

Name: \_\_\_\_\_

Spring 2015

A. Moore

# Math III UNIT 1: Statistics

Topic	worksheet	# assigned	#completed	Teacher's Signature
Central Tendency/ Box Plots	1-1	21		
Standard Deviation	1-2	9		
Normal Distribution	1-3	16		
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		TOTAL Assigned 94	TOTAL Completed	HOMEWORK GRADE (#done/#com x 100=)

## Unit 1 Worksheet 1-1

Date: \_\_\_\_\_ Period: \_\_\_\_\_

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1) Determine the mean, median, and mode for each data set (round to one decimal place).

a) {2, 3, 5, 5, 7, 7, 7, 8, 9, 10}

b) {8, 7, 5, 6, 3, 2, 9, 8}

c) {210, 180, 188, 162, 170}

d) {4.5, 20.7, 35.2, 28.8, 36.5, 40.5}

e) {5.3, 8.4, 5.3, 9.2, 10.6, 9.2}

f) {2150, 1860, 2340, 1990}

2) Invent a data set that matches each description.

a) Five values, mean=15, median=13, no mode.

b) Six values, mean=24, median=25, mode=28

3) Suppose you have a data set containing 1000 test scores. How many scores would you expect to find matching each description?

a) Above the median

b) Below the first quartile

c) Between the first and third quartiles

d) Above the third quartile

e) Below the third quartile

f) Above the first quartile

g) Between the median and the third quartile

4) Give the five-number summary for each data set and draw the box-and-whisker plot for each.

a) {10, 8, 6, 4, 2}

b) {0, 30, 45, 50, 75, 80, 95}

c) {8, 6, 8, 2, 9, 4, 4, 3, 1}

d) {32, 55, 16, 70, 65, 55, 40, 49}

e) {19.3, 32.4, 20.5, 18.0, 26.6, 21.4, 16.7, 33.9}

f) {0.52, 3.91, 4.67, 2.20, 8.15, 5.91, 7.94, 1.11, 6.55, 4.03}

1) For each data set, find the mean, the deviation from the mean **for each value**, and the standard deviation of the data set. (Round to one decimal place.)

a) {12.4, 26.3, 9.8, 33.9, 7.6}

b) {235, 413, 505, 111, 700, 626, 357}

c) {0.5, 2.6, 1.8, 4.7, 0.9}

2) For each data set, calculate the mean and standard deviation. Include appropriate units in your answers.

a) The heights, in inches, of eight children are 32, 45, 39, 51, 28, 54, 37, and 42.

b) The lengths, in centimeters, of six pencils are 8.5, 19.0, 11.8, 13.2, 16.4, and 6.1.

c) The prices of seven music CDs are \$13.50, \$10.95, \$9.95, \$16.00, \$12.50, \$15.95, and \$17.75.

3) For each data set, find the median, the range, and the IQR.

a) {18, 13, 15, 24, 20}

b) {4, 9, 7, 6, 0, 11, 7}

c) {356, 211, 867, 779, 101, 543}

1. The lifetimes of 10,000 watch batteries are normally distributed. The mean lifetime is 500 days. The standard deviation is 60 days. Sketch a normal curve that represents this distribution; label the mean and standard deviation.

Estimate **how many** watch batteries will last for each of the following intervals.

a.) 440 - 560 days

b.) 380 - 620 days

c.) 320 - 680 days

d.) 410-590 days? (In addition to your answer, also write down what you have to enter into your calculator.)

2. A group of students weighs 500 US pennies. They find that the pennies have normally distributed weights with a mean of 3.1g and a standard deviation of 0.14g

a) What percentage of pennies will weigh between 2.8 and 3.3g?

b) What percentage of pennies will weigh between 2.11 and 3.5g?

c.) What percentage of pennies will weigh less than 2.96g?

d.) What percentage of pennies will weigh more than 3.4g?

3. A set of 1000 values has a normal distribution. The mean of the data is 120, and the standard deviation is 20.

a. What percent of the data is in the range 110 to 130?

b. What percent of the data is in the range 90 to 110?

c. How many values are within the limits 100 and 150?

d. How many values are greater than 140?

e. How many values are within one standard deviation from the mean?

f. Find the point below which 90% of the data lie.

4. The heights of a large group of men are normally distributed with a mean of 70in. and a standard deviation of 2.5 in. Find an interval about the mean that contains 75% of the heights.

**The weights of 1000 children were recorded on their first birthdays. The weights are normally distributed with mean 10.3 kg and standard deviation 1.6 kg.**

*(Round answers to one decimal place.)*

1. What percent of the children weigh between 8.7 kg and 11.9 kg?
  
2. What percent of the children weigh between 9.5 kg and 11.5 kg?
  
3. What percent of the children weigh between 9.2 kg and 11.3 kg?
  
4. What percent of the children weigh between 8.3 kg and 12.3 kg?
  
5. What percent of the children weigh less than 10 kg?
  
6. What percent of the children weigh more than 13 kg?
  
7. How many children weigh less than 7.9 kg?
  
8. How many children weigh more than 8.7 kg?

9. The heights of a group of 500 women are normally distributed with mean 65 inches and standard deviation 2.2 inches. Find the height for each of these z-scores. *Round your answers to one decimal place.*

a)  $z = 2$

b)  $z = 0.5$

c)  $z = -1.5$

d)  $z = 1.7$

e)  $z = -2.3$

f)  $z = -3.4$

10. For a normal distribution, give the percentage of all data values that fall within each interval.

a) Within three standard deviations of the mean

b) Between the mean and one standard deviation above the mean

c) Between the mean and two standard deviations below the mean

11. The mean commuting time for a resident of a certain metropolitan area is 38 minutes, with a standard deviation of 10 minutes. Assume that commuting times for this area are normally distributed.

a) Find the z-score for a 23-minute commute

b) Find the z-score for a 60-minute commute

c) What is the probability that a commute for a randomly chosen resident will be between 28 minutes and 58 minutes?



## 1-5

**Practice**

Form K

**Samples and Surveys**

Identify the sampling methods used in each of the following situations. Then state whether the sampling method has any bias.

1. A television station invites viewers to call in and name their favorite game show.
2. A school principal gathers an alphabetical list of all the students at her school. Then she selects every 15th student to take a survey about the cafeteria's lunch menu.
3. A reporter asks people leaving a movie theater to take a survey about their television viewing habits.
4. A psychologist uses a computer program to randomly select names from a list of students at a university. The members of the sample will take a survey about student housing at the university.
5. **Writing** A group of television producers plans to survey 10-year-olds to determine their opinions about a new cartoon. Describe a sampling method that could be used to gather a biased sample in this situation. Then describe a method to gather an unbiased sample.
6. **Multiple Choice** A school psychologist sits in a school cafeteria and takes notes on students' behavior while they eat lunch. Which of the following types of studies is the researcher conducting?  
 A controlled experiment       B observational study       C survey
7. **Open-Ended** Your classmate is randomly selecting a sample of students at his high school to take a survey. You say that your classmate's sample is biased because it only contains high-school students. In what case might you be wrong?



1. A news report states that based on a recent survey of randomly selected high school seniors, it is estimated that 30% of all seniors drink alcohol on a regular basis (margin of error  $\pm 3.5\%$ ).
  - a) Identify the population and the sample.
  - b) Identify the parameter and the statistic.
  - c) What reliability (or confidence) do you associate with this result?
  - d) Must it be true that between 26.5% and 33.5% of *all* high school seniors drink alcohol on a regular basis?
  - e) A friend asks you what this result means. Explain...without resorting to any symbols or formulas.
  
2. A public interest group is interested in people's opinions about gun control. Random samples of voting age citizens are drawn in each of 3 states: Texas, Montana and New York. Each person is asked "Do you favor tougher gun control legislation?"
  - a) In Texas, 1000 people are sampled; 402 answer YES. Give an estimate and margin of error for the percentage of all Texans who favor gun control legislation.
  - b) In Wyoming another 1000 people are sampled; 378 answer YES. Give an estimate and margin of error for the percentage of all Montanans who favor gun control legislation.
  - c) In New York 2000 people are sampled; 965 answer YES. Give an estimate and margin of error for the percentage of all New Yorkers who favor gun control legislation.
  - d) What reliability is associated with each of your results?
  - e) What are the approximate populations of Texas and Wyoming? (The answer can be found in the library or somewhere on the internet.)
  - f) Compare the results from a, b and d. Does the margin of error depend on the size of the (state) population that is sampled from?
  - g) The correct margin of error for the result in Texas is approximately  $\pm 3.2\%$ . A friend suggests that, since twice as many people are surveyed in New York, the margin of error ought to be twice

as small...that is, the New York margin of error should be  $\pm 1.6\%$ . Is your friend right?

3. A reporter for the Oswego newspaper surveys students at a local bar, asking them if they favor an earlier closing time for bars. Later the following headline is published: **Only 20% of all students favor proposal for earlier closing of bars (margin of error  $\pm 6\%$ )**. What's wrong here?