

Name Answer Key
Date _____ Period _____

Advanced Algebra
Module 1 Review

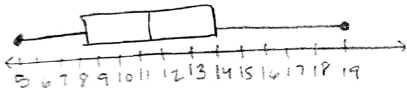
1. The data below reflects all of Mr. & Mrs. Marid-to-long's great-grandchildren.
a) Determine the mean, median, and mode of the children's ages.
b) Construct a box and whisker plot and find the IQR.
c) Lastly, find the variance and standard deviation- by hand!!

15, 12, 12, 8, 19, 11, 7, 10, 9, 13, 17, 5

a) $\bar{x} = 11.5$ median = 11.5 mode = 12

b) min = 5 Q1 = 8.5 Q2 = 11.5 Q3 = 14 max = 19

IQR = 14 - 8.5 = 5.5



c)

X	$x - \bar{x}$	$(x - \bar{x})^2$
10	-1.5	2.25
7	-4.5	20.25
8	-3.5	12.25
9	-2.5	6.25
10	-1.5	2.25
11	-.5	.25
12	.5	.25
13	1.5	2.25
15	3.5	12.25
17	5.5	30.25
19	7.5	56.25

$\sigma = \sqrt{15.42} = 3.93$

$185/12 = 15.42 \rightarrow \sigma^2$ (variance)

2. a) Use a calculator to find the mean and standard deviation of the following data.
b) Show your work to determine the outlier intervals to see if there is a true outlier.
c) Then, describe numerically what happens to the mean and standard deviation when the outlier(s) is removed.

13, 14, 65, 11, 15, 14, 14, 12, 13, 15, 14, 12

a) $\bar{x} = 17.67$ $\sigma = 14.32$

b) $17.67 - 3(14.32) = -25.29$
 $17.67 + 3(14.32) = 60.63$

$[-25.29, 60.63]$ ← Interval

65 is an outlier

- c) If 65 is removed, the \bar{x} will go down & the σ will go down.

3. The probability distribution for the number of sales for a salesman each day is given below. Find the expected number of sales for this salesman. Show your work.

$5(.5) + 7(.38) + 9(.12) =$

6.24

Daily Sales Total			
n sales	5	7	9
Probability of n sales	0.50	0.38	0.12

For #4-7, determine if the sample is biased or unbiased. Use complete sentences to explain your answer.

4. The principal of a school wants to know his students' opinion on changing the dress code. You use a computer to randomly generate 100 student numbers and poll only those students.

Unbiased, students were randomly chosen from the entire school.

5. You are interested in finding out how often the students at your school attend sporting events. You survey every 5th student to walk in the gate at the football game.

Biased, you are only asking students at the football game about sporting events.

6. The principal of a school wants to know his students' opinion on changing the dress code. He sets up a suggestion box in the front office for students to give their opinions.

Biased, only students who go to the front office & choose to participate are surveyed.

7. A state politician's office is conducting a survey to find which issues are most important to the state's citizens. The office randomly selects 100 residents of the state's cities, 100 residents of the state's rural communities, and 100 of the state's suburban communities to call and ask to participate in a telephone poll.

Unbiased - people are randomly chosen from each area.

Describe the population and sample and then solve.

8. A random survey of 145 BHS students shows that 94 become stressed during finals week. If BHS has 1237 students, about how many will be stressed out during finals week?

$\frac{94}{145} = \frac{x}{1237}$ $145x = 116278$
 $x = 801.9$
 ≈ 802

Population = 1237 students
 Sample = 145 students surveyed

9. One hundred and thirty students out of 2,110 at a local high school were surveyed about next year's Homecoming Dance. Seventy three of those surveyed claimed they would be attending the dance next year. Based on this data, how many students in the school may the school's administration predict will be attending the dance next year?

$\frac{73}{130} = \frac{x}{2110}$ $130x = 154030$
 $x \approx 1185$

Population = 2110 students
 Sample = 130 students surveyed

For #10 - 14, use complete sentences to explain whether the following should be classified as an experimental or an observational study.

10. A teacher asks her students to write down all they eat in a day and then calculate the total number of calories consumed. **Observational b/c teacher is just observing what they ate & not performing any treatment.**

11. A marine biologist visits a certain beach in Florida every year and counts the number of eggs in sea turtle nests. **Observational b/c the biologist is just counting the eggs & not performing a treatment.**

12. A researcher asks students the average number of hours of sleep they get per night and examines whether the amount of sleep affects students' grades. **Observational b/c he is just recording how much they sleep & not performing any treatment.**

13. A park employee wants to know if latex paint is more durable than non-latex paint. She paints 50 benches with latex paint and 50 with non-latex paint. **Experimental b/c the employee is performing a treatment by painting the benches.**

14. The manager of a grocery store wants to know if a product's location in the store affects how well the product sells. He first tracks how many of a certain item sells over a month when the display is located where it always has been. He then moves the display to the front of the store so customers see it when they first enter. He again tracks how many of the items sell over a month and compares the numbers.

Experimental b/c he is performing a treatment by moving the display.

The studies described in #15-18 are randomized comparative experiments. Describe the treatment, the treatment group, and the control group.

15. A researcher wants to know whether background noise affects people's abilities to complete simple cognitive tasks. She has the 20 people perform a series of tasks. Ten randomly selected subjects perform the tasks in a quiet room. The other 10 perform the tasks in a room with traffic noise outside and muffled voices coming from the room next door. She records how successful each group of subjects is in completing the assigned tasks.

Treatment = background noise
 TG = 10 students performing the task w/ noise
 CG = 10 students in a quiet room

16. A food company is testing a new recipe for a dinner entrée. The company invited 100 people to dinner to test the new recipe. Half the people are served the old recipe, and half are served the new recipe. They find that the people who were served the new recipe ate 15% more.

Treatment = new recipe for a dinner entrée
 TG = 50 people served new recipe
 CG = 50 people served old recipe

17. At Ashland Middle School, 50 randomly chosen students were given milk at lunch every day for a year, and 50 other randomly chosen students were given other beverages. At the end of the year, students in the "milk" group had 15% fewer cavities than students in the other group.

Treatment = Milk
 TG = 50 students given milk
 CG = 50 students given other beverages

18. A department store wants to increase its sales. It assembled 100 of its best credit card customers and randomly divided them into two groups of 50. One group was allowed to use a special website for ordering goods and paying bills and the other group was not. At the end of six months, the group using the special website made 40% more purchases than the control group.

Treatment = special website
 TG = 50 customers using special website
 CG = 50 customers not using special website

19. Determine the expected value of a lottery ticket that costs \$20 if the probability of not winning is .98, the probability of winning \$5,000 is .005 and the probability of winning \$100 is .015.

$-20(.98) + 5000(.005) + 100(.015) = \6.90