

What Size is Your Family?

Grade level: 4th – 6th

Standards: Math: A 6, Science: A 11, B2, B5

Concept: Given a set of numerical data, student should be able accurately analyze the data for mean, median, mode, and range.

Material: Counters, chips, or post-it pads
How Many in Your Family? By Sherry Bailey, Texas Instrument web site.
Mathematics for Elementary Teachers, A Conceptual Approach, by Albert B. Bennett, Jr. and L. Ted Nelson.

MATH COMPONENT:

Statistical terms: range, mean, mode, and median.
Graphs

SCIENCE COMPONENT:

Observation
Collect and Interpret data

Gear Up:

Ask students what the word statistics means and their chart answers. Inform students that the word *statistics* means the science of collecting and interpreting data. Today we are going to do a fun activity and learn some very useful statistical terms: **range, median, mode, and mean**. Then we can apply the knowledge and skills we learned to understand other events.

Before starting this activity, first tell students that immediate family here defines as mother, father, brothers and sisters. Extended family members will be cousins, nephews and nieces, uncles, aunts and grandparents.

Explore:

- Ask the students how many immediate family members they have. This will be defined as the size of their family. Give each student the same amount of chips, rocks, or counters as their family size. If a student has three people in his/her family, then he/she will get three counters, five people then 5 counters, etc.
- Have the students line up and arrange themselves in order as to the size of their family. The smallest size family at one and the largest size family at the other end.
- **RANGE:** Inquire what the smallest family size is, and what the largest family size is. The difference between the smallest number and the largest number is called the **range**.

- **MEDIAN:** Divide the line of students in half. If the number of students is an odd number, then there will be one student in the middle. That middle student's number is called the **median**. If there is an even number of students, then the number that is half way between the middle two is the **median**. For example, if the two students in the middle have 4 in one family and 5 in the other, then the median is 4.5, halfway between 4 and 5.
- **MODE:** Have students make a human bar graph. Tell the students who have the same family size to line up behind each other. The line of students that the longest is called the **mode**. Mode is the number that occurs the most.
- **MEAN:** Ask students to go back to their seat and leave their counters in one pile. Count the number of counters in the pile. Distribute the counters among the students evenly so that they all have the same number of counters. This will be the **average or mean**. If there are counters left over, discuss how we might divide them up so that each student will have the same amount of chips. One way is to imagine cutting up the leftover counters into same amount as the number of students in class, and each student get a fraction of the counter. For example: There are 20 students in the class, and 65 counters are in the pile. Each student will get 3 whole counters and 5 counters leftover. Pretend to cut each counter into 20 small pieces. Then each student will get 5 additional small pieces, each piece is $1/20$ in size, ($5/20$). Now each student will have 3 and $5/20$ counters. The number of whole counters and the number of smaller pieces, using the fraction representation, is the **mean** number people in each student's family, or the **average** family size.

Explore: Give students a set of test scores: 78, 62, 70, 84, 76, 66, 70, 74, Ask them to tell you what is the range? ($84 - 62 = 24$) (Reinforce the concept by reminding students that range is NOT the difference between the first number and the last number, but rather the smallest number and the largest number. So first thing they need to do is to rearrange these numbers from the smallest to the largest.) What is mode? (70), What is the median? [$(70 + 74)/2 = 72$], What is the mean? ($580/8 = 72.5$)

Experiment: Have students record the temperature at a certain time of the day for a period of one month and save their data. After one month, students will organize these daily temperatures from lowest to highest and find the range, mode, median, and mean of the temperature for the month.

Interpret: Have them interpret and display the data that they have collected, organized, and calculated. Charts or graphs can easily be incorporated in their presentation.

Apply/Assess:

Students will collect numerical data and accurately analyze the data for mean, median, mode and range.

- (A) Student may choose one of the followings topics, (but not limited to...)
 - a. The amount of time you and your classmates watch TV during a weekend
 - b. The height of your classmates
 - c. The weight of your classmates
 - d. The temperature at a certain time (ex. 10 A.M.) for two weeks
 - e. The shoe sizes of your classmates
 - f. The high and low tides of a two week period
- (B) Collect at least ten data points.
- (C) Accurately analyze the data for mean, mode, median, and range.
- (D) Graph the data.

Scoring Guide: Assessment Rubric

Outstanding	3 points	Student collected at least ten data points to analyze. All data was put into a neat table format. All statistical analysis was mathematically correct. Data was graphed appropriately and neatly.
Competent	2 points	Student collected less than 10 data points. There are minor mistakes in calculation. Work is done completely, but not neatly.
Fair	1 points	Student showed effort in collecting the data. Some of the calculations are inaccurate. Work is not fully completed and neatly done. No graph
Poor	0 points	Student did little or none of the assignment.

Reference:

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