



**Cedar Grove High School
Mathematics Department**

Summer Skills Packet

Statistics

This packet is to be handed in on the first day of school. A diagnostic assessment of this material will take place within the first week of the new school year.

Topics you are expected to know Day 1 of the upcoming school year. You may need to research terms and review algebraic concepts to complete this assignment.

- **Descriptive Statistics:** Mean, median, mode, variance, standard deviation, range, quartile 1, quartile 3, minimum, and maximum.
- **Statistical Displays:** Box-and-whisker plot, bar graph, histogram, circle (pie) graph, and stem-and-leaf plot
- **Elementary Probability and Logic**

Part One

Define each of the following terms. I encourage you to rephrase the definition in your terms in order to challenge your learning.

1. Categorical variables

a. Example:

2. Quantitative variables

a. Example:

3. Discrete variables

4. Continuous variables

5. Population

a. Example

6. Sample

a. Example

7. Median

8. Mean

a. Formula

9. Outlier

10. Parameter

11. Statistic

12. Range

13. Z-score

14. Variance

a. Formula

15. Standard Deviation

a. Formula

16. Symmetry

a. Example

17. Dot plots

18. Bar chart

19. Histogram

20. Difference between bar graph and histogram

21. Stemplots

22. Boxplots

23. Quartiles

24. Interquartile range

Part Two

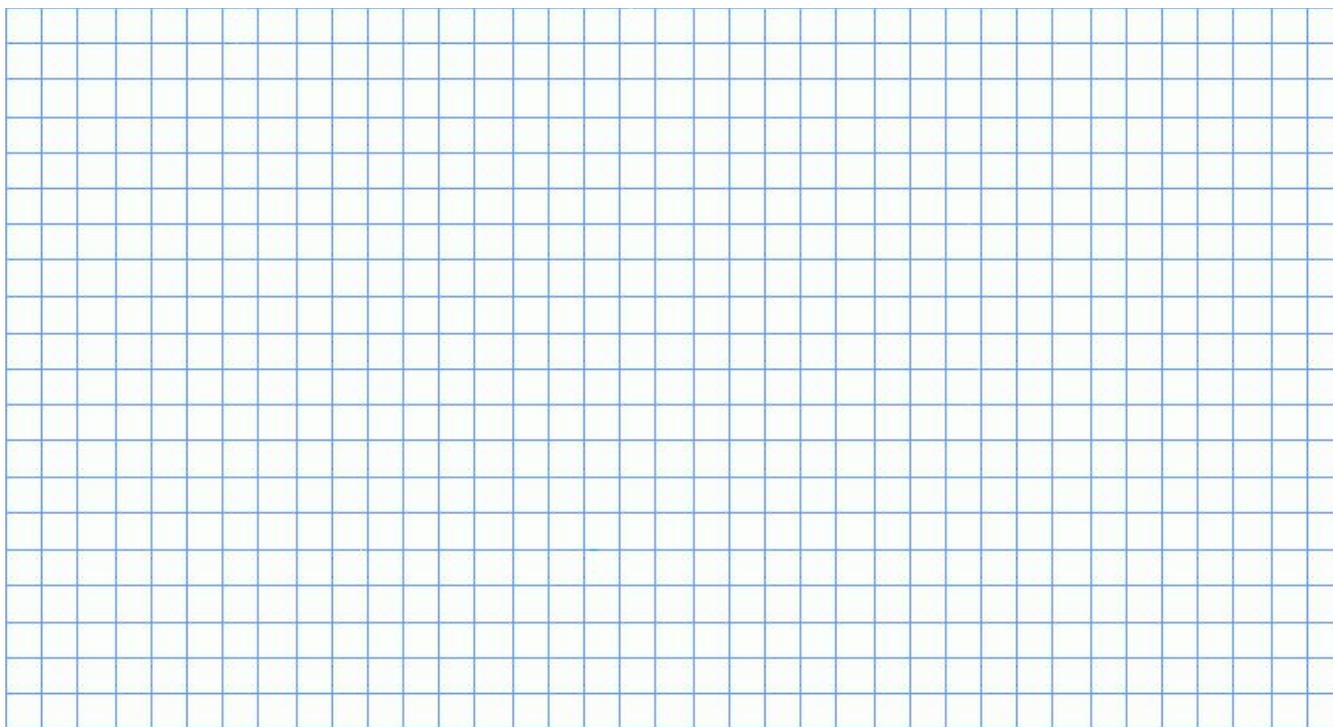
1. Categorical or Quantitative: Determine if the variables listed below are quantitative or categorical (qualitative).

- a. Time it takes to get to school
- b. Number of people under 18 living in a household
- c. Hair color
- d. Temperature of a cup of coffee
- e. Teacher salaries
- f. Gender
- g. Smoking
- h. Height
- i. Amount of oil spilled
- j. Age of Oscar winners
- k. Type of depression medication
- l. Jellybean flavors
- m. Country of origin
- n. Type of meat
- o. Number of shoes owned

2. Accidental Deaths

- a. In 1997, there were 92,353 deaths from accidents in the United States. There were 42,340 deaths from motor vehicle accidents, 11,858 from falls, 10,163 from poisoning, 4051 from drowning, and 3601 from fires. The rest were listed as “other” causes.
 - i. Find the percent of accidental deaths from each of these causes, rounded to the nearest percent.
 - ii. What percent of accidental deaths were from “others causes”?

iii. Neatly create a well-labeled bar graph of the distribution of causes of accidental deaths. Be sure to indicate an “other causes” bar.



iv. A pie chart is another graphical display used to show all categories in a categorical variable relative to each other. Create a pie chart for the accidental death percentages. You may try using a software or internet source to make one and paste in the space below.

3. Shopping Spree

a. A marketing consultant observed 50 consecutive shoppers at a supermarket. One variable of interest was how much each shopper spent in the store. Here is the data (rounded to the nearest dollar), arranged in increasing order.

| | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|
| 3 | 9 | 9 | 11 | 13 | 14 | 15 | 16 | 17 | 17 |
| 18 | 18 | 19 | 20 | 20 | 20 | 21 | 22 | 23 | 24 |
| 25 | 25 | 26 | 26 | 28 | 28 | 28 | 28 | 32 | 35 |
| 36 | 39 | 39 | 41 | 43 | 44 | 45 | 45 | 47 | 49 |
| 50 | 53 | 55 | 59 | 61 | 70 | 83 | 86 | 86 | 93 |

b. Make a stemplot using tens of dollars as the stem and dollars as the leaves. Make sure you include appropriate labels.

4. Where do older folks live?

a. This table gives the percentage of residents ages 65 or older in each of the 50 states.

| State | Percent | State | Percent | State | Percent |
|-------------|---------|----------------|---------|----------------|---------|
| Alabama | 13.1 | Louisiana | 11.5 | Ohio | 13.4 |
| Alaska | 5.5 | Maine | 14.1 | Oklahoma | 13.4 |
| Arizona | 13.2 | Maryland | 11.5 | Oregon | 13.2 |
| Arkansas | 14.3 | Massachusetts | 14.0 | Pennsylvania | 15.9 |
| California | 11.1 | Michigan | 12.5 | Rhode Island | 15.6 |
| Colorado | 10.1 | Minnesota | 12.3 | South Carolina | 12.2 |
| Connecticut | 14.3 | Mississippi | 12.2 | South Dakota | 14.3 |
| Delaware | 13.0 | Missouri | 13.7 | Tennessee | 12.5 |
| Florida | 18.3 | Montana | 13.3 | Texas | 10.1 |
| Georgia | 9.9 | Nebraska | 13.8 | Utah | 8.8 |
| Hawaii | 13.3 | Nevada | 11.5 | Vermont | 12.3 |
| Idaho | 11.3 | New Hampshire | 12.0 | Virginia | 11.3 |
| Illinois | 12.4 | New Jersey | 13.6 | Washington | 11.5 |
| Indiana | 12.5 | New Mexico | 11.4 | West Virginia | 15.2 |
| Iowa | 15.1 | New York | 13.3 | Wisconsin | 13.2 |
| Kansas | 13.5 | North Carolina | 12.5 | Wyoming | 11.5 |
| Kentucky | 12.5 | North Dakota | 14.4 | | |

b. Histograms are a way to display groups of quantitative data into bins or groups (the bars). These bins have the same width and scale and are touching because the number line is continuous. To make a histogram you must first decide on an appropriate bin width and count how many observations are in each bin. These bins for percentage of residents aged 54 or older have been started below for you.

c. Finish the chart of bin widths and then create a histogram using those bins on the grid below. Be sure to include appropriate labels.

| Bin Width | Frequency |
|-----------|-----------|
| 4 to <6 | 1 |
| 6 to <8 | |
| 8 to <10 | |
| | |
| | |
| | |
| | |
| | |

Part Three

1. Here is a formula that is used often in Statistics: $z = \frac{x - \bar{x}}{s}$. Use your algebra skills...

a. If $z=2.5$, $x = 102$, and $\bar{x} = 100$, what is s ? Show your work.

b. if $z = -3.35$, $x = 60$, and $s = 4$, what is \bar{x} ? Show your work.

2. The USDA reported that in 1990 each person in the United States consumed an average of 133 pounds of natural sweeteners. They also claim this amount has decreased by about 0.6 pounds each year.

a. If 1990 could be considered “year 0”, which of the above numbers represents the slope and which represents the y-intercept?

b. What is the equation of the line of best fit using the slope and y-intercept above?

c. Predict the average consumption of sweeteners per person for the year 2005.

3. The following equation can be used to predict the average height of boys anywhere between birth and 15 years old: $y = 2.79x + 25.64$, where x is the age (in years) and y is the height (in inches).

a. What does the slope represent in this problem? Interpret it in the context of this problem/situation.

b. What does the y-intercept represent in this problem? Interpret it in context.

4. Hilary wonders if people of similar heights tend to date each other. She measures herself, her dormitory roommate, and the women in the adjoining rooms; then she measures the next man each woman dates. Here are the data (heights in inches):

| | | | | | | |
|-------|----|----|----|----|----|----|
| Women | 66 | 64 | 66 | 65 | 70 | 65 |
| Men | 72 | 68 | 70 | 68 | 74 | 69 |

a. Construct a scatterplot of the data.



b. Describe the association between the heights of the women and the men they date.

5. A special lottery is to be held to select the student who will live in the only deluxe room in a dormitory. There are 100 seniors, 150 juniors, and 200 sophomores who applied. Each senior's name is placed in the lottery 3 times; each junior's name, 2 times; each sophomore's name, 1 time. What is the probability that a senior's name will be chosen?

- a. $1/8$
- b. $2/9$
- c. $2/7$
- d. $3/8$
- e. $1/2$

6. If a coin is tossed twice, what is the probability that on the first toss the coin lands heads and on the second toss the coin lands tails? (Hint: What are the possible outcomes when you toss a coin twice?)

- a. $1/6$
- b. $1/3$
- c. $1/4$
- d. $1/2$
- e. 1

7. If a coin is tossed twice, what is the probability that it will land either heads both times or tails both times?

- a. $1/8$
- b. $1/6$
- c. $1/4$
- d. $1/2$
- e. 1