Chris Shore, 2019
Statistics

Name _____

"How Tall Is Our Class?"

Statistical Questions

1) "How tall is our class?" Your guess: _____. Why?

2) Which of the following is a statistical question and why?

"How tall is our class?" "How tall are you?"

Statistical questions anticipate _____.

3) Can you write a statistical and a non-statistical question regarding something outside of school?

Statistical: _____

Non-Statistical: _____

4) "How tall are the boys in our class?" Your group's guess: _____. Why?

5) a) Record the group guesses for boys' heights from your class.

Group	1	2	3	4	5	6	7	8	9	10
Guess (in)										

b) What is the mean, median and the range of the group guesses?

Mean: _____, _____

Median: _____, _____

Range: _____, _____

c) Which shall we use for our class guess?

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Name _____

"Who Is Our Typical?"

Measures of Center

For a set of data, the …

center can be represented by ____ number, and the
spread can be represented by ____ number, and the
shape can be described and displayed in a few ways.

1) a) For two boys close in height, calculate the mean, median and the range.

b) Which of these measures the center?

c) Which measures the spread?

2) a) For the shortest and tallest in the class, calculate the mean, median and range.

b) Add a third, in between. Before you calculate, does this person's height affect the…

i) mean?
ii) median?
iii) range?

c) Now calculate.

3) a) For four new boys, sketch their heights (stick figures) on the human number line.

b) calculate the mean, median and range.

b) Of the four, which height is closest to the center of the data?

c) Do the data have a realtively wide or narrow spread?

4) In regards to possible heights in any class, answer each prompt below with both a set of values and a drawing of stick figures on a human number line.

a) Three heights with a large range, and one of the values is the mean.
b) Three heights with a large range, and one of the values is the not the mean.
c) Three values with the same mean as in part (b), but with a relatively small range.

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Name _____

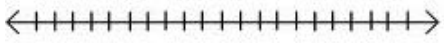
"How Far Off Center Are We?"

Measure of Spread
Mean Absolute Deviation (MAD)

For a given set of seven boys:

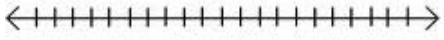
1) a) For the values of the Min and Max, calculate the mean (μ). _____

b) Calculate the distance from the mean, (absolute deviation) for each of the two boys.



2) a) Add a third boy and recalculate the mean. ____

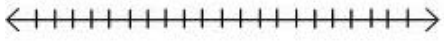
b) Calculate the absolute deviation for each of the three boys.



c) Find the average of these absolute deviations (Mean Absolute Deviation). ____

3) a) Add a fourth, and recalculate the mean. _____

b) Calculate the absolute deviation for each of the four boys.



Initials	Height (in)

c) Find the MAD. ____

4) Find the MAD for all 7 boys. MAD = _____

Initials	Height (in)

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Name _____

"How Wide Is Our Middle?"

Measure of Spread
Interquartile Range (IQR)

1) For a given set of eight boys:

a) Write their value below, in ascending order.

b) Lable the minimum values and maximum values as Min & Max respectively.

c) Starting with the lowest value, circle each *quarter* of the data.

d) Calculate and label the median among your values above.

e) Calculate the first quartile (the median of the lower half of the data). Label it Q_1.

f) Calculate the third quartile (the median of the upper half of the data). Label it Q_3.

g) Calculate the interquartile range (Q_3 - Q_1).

i) What percentage of the data is within the IQR?
ii) What does this IQR say about the spread of the data?

2) For a given set of nine boys:

a) Anticipate what will make calculating the 5-number summary (min, max, med, Q_1, Q_3) different than with 8 boys.

b) Calculate the IQR, and interpret it in terms of the boys heights.

3) For a given set of ten boys, calculate the IQR, and interpret it in terms of the "middle" heights.

4) For a given set of eleven boys, calculate the IQR, and interpret it in terms of the "middle" heights.

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"Are We Evenly Distributed?"

Displays of Shape
Box Plots

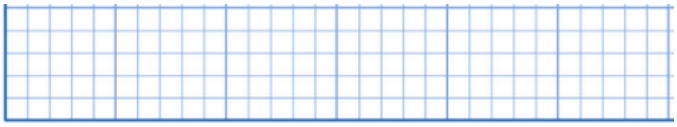
1. a) Given the set of data below, determine the 5-number summary and the interquartile range.

15, 12, 17, 20, 19, 19, 16, 14, 15, 18, 17

Min = ___ Q_1 = ___ Med = ___ Q_3 = ___ Max = ___

IQR = ___

b) Box Plot



2. a) For heights of 11 boys, determine who would be the min, max, med, Q_1, and Q_3.

b) Record these values:

c) Create a box plot for these values.

d) Calculate the IQR. ____ Where on the box plot would we find this value.

3. a) Given the set of data below, determine the 5-number summary and the interquartile range.

90, 72, 83, 87, 66, 95, 80, 79, 72, 70, 88, 77

Min = ___ Q_1 = ___ Med = ___ Q_3 = ___ Max = ___

IQR = ___

b) Create a box plot for the values above.

c) What percentage of the values are within the interquartile range?
d) What percentage of the values are within the upper quartile?
e) Does a wider box or whisker imply a greater amount of data or a greater spread of data?

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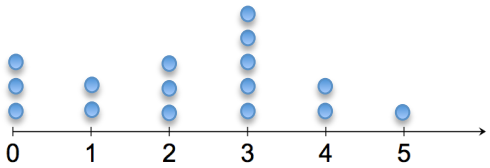
Name _____

"What is the Shape of Our Heights?"

Displays of Shape
Dot Plots

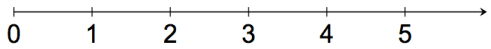
1. Given the dot plot below…



a) How many students were polled?
b) How many students study 4 hours a week?
c) How many students study more than 2 hours a week?
d) How many hours of studying is the most common?
e) How many hours is the least common?
f) What is the least number of hours spent studying?

2. a) A class of 6th graders was polled about the number of pets in their family. Create a dot plot for the data shown below.

5, 1, 3, 2, 4, 1, 2, 2, 0, 3, 2, 0, 2, 3, 5



b) What is the most common number of pets?
c) What is the least common number of pets?
d) What is the most number of pets owned?

3. a) For the dot plot in #1, create a box plot.

b) What does the box plot tell you about the distribution of the data?

Challenge: What is the mean of the data in #1?

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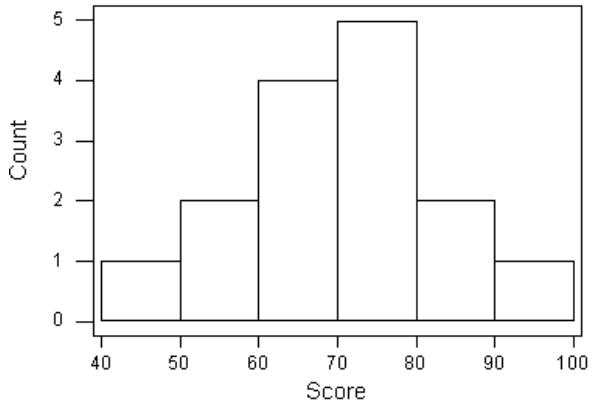
Name _____

"Of Which Group Do We Have The Most?"

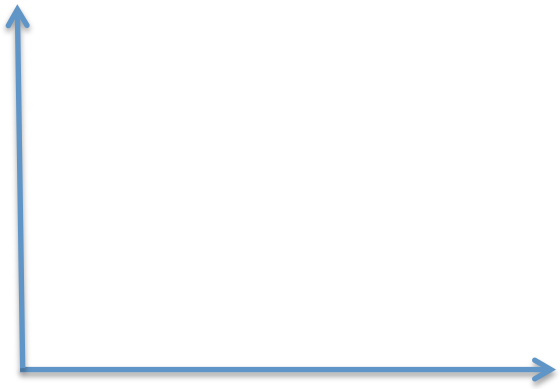
Displays of Shape
Histograms

1) For the histogram below, representing student test scores,...
   a) What are the intervals?
   b) How many students scored in the 60s?
   c) How many total students took the test?
   d) Which interval has the most scores?



2) a) For the given data below, representing years of experience on the job, create a histogram with intervals of 0-, 10-, 20-, etc.

15, 1, 23, 22, 14, 11, 2, 32, 20, 31, 42, 20, 12, 37, 25



b) Which interval has the greatest number of people?
c) Which interval has the least number of people?
d) Describe the shape of the histogram.

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Name _____

"How Tall Are the Boys in Our Class?"

Statistics Overview

For the heights of all the boys in our class:

Initials	Height (in)

Measures of Center

Calculate the …

1) mean

2) median

Measures of Spread

Calculate the …

3) range

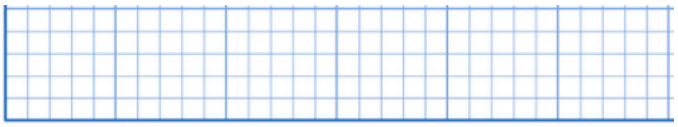
4) mean absolute deviation (MAD)

5) interquartile range (IQR)

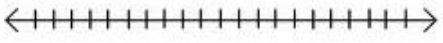
Displays of Shape

Create a …

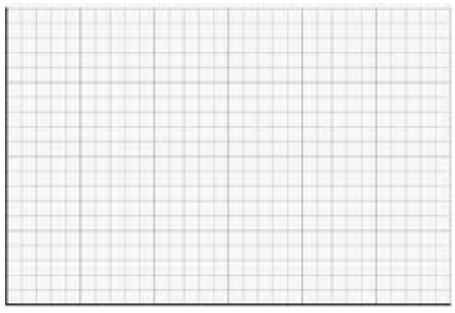
6) Box Plot



7) Dot Plot



8) Histogram (for intervals 50-, 55-, 60- etc.)



Interpretation

9) Who is most normal in height? (Give intitials and height.) Why?

10) What do your measures of spread tell you about the distribution of the data?

11) What do your displays tell you about the shape of the data?

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Statistics

Name _____

Titanic 1

Inspired by *Illustrative Mathematics*

On April 15, 1912, the Titanic struck an iceberg and sank with only 710 of the 2,204 people on board surviving. Data on survival of passengers are summarized in the table below.

	Survived	Did Not Survived	Total
First Class Passengers	**201**	**123**	**324**
Second Class Passengers	**118**	**166**	**284**
Third Class Passengers	**181**	**528**	**709**
Total Passengers	**500**	**817**	**1317**

a. Calculate the following probabilities.

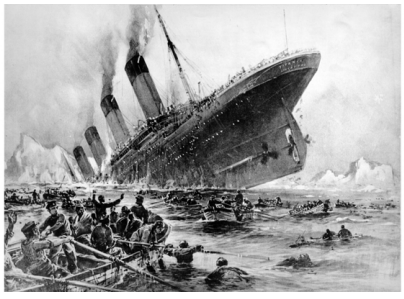
   i. If one of the passengers is randomly selected, what is the probability that this passenger was in first class?

   ii. If one of the passengers is randomly selected, what is the probability that this passenger survived?

   iii. If one of the passengers is randomly selected, what is the probability that this passenger was in first class and survived?

   iv. If one of the passengers is randomly selected from the first class passengers, what is the probability that this passenger survived? (That is, what is the probability that the passenger survived, given that this passenger was in first class?)

   v. If one of the passengers who survived is randomly selected, what is the probability that this passenger was in first class?



b. Why is the answer to part (a.iv) larger than the answer to part (a.iii)?

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Name _____

Titanic 2

Inspired by Illustrative Mathematics

On April 15, 1912, the Titanic struck an iceberg and sank with only 710 of the 2,204 people on board surviving. This scene from the movie *Titanic* suggests that wealthier people were treated differently during the evacuation than the third class passengers. http://bit.ly/TitanicData1 Was this true?

	Survived	Did Not Survived	Total
First Class Passengers	**201**	**123**	**324**
Second Class Passengers	**118**	**166**	**284**
Third Class Passengers	**181**	**528**	**709**
Total Passengers	**500**	**817**	**1317**

a. Are the events "passenger survived" and "passenger was in first class" independent events? Support your answer using appropriate probability calculations.

b. Are the events "passenger survived" and "passenger was in third class" independent events? Support your answer using appropriate probability calculations.

c. Did all passengers aboard the Titanic have the same probability of surviving? Support your answer using appropriate probability calculations.

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Statistics

Name _____

Titanic 3

Inspired by Illustrative Mathematics

On April 15, 1912, the Titanic struck an iceberg and sank with only 710 of the 2,204 people on board surviving. Some believe that the rescue procedures favored the wealthier first class passengers. Others believe that the survival rates can be explained by the "women and children first" policy: as is depicted in this scene from the movie Titanic. http://bit.ly/TitanicWomen. Even though you were not there, you can use the data summarized below to determine the truth.

	Survived	Did Not Survived	Total
Children in First Class	**4**	**1**	**5**
Women in First Class	**139**	**4**	**143**
Men in First Class	**58**	**118**	**176**
Children in Second Class	**22**	**0**	**22**
Women in Second Class	**83**	**12**	**95**
Men in Second Class	**13**	**154**	**167**
Children in Third Class	**30**	**50**	**80**
Women in Third Class	**91**	**88**	**179**
Men in Third Class	**60**	**390**	**450**
Total	**500**	**817**	**1317**

COOL SHOES: LINEAR

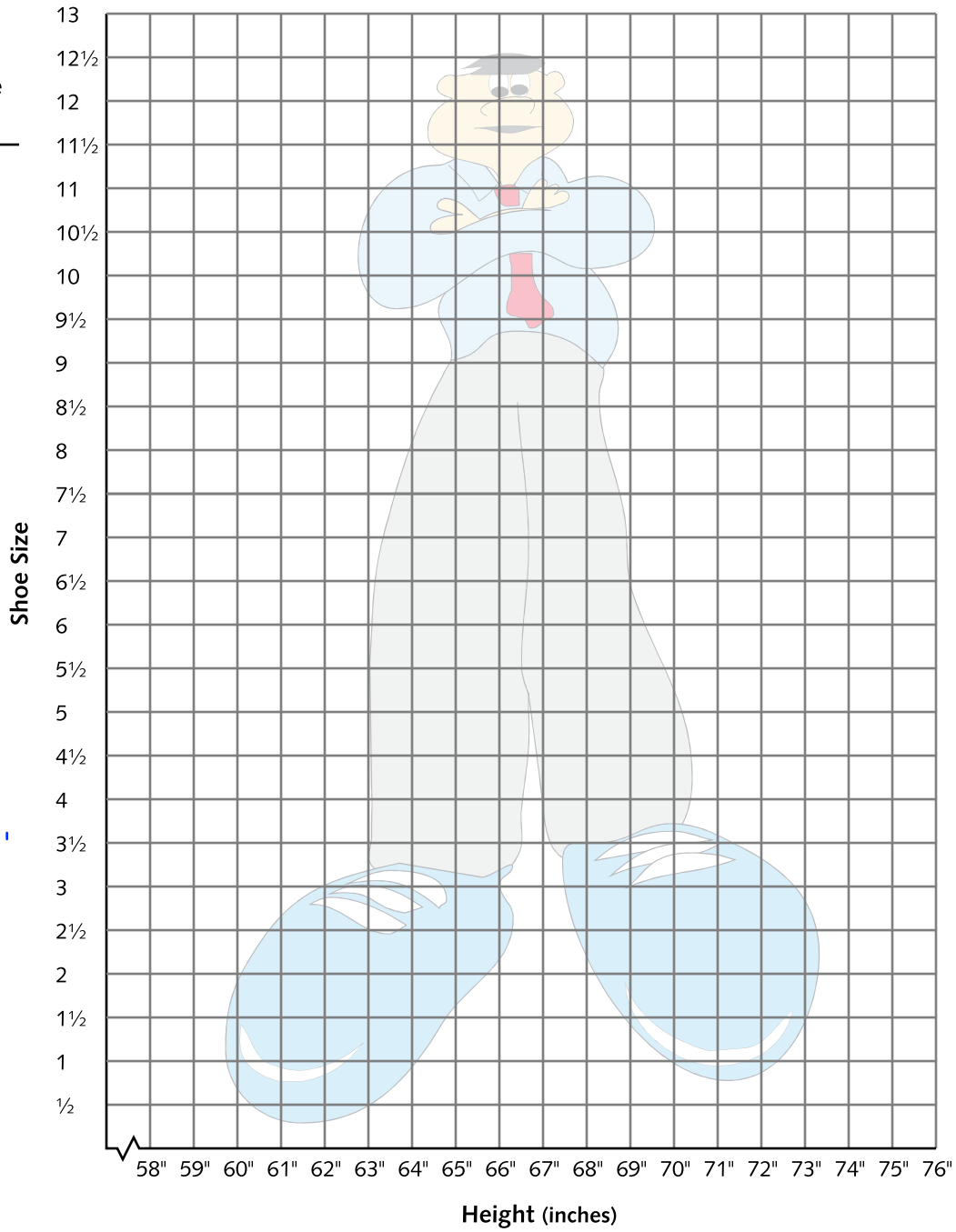
You own and operate NewCoolShoes.com, an online shoe store. Many people want to order shoes for friends and relatives, but do not know their shoe size. Since it is easier to estimate a person's height than shoe size, you want the customer to be able to enter a person's height and calculate the appropriate shoe size (approximate). You must have either a graph or equation in order to do this. So, your task here is to create both, using sample data from your class.

BOYS

Height (inches)	Shoe Size

GIRLS

Height (inches)	Shoe Size



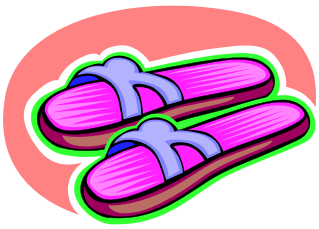
COOL SHOES: LINEAR (CONTINUED)

1. Fill the charts with data from your class. Record each person's height and shoe size.
2. Plot data points from the charts. Use one color or symbol (+) for boys and a different one for girls (*).
3. Do you notice any relationship between people's height and shoe size? What kind of correlation is it?

4. Draw an approximate line of best fit for each set of data (one for boys, one for girls).
5. For each line, calculate the rate of change (slope).

   BOYS: There is a change of _____ sizes for every _____ inches of height, or _____ sizes per every one inch.

   GIRLS: There is a change of _____ sizes for every _____ inches of height, or _____ sizes per every one inch.



6. a) Calculate the y-intercept of each line. **BOYS:** _____ **GIRLS:** _____

   b) What do these intercepts imply? Do they match your graph?

7. Write the equations of each line.

   BOYS: _____ **GIRLS:** _____

8. For each set of data, find a **height** that does NOT appear in the chart. For instance, if no girl in the class is exactly 68" tall, then choose 68 inches for the girls. Use your equation and your chosen value for height to find the corresponding shoe size at that height. Do your solutions match the graphs?

   BOYS: Height = _____ **GIRLS:** Height = _____
   Shoe Size = _____ Shoe Size = _____

9. For each set of data, find a **shoe size** that does NOT appear in the chart. For instance, if no boy in the class has a shoe size of 13.5, then choose 13.5 for the boys. Use your equation and your chosen value for shoe size to find the corresponding height. Do your solutions match the graphs?

   BOYS: Height = _____ **GIRLS:** Height = _____
   Shoe Size = _____ Shoe Size = _____