7 9
9 8 8 7 5 4 3 2 0	1	0 2 4 6 6 7 8 9

Determine which of the following statements are true. Justify by identifying which part(s) of the statement is false.

Women: Range _____ Median _____ Men: Range _____ Median _____

A. The median spending and range of spending were both greater for women than men.

B. The median spending and range of spending were less for women than men.

C. The median spending and range of spending were the same for both women and men.

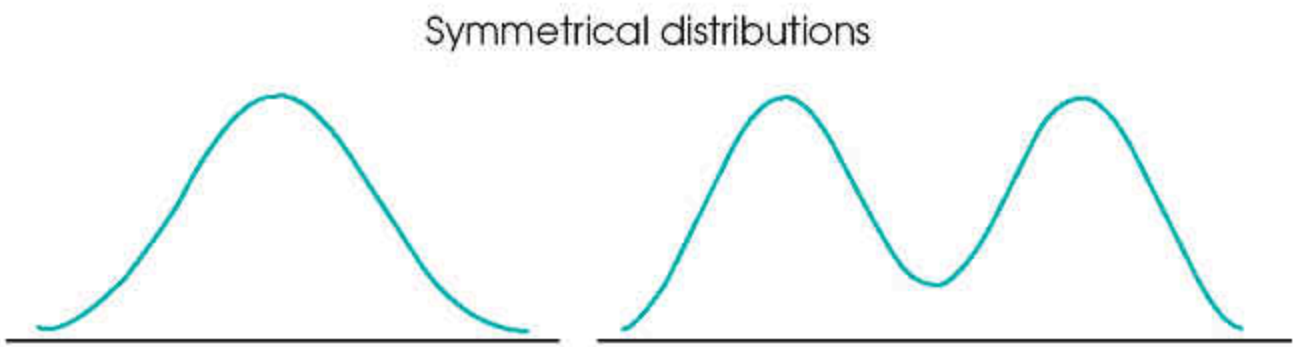
D. The median spending is less for women than men while the spending range was greater for women than men.

E. The median spending is greater for women than men while the spending range was less for women than men.

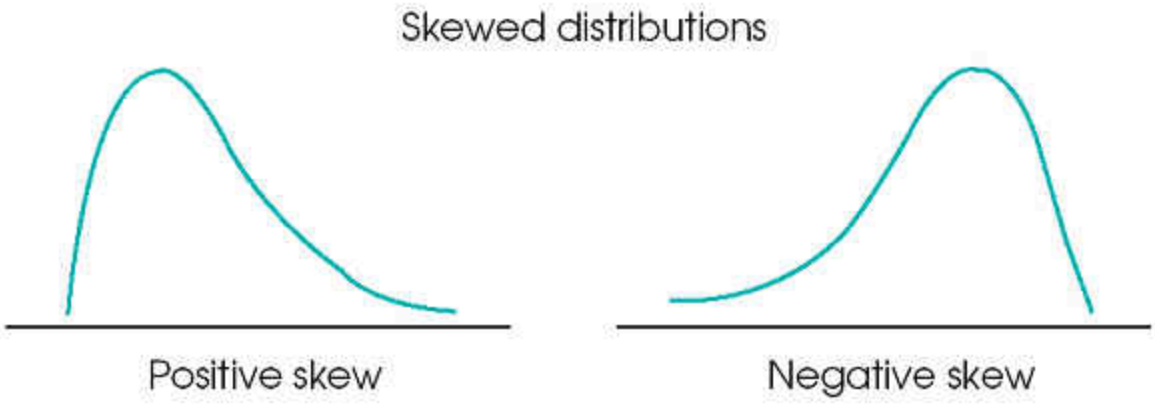
Unit 02 Lesson 05: Identifying Shapes of Distributions

What vocabulary exists for describing the shape of a distribution?

- Use the commonly accepted vocabulary for shapes of distribution

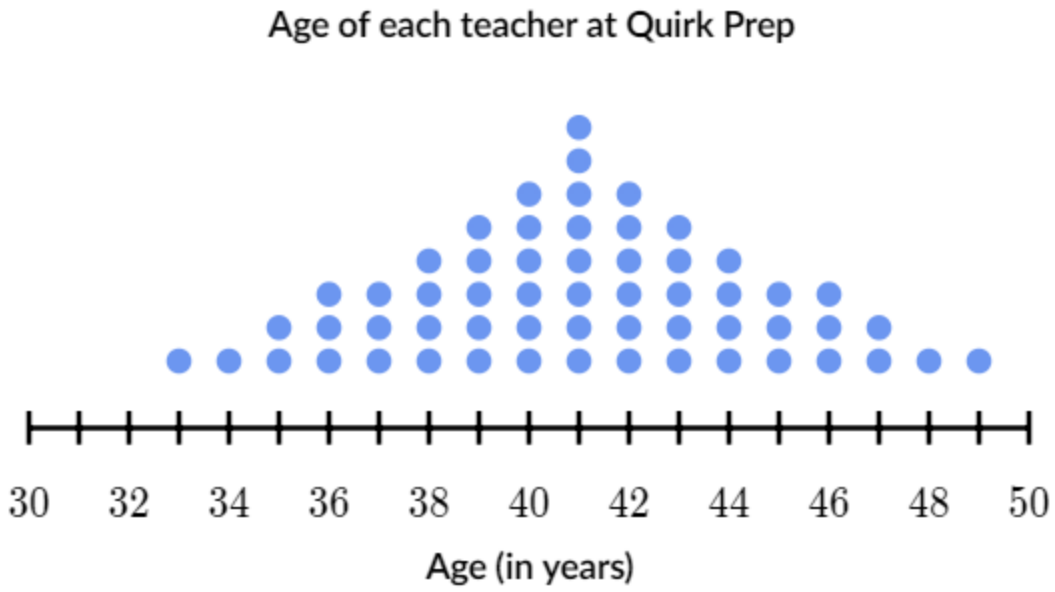


$$y = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$



Uniform

1. Describe the shape of the distribution



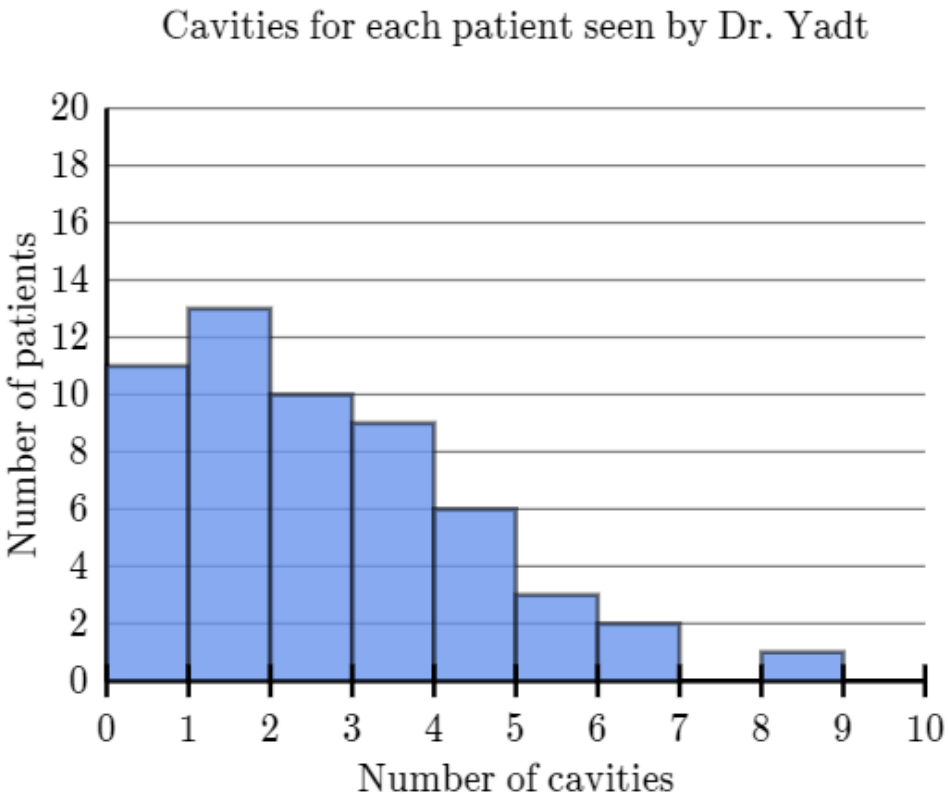
2. **AP**: The height, in feet, of the 21 Christmas trees at a certain Christmas tree lot are shown in the table below.

Height (in feet)	4	5	6	7	8	9	10	11	12	13
Frequency	0	1	2	15	19	13	4	2	1	0

Which of the following best describes the shape of the distribution of used car prices at the dealership?

a. Skewed to the left (negatively skewed)
b. Skewed to the right (positively skewed)
c. Bimodal
d. Uniform
e. Approximately Normal

1. Describe the shape of the distribution

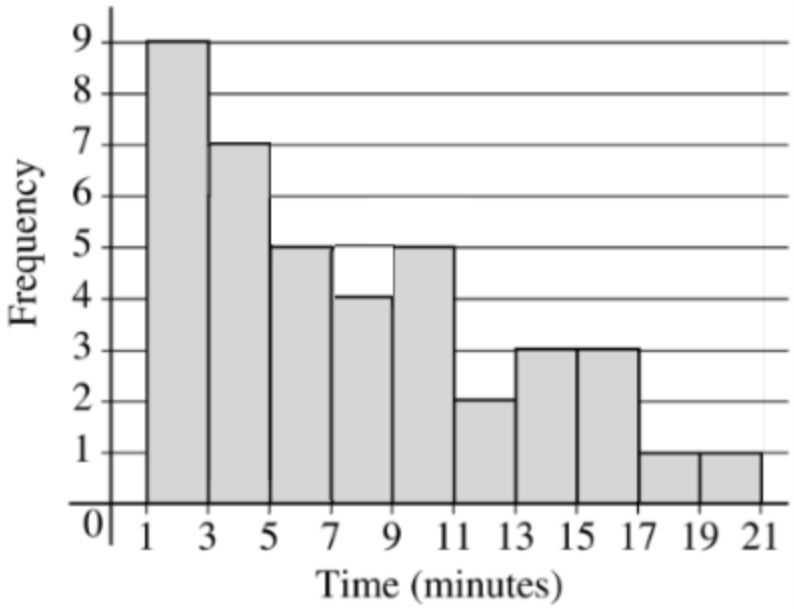


2. **AP**: Wheat plants can be defined as either dwarf wheat or standard wheat. The distribution of heights for the plants classified as dwarf wheat is approximately normal, centered at 35 centimeters, and ranges from 28 to 41 centimeters. The distribution of heights for standard wheat is approximately normal, centered at 64 centimeters, with ranges from 55 to 74 centimeters. There are 10,000 plants in each classification.

   Draw a rough sketch of what a distribution of all 20,000 plants might look like.

   Which of the following is the best description of a histogram of the weights of all 20,000 plants?
   f. Skewed to the right (positively skewed)
   g. Skewed to the left (negateively skewed)
   h. Approximately uniform and centered at 49.5 centimeters.
   i. Approximately normal and centered at 49.5 centimeters.
   j. Bimodal

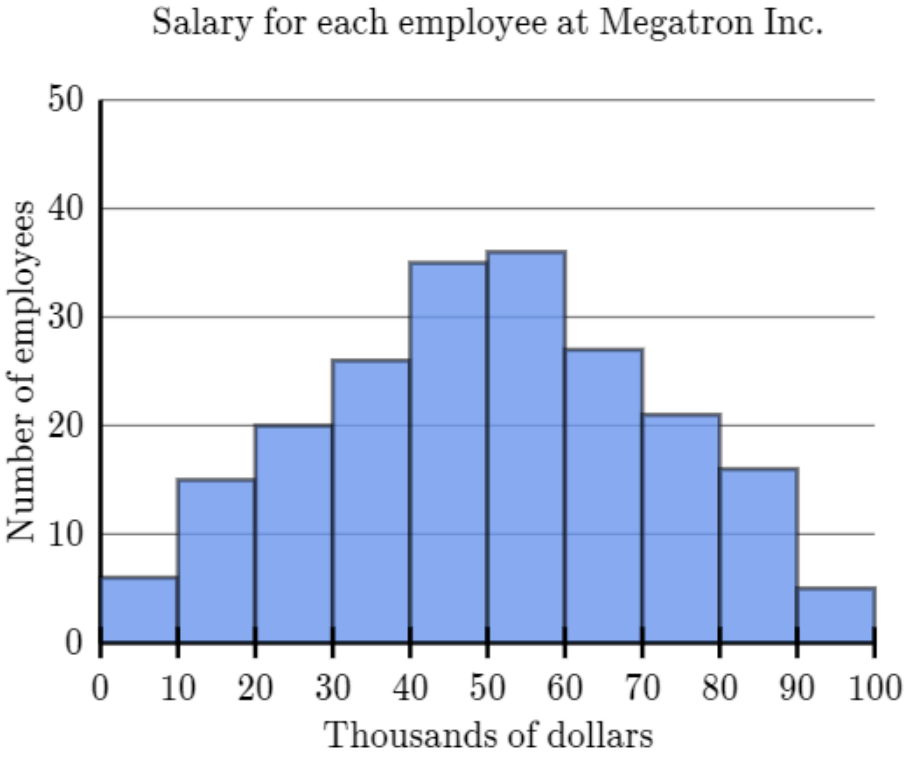
3. **AP**



The histogram above shows the number of minutes for 40 randomly selected lab rats to navigate a maze. Which of the following statements is correct?

A. The distribution is skewed to the right.
B. The distribution is skewed to the left.
C. The distribution appears to be normal.
D. The distribution appears to be chi-square.
E. The distribution appears to be uniform.

4. Describe the shape of the distribution



Unit 02 Lesson 06: Describing Distributions

How does one give a complete description of a quantitative distribution?

- Describe distributions
- Compare distributions

1. Definitely not copy pasted from Khan Academy

Many people require more than one attempt to pass the **Unit 1** test for a **certain teacher's class**
The dot plot gives the number of times 21 people took the **Unit 1** test in order to earn their **desired grade.**

Describe the distribution of the number of tests taken.

2. A student wanted to investigate the miles per gallon of several popular cars. The following data collected by the student show the amounts of miles per gallon for 10 popular cars.

   54 31 26 32 44 29 47 33 24 22

A. Construct an appropriate graphical display of the amounts of miles per gallon found in the 10 cars.

B. Use the graph in part A to write a few sentences describing the distribution of miles per gallon ratings for the 10 cars.

C. An experimental car that has not entered production yet claims to get over 250 miles per gallon. If this value was added to the data set of twelve numbers above, how would the mean and median of the data set above compare with the mean and median of the new data set with the 11th numbers? Explain how this comparison could be made without performing any computations.

~~~U02L06 Classwork~~~

1. An investor is comparing the historical profits from two different hedge funds, A and B. The percentage of profit gained or lost for the last 11 years for each are recorded in the table below.

Hedge Fund A

28%	39%	13%	21%	21%	10%	21%	23%	45%	9%	29%

Hedge Fund B

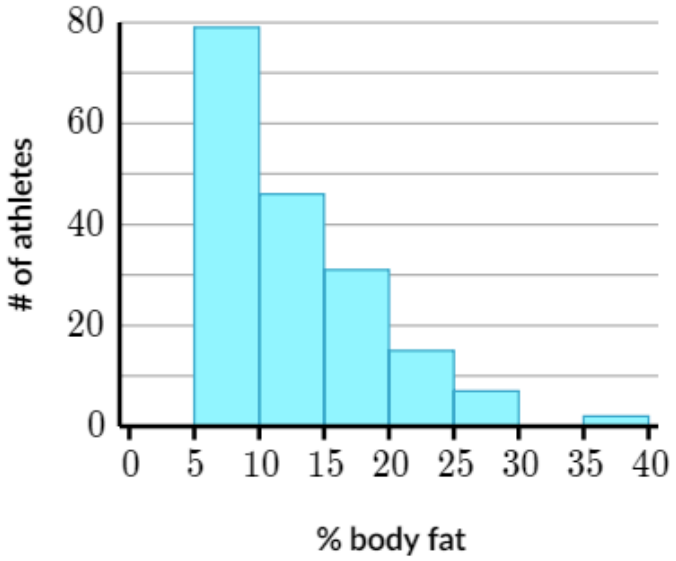
43%	14%	14%	15%	13%	25%	34%	14%	63%	7%	5%

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

b. In a few sentences, compare the distributions in part a.

2. Source: Khan Academy

Josephine was looking at data describing the body fat percentages for a sample of professional athletes. She was trying to describe the distribution:



Here's Josephine's description of the distribution:

> *The distribution of body fat percentages is skewed to the right with a median between 10 and 15 percent. There are a few potential high outliers.*

Use the description to fill in the following chart. If Josephine did not address an aspect, write "Missing" and give your own description.

Aspect of Distribution	**Description**
Shape	
Outliers	
Center	
Spread	

Unit 02 Lesson 07: Review for Test

Can I handle any situation that involves quantitative graphical displays or elementary descriptions of distributions?

- Ensure you've mastered the concepts and skills of displaying and describing quantitative data
- Ensure you've retained mastery of preview units

1. **AP**: Contestants on The Price is Right each try to guess the price of a new microwave oven. The contestant who guesses closest to the actual price without going over wins a prize. The guess of each contestant is shown in the back to back stemplot below.

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

Which of the following statements is true about the distribution of guesses? Justify your answer.

a. The distribution of guesses for males is skewed to the left while the distribution for females is skewed to the right.

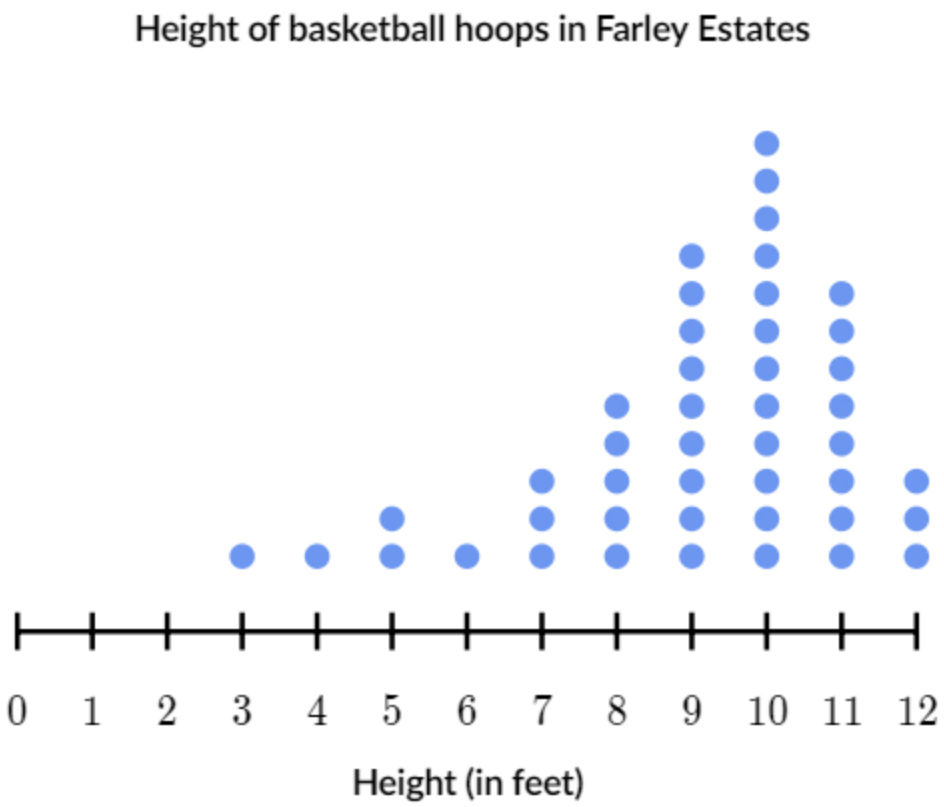
b. The distribution for males is skewed to the right while the distribution for females is skewed to the left.

c. The distribution for both genders is skewed to the right.

d. The distribution for both genders is skewed to the left.

e. The distribution for both genders are symmetric.

2. For the dot plot below



   a. Convert to a histogram with 6 bins

   b. Determine the median, and show something that illustrates your process.

   c. Describe the distribution

3. Don't forget how to use those 2-way tables from Unit 1;)