

Name: Answer Key Per: \_\_\_\_\_ Date: \_\_\_\_\_  
 Serafino • Algebra 2E

## 10R Statistics Unit Review

### Quest Review / Classwork

**Situation:** I'm at a store and overhear a conversation between two parents about how long it takes their teenagers to get ready in the morning. Now I'm curious: I want to know how many minutes it takes the average NJ high school student to get ready for school in the morning.

1. Define my population. What kinds of population/sample concerns/biases should I be aware of before I attempt to collect my data?

*Population:* All high school students in NJ (that's big!) That's every high school student enrolled in every high school in every town in every county in NJ, including public school, private school, boarding schools, etc.

*Sample Concerns/Biases include but are not limited to:*

*Gender:* Girls typically have more clothing/hair concerns/options and take longer to get ready.

*Age:* Underclassmen are not as independent as upperclassmen; freshmen/sophomores may have a stricter, more efficient morning schedule controlled by a parent/guardian.

*Family situation/Income Level:* Students in lower-income families may not have as many clothes, accessories, hair products; They may not have their own bedrooms or bathrooms in which they have the luxury of taking their time; Students whose parents work are responsible for caring for younger siblings; Some students need to get to school in time for breakfast or they don't eat.

*School System:* Some schools have uniforms (or strict/religious dress codes). Some schools have rotating schedules, giving students a different morning schedule (and different answers to the question at hand) on different days; Some schools strictly discipline students for being late, some don't; Some towns offer school buses, some don't; Some towns are larger, and would take students a longer time to walk; Some boarding schools have students that live on campus.

*Interpretation of the question:* What students define as "get ready" could vary, skewing results. Some may report how long it takes to simply wash up/get dressed/do their hair. Some may include breakfast. Some may consider "getting ready" the time from getting out of bed to getting in the car. Some may consider their "8-alarm snoozes" part of the process.

*Self-reporting bias:* Some students may inaccurately report their answers, either because they are mistaken or they lie because they're embarrassed by how long it takes them.

*Time of Week/Year:* Survey given on a Monday in winter (it's dark out, students have more layers, and may be moving more slowly) or during Finals (students have more studying to worry about, and come in to take a test and go back home?)

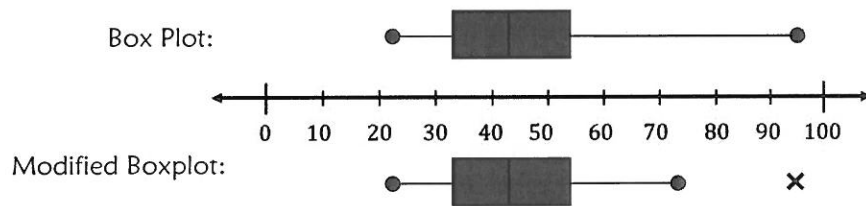
2. I decide limit my population to RHS students, and decide to give the students a survey (because observation, experiment and simulation are all super impractical and super weird). Come up with an example of each type of sampling method for me to collect my data:

- a. Voluntary response: Put a sign up in the hallway, asking students to come by and respond.
- b. Systematic: Print out the master student list and ask every 100<sup>th</sup> student.
- c. Stratified: Separate students into groups of males/females or freshmen/sophomores/juniors/seniors or by distance from HS and then ask random students from each.
- d. Cluster: Randomly select classrooms in session in the building and ask every student in each of those.
- e. Convenience: Ask the students in my classes only.

3. A fair and unbiased method of sampling is established. Twenty random students are asked to time themselves on a normal-scheduled Wednesday from, "When they step out to bed to when they leave the house". Here are the responses: 23 25 26 27 32 35 35 35 35 38 46 48 49 52 53 54 64 73 74 96

- a. Mean = 46                      Median = 42                      Mode = 35                      Range = 73  
       5#-Summary = 23, 33.5, 42, 53.5 73                      IQR = 20                      St. Dev = 18.67 (or 19.16)
- b. Find the limits for and identify any outliers:      Limits =  $x < 3.5$  or  $x > 83.5$                       Outliers = 96

- c. Make a box-and-whisker of the original data using the number line. Then make a modified boxplot below the number line, if applicable.



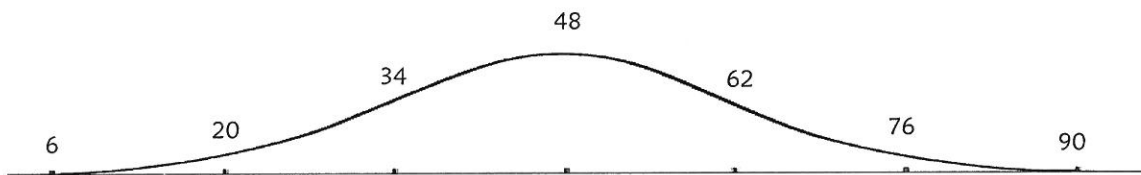
- d. What percent of students take between 30 and 60 minutes to get ready in the morning?  $12/20 = 60\%$

What is the margin of error?  $\pm 1/\sqrt{20}, \approx 22.36\%$

What does that mean about the population as a whole? It means that between 37.64% and 82.36% of all RHS students probably take between half an hour and an hour to get ready in the morning.

4. I decide to decide to give more surveys and have my teachers collect even more data. Now I've collected 500 pieces of data that are distributed normally with a mean of 48 and the standard deviation is 14.

- a. Draw the normal distribution, labeling 3 standard deviations to the left and right.



- b. What percent of students take...

34 minutes or less to get ready? 16%

76 minutes or more to get ready? 2.5%

1 hour or less to get ready? 80.5%  
 $z(60) \approx 0.857$

Between 30 and 60 minutes to get ready? 70.65%  
 $z(30) \approx -1.29, \approx .0985$

- c. What is the z-score of someone who takes 15 minutes to get ready? What percentile is that person in?  
 $z(15) = -2.357$ ; The  $\approx 0.92$ th percentile

Someone with a z-score of +2.86 takes how long to get ready? What percentile is that person in?  
88.04 minutes; The  $\approx 99.79$ th percentile

5. Who eats breakfast? 595 students in an urban school were surveyed about who eats breakfast:

	Male	Female	Total
Eat Breakfast Regularly	190	110	300
Doesn't Eat Breakfast Regularly	130	165	295
Total	320	275	595

If we selected a student at random from the survey, what is the probability that the student is:

- a. Female?  $275/595 \approx 46.29\%$
- b. Female who doesn't eat breakfast regularly?  $165/595 \approx 27.73\%$
- c. Doesn't eat breakfast regularly, given they are female?  $165/275 \approx 60\%$
- d. Female, given they don't breakfast regularly?  $165/295 \approx 55.93\%$