

# Algebra Common Core Review

## **Numbers and Quantity – Session One**

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Rational and Irrational Numbers: pages 3-5

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Error in Measurement: page 7-8

## **Algebra- Session Two**

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## **Functions- Session Three**

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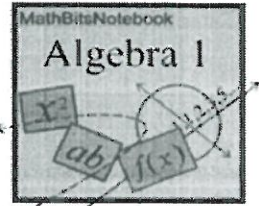
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# Types of Data

Name \_\_\_\_\_

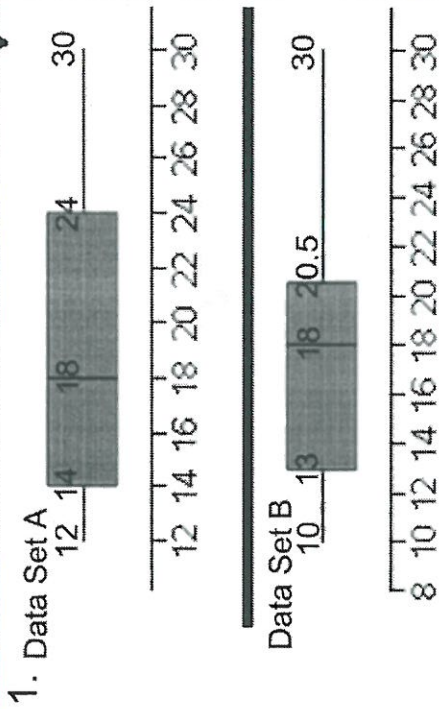
*Directions: These questions deal with types of statistical data: quantitative or qualitative; univariate or bivariate; biased or unbiased. Explain how you made your choice.*

<p><b>1.</b> Description of a mule, named Monty:</p> <ul style="list-style-type: none"><li>• 14.1 hands high</li><li>• 800 pounds</li><li>• 12 years old</li><li>• purchase cost: \$800</li><li>• maintenance cost: \$100 a month</li></ul> <p>Explain whether this data is quantitative or qualitative.</p>	<p><b>2.</b> Description of sports car:</p> <ul style="list-style-type: none"><li>• black</li><li>• convertible</li><li>• chrome accessories</li><li>• saddle brown interior</li><li>• two-seater</li></ul> <p>Explain whether this data is quantitative or qualitative.</p>
<p><b>3.</b> Determine the average number of M&amp;Ms in a mini canister.</p> <p>Explain whether this data is univariate or bivariate.</p>	<p><b>4.</b> Data is collected to determine if the number of a student's extra-curricular activities affects his/her math test scores.</p> <p>Explain whether this data is univariate or bivariate.</p>
<p><b>5.</b> Lamar collects data to determine whether students think boys or girls are smarter. He surveys his all-male basketball team.</p> <p>Explain whether this data is biased or unbiased.</p>	<p><b>6.</b> A study is conducted to determine the number of students in the freshman class who own a laptop computer. Fifty students chosen at random from the 112 students in the freshman class were surveyed.</p> <p>Explain whether this data is biased or unbiased.</p>

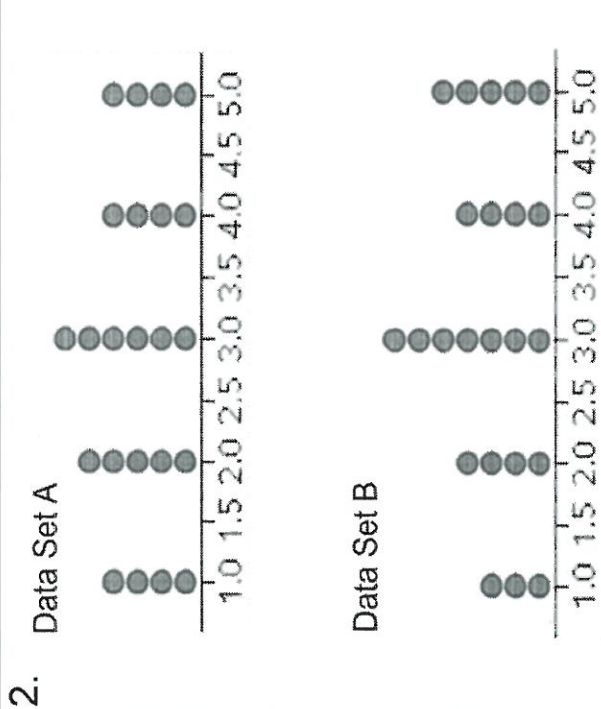


# Comparing Data Sets

Name \_\_\_\_\_



- a) range of set A \_\_\_\_\_; of set B \_\_\_\_\_
- b) median of set A \_\_\_\_\_; of set B \_\_\_\_\_
- c) interquartile range of set A \_\_\_\_\_  
interquartile range of set B \_\_\_\_\_
- d) If the data represents quiz scores, which class would you say did better? \_\_\_\_\_ Why?

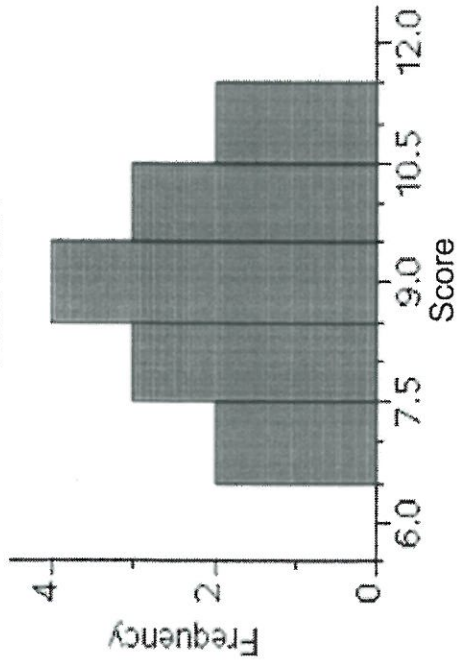


Round answers to the nearest *hundredth* if necessary.

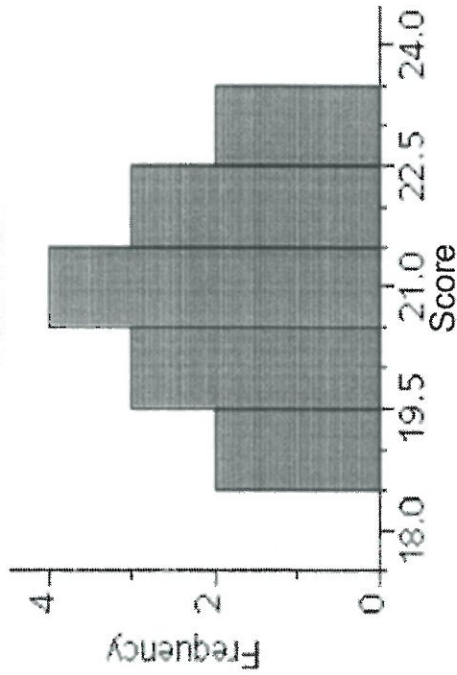
- a) median of set A \_\_\_\_\_; of set B \_\_\_\_\_
- b) mean of set A \_\_\_\_\_; of set B \_\_\_\_\_
- c) standard deviation of set A \_\_\_\_\_  
standard deviation of set B \_\_\_\_\_
- d) What change, when made to set A, will make it symmetric? \_\_\_\_\_
- e) If the data represents scores on a video game (with 5 being a perfect score), which player would you say is the better player? \_\_\_\_\_ Why?

3.

Data Set A



Data Set B



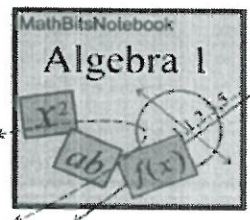
Circle whether the following statements are TRUE or FALSE:

- a) Both data sets are symmetric. T F
- b) Both data sets have the same range. T F
- c) Both data sets have the same mean. T F
- d) The mean and the median within set A have the same value. T F
- e) Data set B is skewed to the right. T F
- f) The mean within set B is greater than its median. T F
- g) The standard deviation of set A equals the standard deviation of set B. T F
- h) If these data sets represent how well students in two different classes scored on the same quiz, then it can be said that the students in set B scored exactly two times better than those in set A. T F

# Measures of Center & Shapes of Distributions

Name \_\_\_\_\_

Directions: Read carefully and choose the best answers.



1. The number of snowboarding accidents reported weekly during one winter season at the Fun Mountain Resort: 12, 15, 6, 8, 12, 17, 10, 8, 7, 13, 14, 16, 8, 18, 11
- (a) Find the mean to the *nearest tenth*.
  - (b) Find the median.
  - (c) Find the mode.
  - (d) A teenager wants to emphasize the safety of snowboarding. Which measure of central tendency should the teen use?
  - (e) A parent wants to emphasize the dangers of snowboarding. Which measure of central tendency should the parent use?

2. A company is releasing two new types of knee socks: argyle and plaid. The table below shows the sales numbers for the first week.

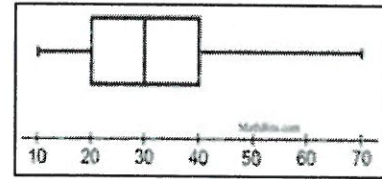
Day of Week	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Argyle	8	10	1	10	2	10	1
Plaid	14	6	8	6	18	12	6



- (a) Find the mean, median and mode of the argyle knee socks sales.
- (b) Find the mean, median and mode of the plaid knee socks sales.
- (c) Which measure of central tendency would you use to show that the argyle knee socks are selling better?
- (d) Which measure of central tendency would you use to show that the plaid socks were selling better?
- (e) Which measure of central tendency would you use to show that there is no difference between the sales of the two types of knee socks?
- (f) Which knee socks sales had the larger spread of sales?

3. The box plot shown at the right is described as being a \_\_\_\_\_.

Choose: symmetric distribution, skewed left distribution, or skewed right distribution.



4. Compare mean and median in differently shaped data distributions. For each type of distribution stated below, decide what is "typically" the relationship between the mean and the median. Place a "X" in the appropriate column.

Type of distribution:	mean larger	median larger	mean = median
Symmetric, bell-shaped distribution			
distribution skewed right			
distribution skewed left			
uniform distribution			

5. The best measure of center to use when data is skewed is the \_\_\_\_\_.  
Choose: mean, median or mode

6. Which of the following statements is FALSE?

- (1) In a skewed distribution, the mean typically gets pulled toward the tail.
- (2) The graph of a distribution with one clear peak is called a unimodal distribution.
- (3) The graph clearly showing the median value is the box plot.
- (4) The median can also be thought of as a balance point.

# Two-Way Frequency Tables

Name \_\_\_\_\_

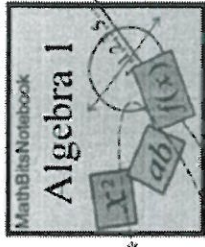
Directions: Read carefully.

1. The two-way frequency table, shown below, displays the data collected from a random group of high school students regarding whether they "liked" skateboards and/or "liked" snowmobiles.

	Like Skateboards	Do Not Like Skateboards	Totals
Like Snowmobiles	80	25	105
Do not like Snowmobiles	45	10	55
Totals	125	35	160

MathBits.com

- How many students participated in the survey?
- How many students said they "like" snowmobiles?
- Which of the following values is referred to as a "marginal frequency"? (1) 10 (2) 25 (3) 35 (4) 45
- How many of the students "like" snowmobiles, but "do not like" skateboards?
- How many students said they "do not like" skateboards?



2. Freshman girls and boys were surveyed to choose their favorite subject from the list of Math, English or Science. The results are shown in the two-way relative frequency table below. (rounded to nearest hundredth)

	Math	English	Science	Totals
Girls	$\frac{50}{150} = 0.33$	$\frac{40}{150} = 0.27$	$\frac{60}{150} = 0.40$	$\frac{150}{150} = 1.00$
Boys	$\frac{65}{165} = 0.39$	$\frac{30}{165} = 0.18$	$\frac{70}{165} = 0.42$	$\frac{165}{165} = 1.00$
Totals	$\frac{115}{315} = 0.37$	$\frac{70}{315} = 0.22$	$\frac{130}{315} = 0.41$	$\frac{315}{315} = 1.00$

MathBits.com

Round percentage answers to the nearest percent.

- How many girls participated in the survey?
- What percentage of the boys chose "Science"?
- This table shows relative frequencies based upon \_\_\_\_\_.  
(1) the whole table (2) the rows (3) the columns
- What percentage of the girls chose "Math"?
- What percentage of the students chose "English"?

- 3.** You are testing a theory that says that students who speak a foreign language are also strong mathematics students. You survey the freshman class and the results are shown below, in an incomplete two-way frequency table.

	Speak a Foreign Language	Do Not Speak a Foreign Language	Totals
Math Average $\geq 90$	70	15	
Math Average NOT $\geq 90$	10	50	
Totals			

MathBits.com

Round percentage answers to the nearest percent.

- How many students were surveyed?
- What percentage of the students speak a foreign language and have a math average greater than or equal to 90?
- What percentage of the students with a math average greater than or equal to 90 do not speak a foreign language?
- How many of the students do not speak a foreign language?
- Does the table appear to support the theory that students who speak a foreign language are also strong mathematics students? Explain.

- 4.** Allison collected data to see if there was a relationship between students having blue eyes and the students wearing yellow on the day of the survey. She randomly surveyed the freshman class and the results are shown below.

	Wearing Yellow	Not Wearing Yellow	Totals
Blue Eyes	10	2	12
Not Blue Eyes	30	20	50
Totals	40	22	62

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Round percentage answers to the nearest percent.

You will need to prepare row conditional relative frequencies for this table.

- What are the row conditional relative (joint) frequencies, from left to right, for the category “Blue Eyes”?
- What percentage of “Not Blue Eyes” students were “Not Wearing Yellow”?
- Is there a sufficient difference in the row conditional relative frequencies to statistically imply an “association” between Blue Eyes and Wearing Yellow? Explain.



5. The test results of 66 students were compared with whether the students completed a review sheet provided by their teacher prior to taking the test. A row conditional relative frequency table was prepared. (*rounded to nearest hundredth*)

	Passed Test	Failed Test	Totals
Completed Review Sheet	$\frac{50}{51} = 0.98$	$\frac{1}{51} = 0.02$	$\frac{51}{51} = 1.00$
Did not complete review sheet	$\frac{5}{15} = 0.33$	$\frac{10}{15} = 0.67$	$\frac{15}{15} = 1.00$
<b>Totals</b>	$\frac{55}{66} = 0.83$	$\frac{11}{66} = 0.17$	$\frac{66}{66} = 1.00$

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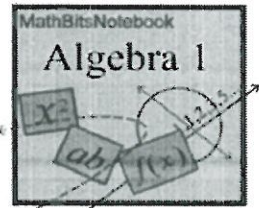
- a) Explain whether the table indicates a statistical association between completing the review sheet and passing the test.

- b) If an association between completing the review sheet and passing the test exists, would it imply that completing a review sheet will improve test scores for ALL students everywhere? Explain.

# Fitting Functions

Name \_\_\_\_\_

Directions: Plot the data. Examine the scatter plot. Write the equation of the regression model that best fits the shape of the scatter plot. Choose from linear regressions, exponential regressions, or quadratic regressions. Round to nearest hundredths.



1. Participants are being eliminated every 10 minutes from a gaming competition. The data is shown in the chart at the right.

- a) Which type of regression model will be the best fit for this data?
- b) Write the equation of your regression model.

Time (minutes)	People Left Playing
10	48
20	24
30	13
40	6
50	3
60	1

2. Kevin is biking to visit his friend who lives in a nearby town. The data is shown in the chart at the right.

- a) Which type of regression model will be the best fit for this data?
- b) Write the equation of your regression model.

Hours of Travel	Miles from Home
1	2
2	4
3	6
4	8
5	10
6	12

3. Two data sets are being compared. The data is shown in the chart at the right.

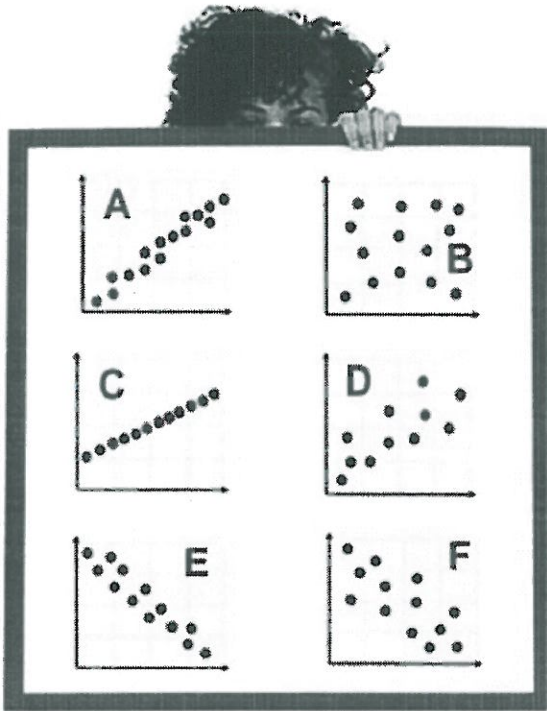
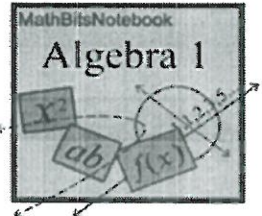
- a) Which type of regression model will be the best fit for this data?
- b) Write the equation of your regression model.

Data A	Data B
1	11
2	6
3	3
4	2
5	3
6	6
7	11

# Practice with Correlations

Name \_\_\_\_\_

Directions: Questions pertain to correlations and correlation coefficients.



Choose the letter of the scatter plot which could possibly have the given  $r$ -value:

1.  $r = 0.50$
2.  $r = 0$
3.  $r = -0.85$
4.  $r = 0.92$
5.  $r = 1$
6.  $r = -0.48$

7. What does it mean to say that data has a strong negative correlation?

- a) There is no relationship at all between the variables.
- b) More than half of the variables have a negative value.
- c) There is a negative cause and effect relationship.
- d) A linear model with a negative slope is appropriate.

8. Which of the following correlation coefficients represents the strongest linear relationship?

- a) 0.79      b) 0.36      c) -0.12      d) -0.87

9. The relationship between the number of widgets in a package and the length of the package, in inches, is given in the table at the right. The linear correlation coefficient for this relationship is:

a) 1      b) -1      c) 0.5      d) 0

Number of Widgets	Length of Package (in.)
3	9.00
4	9.25
5	9.50
6	9.75

10. Which calculator output shows the strongest linear relationship between  $x$  and  $y$ ?

a) 

LinReg
$y = ax + b$
$a = 58.135$
$b = 7.348$
$r = 0.843$

b) 

LinReg
$y = a + bx$
$a = 0.702$
$b = 24.286$
$r = 0.8145$

c) 

LinReg
$y = ax + b$
$a = 0.952$
$b = 3.45$
$r = 0.633$

d) 

LinReg
$y = ax + b$
$a = 22.567$
$b = -4.332$
$r = 0.894$

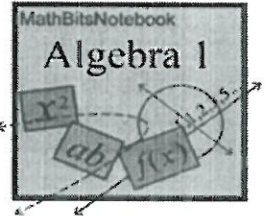
11. Which value of  $r$  represents data with a strong positive linear correlation between two variables?

a) 0.91      b) 0.42      c) 1.03      d) 0.01

12. The table at the right shows the average target training heart rates, by age, according to the American Heart Association. Which value represents the linear correlation coefficient, rounded to four decimal places, between a person's age, in years, and that person's average target training heart rate, in beats per minute (bpm)?

a) -0.6652      b) 1.3231  
c) -0.9996      d) 0.9993

Age (years)	Average Target Heart Rate (bpm)
20	135
30	129
40	122
50	115
60	108
70	102

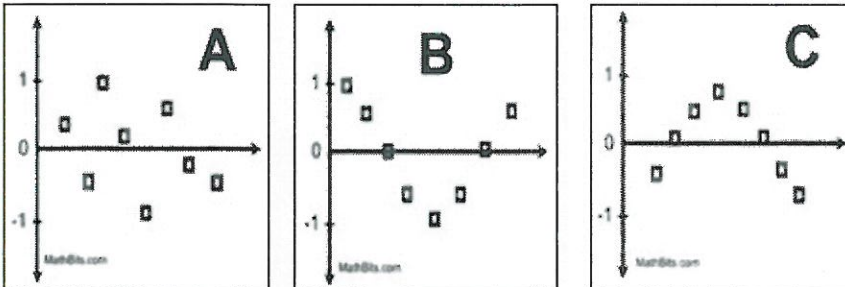


# Residuals

Name \_\_\_\_\_

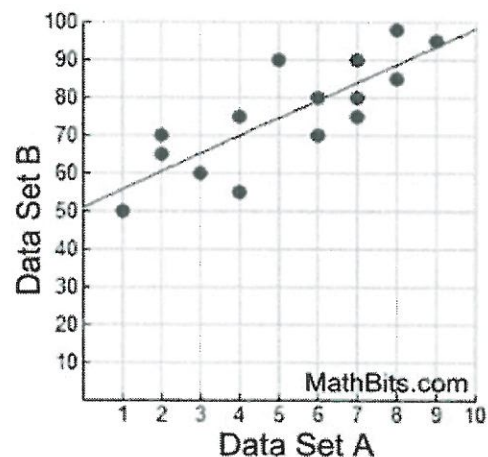
Directions: Questions pertain to residuals.

Questions #1-3 pertain to the residual plots seen below:



- Which of the residual plots indicates that a linear regression will be appropriate for the data it represents?
- Residual plot B tells you that the regression equation was a quadratic regression and that it is appropriate for the data. TRUE FALSE
- Residual plot C shows the pattern needed to ensure a good linear regression fit. TRUE FALSE

- The linear regression equation shown at the right is  $y = 4.7x + 51$ . The scatter plot at  $x = 5$  is  $(5, 90)$ . What is the residual associated with the point where  $x = 5$ ?



5. A rapidly growing bacteria has been discovered. Its growth rate is shown in the chart at the right.

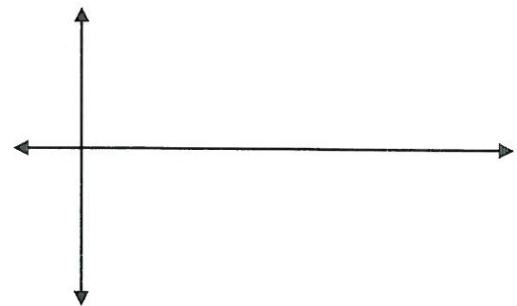
Hours since observation began	Number of bacteria in the sample
0	20
1	40
2	75
3	150
4	297
5	510

a) Write the least squares linear regression equation for this data? (Rounded to *nearest hundredths*.)

b) Find the residuals associated with this data. What is the residual associated with the data point (3,150)? (round to *nearest hundredth*)

c) Prepare a scatter plot of the residuals.

“The scatter plot of the residuals shows that a linear regression is an appropriate model for this data.” TRUE FALSE



6. A scatter plot of the residuals from a linear regression are shown at the right. The plots are (1,1.3), (2,-2.2), (3,1.6), (4,-1.1), and (5,0.4). Which statement is true about the sum of the residuals?

- 1) The sum is positive.
- 2) The sum equals zero.
- 3) The sum is negative.
- 4) The sum is unknown.

