

## AVERAGES (MEAN, MEDIAN, AND MODE) INSTRUCTION SHEET

### A. Finding the Mean

The mean of a set of values is the sum of the values divided by the number of values. It is also called the average.

**Example:** Find the mean of 19, 13, 15, 25, and 18

$$\frac{19 + 13 + 15 + 25 + 18}{5} = \frac{90}{5} = 18$$

When the mean is known and you must find a missing value, some simple rules of algebra must be applied.

**Example:** Cory has received the following grades this term: 75, 87, 90, 88, 79. If he wishes to earn an 85 average, what must he score on his final test?

Set up the problem like this:  $\frac{75 + 87 + 90 + 88 + 79 + s}{6} = 85$

To solve:

1. Add the known values.

$$\frac{419 + s}{6} = 85$$

2. Next, we want to try to isolate the unknown (s) on one side of the equation. To do this we must use inverse operations to eliminate the numbers on the side of the equation with the unknown (this means we do the opposite of what is being done).

Start with the 6. Since we are dividing the expression  $419 + s$  by the 6, we must now multiply it by 6. **NOTE:** Whatever you do to one side of the equation, you must do to the other side of the equation as well. Therefore, I will multiply the 85 by 6 too.

$$6 \times \frac{419 + s}{6} = 85 \times 6$$

I can cancel the 6s on the left side of the equation. This leaves you with the equation:

$$419 + s = 510$$

Now we must eliminate the 419 from the side of the equation with the unknown. Since we are adding 419 to s, we will subtract it from both sides of the equation.

$$\begin{array}{r} 419 + s = 510 - 419 \\ - 419 \\ \hline 0 \end{array}$$

This leaves us with:  $s = 91$

Answer: The student will need to score a 91 on his last test to earn an average of 85 for the term.

## Summer Warm-Up Work

**B. Finding the Median**

The median refers to the midpoint in a series of numbers.

To find the median, arrange the numbers in order from smallest to largest. If there is an odd number of values, the middle value is the median. If there is an even number of values, the average of the two middle values is the median.

**Example #1:** Find the median of 19, 29, 36, 15, and 20

In order: 15, 19, 20, 29, 36 since there are 5 values (odd number), 20 is the median (middle number)

**Example #2:** Find the median of 67, 28, 92, 37, 81, 75

In order: 28, 37, 67, 75, 81, 92 since there are 6 values (even number), we must average those two middle numbers to get the median value

$$\text{Average: } \frac{67 + 75}{2} = \frac{142}{2} = 71 \text{ is the median value}$$

**C. Finding the Mode**

The mode of a set of values is the value that occurs most often. A set of values may have more than one mode or no mode.

**Example #1:** Find the mode of 15, 21, 26, 25, 21, 23, 28, 21

The mode is 21 since it occurs three times and the other values occur only once.

**Example #2:** Find the mode of 12, 15, 18, 26, 15, 9, 12, 27

The modes are 12 and 15 since both occur twice.

**Example #3:** Find the mode of 4, 8, 15, 21, 23

There is no mode since all the values occur the same number of times.

Practice Problems:

1. Fourteen different second-year medical students at Bellevue Hospital measured the blood pressure of the same person. The systolic readings are listed below (in mmHg). Find the mode for the data.

138, 130, 135, 140, 120, 125, 120, 130, 130, 144, 143, 140, 130, 150

2. A dietician obtains the amounts of sugar (in centigrams) from 100 centigrams (or 1 gram) in each of ten different cereals, including Cheerios, Corn Flakes, Fruit Loops and 7 others. Those values are listed below. Find the mean for the data.

3, 24, 30, 47, 43, 7, 47, 13, 44, 39

3. Listed below are intervals (in minutes) between eruptions of the Old Faithful geyser in Yellowstone National Park. Find the median for the data.

98, 92, 95, 87, 96, 90, 65, 92, 95, 93, 98, 94

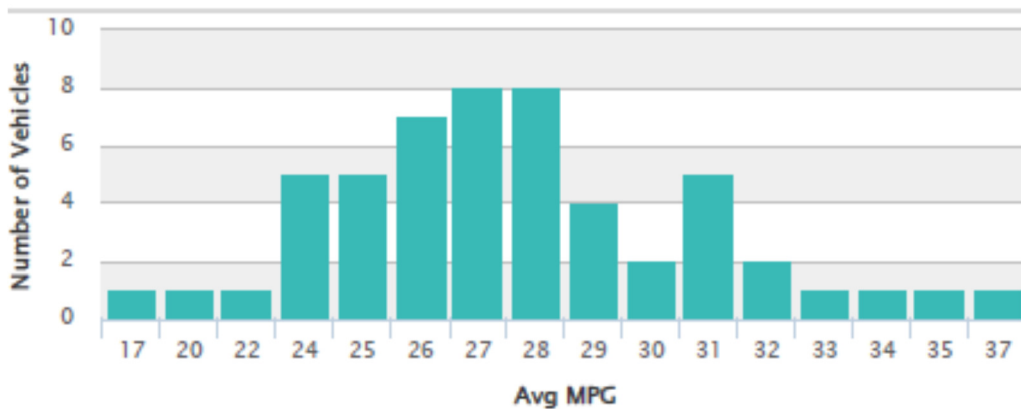
4. An AP Statistics student has the following grades on completed assignments. Each grade has an equal weight. Which measure gives the student the “Best” rating, and which measure gives the student the “worst” rating? (Mean, Median, or Mode) Which would you use?

45, 75, 80, 80, 95, 97, 100

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

Summer Warm-Up Work

<http://www.fuelly.com/car>



Go to the fuelly.com website and look up three vehicles you would be interested in driving. Complete the following chart. The first example is from the above model and is done for you. Use the lowest mileage rating, middle and highest in the denominators of the example formulas. You can either use \$2.30 per gallon as the average price of gas, or the current pump price, just make sure you use the same number for comparison in ALL VEHICLES you select.

Car Make/Model	Lowest Fuel Cost per 1000 miles	Middle Fuel Cost per 1000 miles	Highest Fuel Cost per 1000 miles
Acura CSX	$\frac{1000 \times 2.30}{17} = 135.29$	$\frac{1000 \times 2.30}{28} = 84.14$	$\frac{1000 \times 2.30}{37} = 62.16$
Make/Model #1			
Make Model #2			
Make Model #3			

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

AP Statistics

Summer Warm-Up Work

1. Which car, from the ones you selected, would be the cheapest to drive based on the lowest fuel cost? The Middle Cost? Or the Highest Cost?
  
  
  
  
  
  
  
  
  
  
2. Out of the three Fuel Cost calculations which would you reasonably expect to be YOUR actual cost of driving one of the vehicles?
  
  
  
  
  
  
  
  
  
  
3. From the three vehicles you selected, which would you prefer to drive? And does the cost of driving influence your decision?
  
  
  
  
  
  
  
  
  
  
4. Why do you think there is such a variation in fuel economies reported on the same vehicles?
  
  
  
  
  
  
  
  
  
  
5. Since this is a **voluntary survey** of vehicles, meaning drivers are choosing to self-report their gas mileage; do you think the data is accurate? Why or Why not?