

## Title: Traveling Through Line Plots

### **Brief Overview:**

The students will use their knowledge of graphs and central tendencies to explore and extend their understanding of line plots, range, median, mode, and mean. In order to help their local shoe factory, they will generate a graph of shoe sizes and decide what the most popular size is using the appropriate central tendency of 9 and 10 year olds.

### **NCTM Content Standard/National Science Education Standard:**

Data and Analysis  
Measurement

### **Grade/Level:**

4<sup>th</sup> and 5<sup>th</sup> grades

### **Duration/Length:**

Three 60-minute lessons

### **Student Outcomes:**

Students will:

- Interpret and analyze data in a line plot
- Compose and create a line plot using data collected in class
- Apply knowledge of range, median, mode, and mean in order to analyze the data present in the line plot

### **Materials and Resources:**

Chart Paper  
Math Journals  
Highlighters  
Markers  
Ruler/Meter Stick  
Student Resource Sheets  
Teacher Resource Sheets  
Scissors  
Glue

## **Development/Procedures:**

### Lesson 1

**Preassessment** – Given a bar graph (SR1) students will label the important features of the graph and their purpose.

**Launch**– Reintroduce examples of simple graphs such as bar and pictograph. Display both types of graphs on the overhead and discuss their elements (titles, labels, key, scale, axis) and purposes (display and organize specific data). See Teacher Resource 1. Show the class a line plot and allow the students to compare its elements to the other two types of graphs.

**Teacher Facilitation** – Distribute definition list to students (SR2) and an example of a line plot (SR3). Review with students and label vocabulary on the graph. Ask questions to focus the students on the parts of the graph (What is the title? What does the graph tell us? What does the number line represent? What does each “x” represent? How many people responded to this data collection? etc.) As students answer the questions they will highlight the appropriate element of the graph and label it with the vocabulary term. Students will then glue the sheets into their math journals. Survey the class to find out the class makeup. Use tally chart to record data.

**Student Application** – Students will receive an outline of a line plot (SR4). They will be responsible for imputing the classroom survey data correctly using their outline and definition sheet.

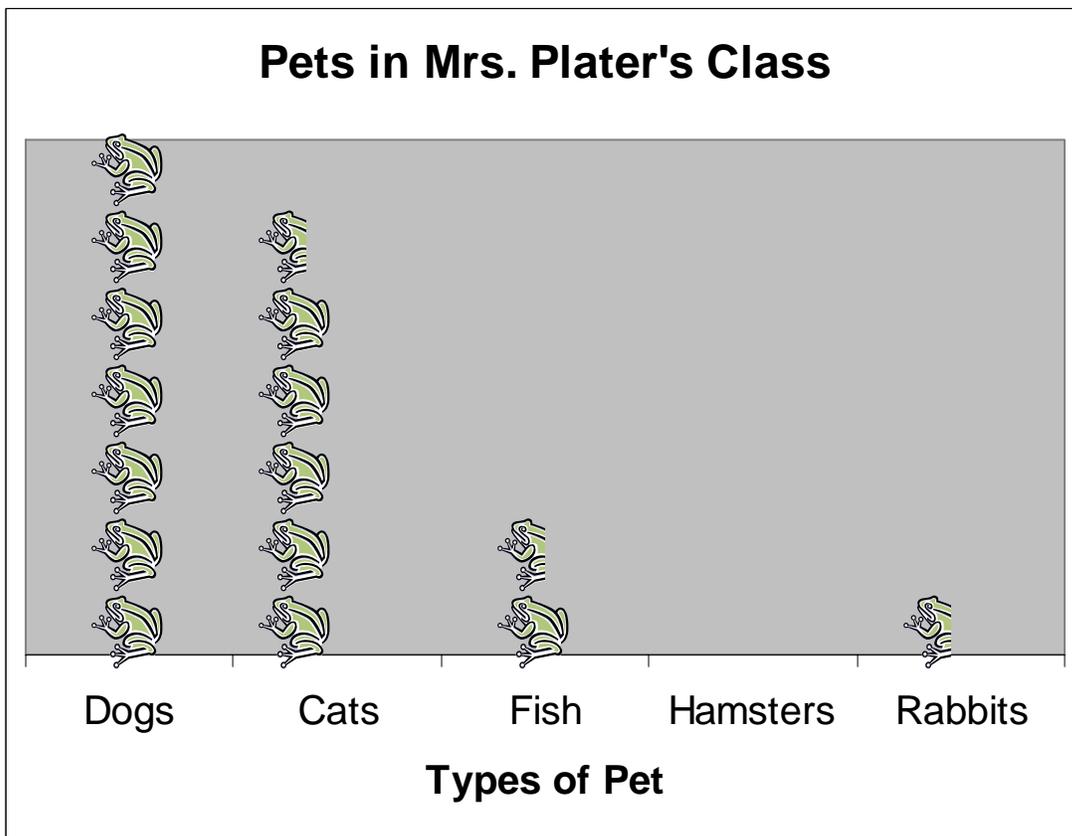
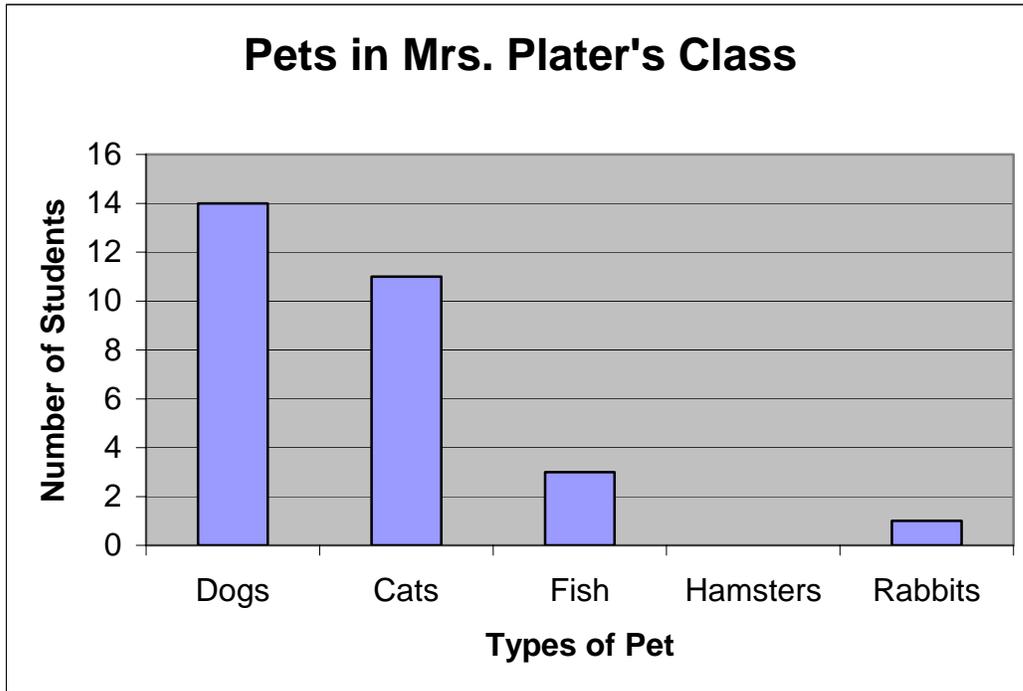
**Embedded Assessment** – After students complete the line plot they will interpret the data in their math journal. Example of criteria would be: explanation and purpose of title, label, and scale choices. Students will also explain why this was the appropriate graph choice for the given data set.

### **Reteaching/Extension** –

- Reteach- Student will be given a blank line plot (SR4) and a sheet with elements of a line plot. Student will be asked to match the appropriate elements to its place on the line plot based on the given data set (SR 5) that the student will cut apart and paste on SR 4. Students will then cut and paste the definitions onto the line plot (SR2) beside the appropriate element. **SR 3 works as the answer key**

**Extend**- Students will be given a data set (SR6) in paragraph form and will be asked to display the data on a line plot using SR4. Answers may be found on TR2.

1. paragraph form and will be asked to display the data on a line plot using SR4. Answers may be found on TR2.



**Key**

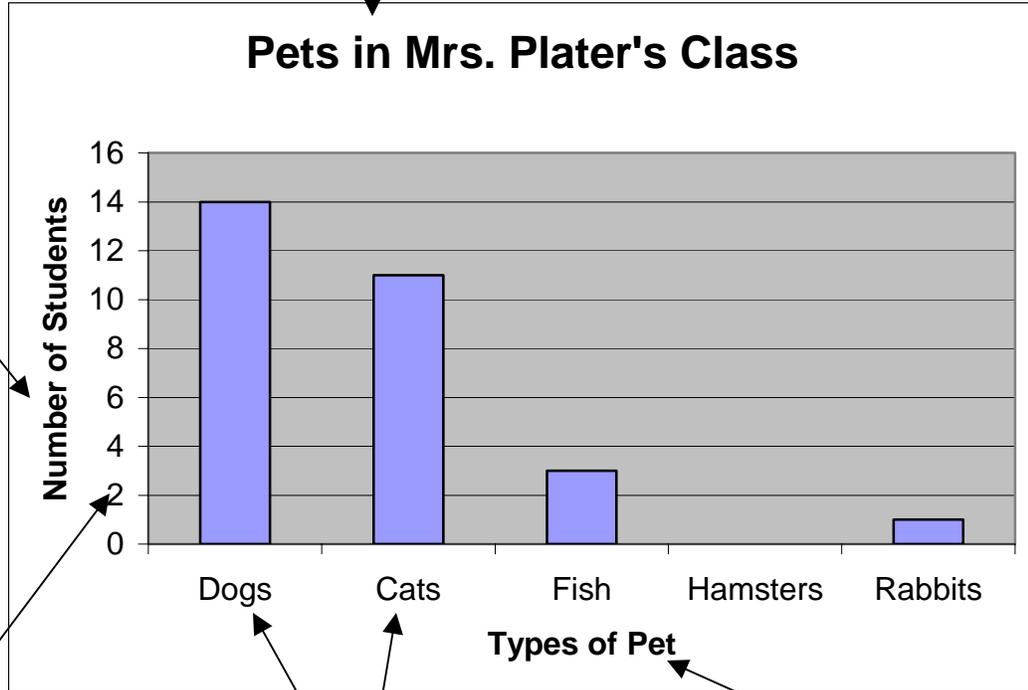


= 2  
students

TR1

Title- The purpose is to tell anyone looking at the graph what the graph is about.

This label tells what is found on the y-axis and that the units on this graph measure the number of student responses. Mention scale if students do not.



This bar shows the student response for the type of pet that they like.

These labels show the different responses children can have to the questions.

This label tells us about the type of information found on the x-axis.

# Line Plot Definitions

**Line Plot:** a graph used to show one kind of information or data that indicates the location of data along a segment of a real number line.

**Title:** a name given to the graph that briefly describes the data set

**Number line (x-axis):** shows the frequency of an event or occurrence and is ordered from least to greatest

**Label:** describes the data counts and is found below the x-axis

**Data Set:** information that is used to complete a line plot; this information can be either gathered by the student or provided by the teacher

**Cluster:** isolated groups of points

**Gap:** large spaces between points

**Outlier:** data that is substantially larger or smaller than the other values

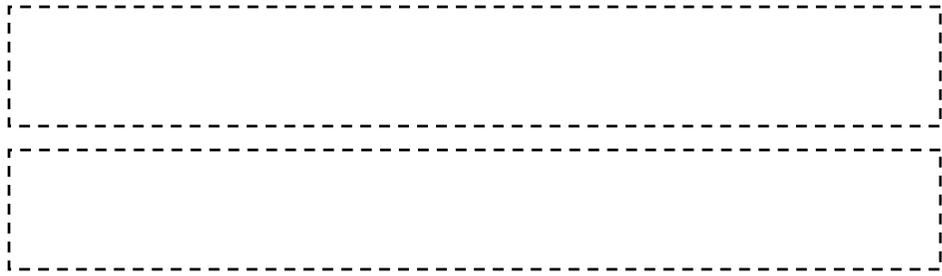
SR 3



SR 4



SR 5





Ms. Hansen's class was surveyed to find out how many people were in each

family. Her class found out that there were six students that had five people in their family.

Desiree, Jennie, Jeremy, and Shawn only have one parent in their family. Justin, Steve, and Monique



are only children. Seven people had four people in their family. Frankie and Isaiah had the biggest families with a

total of 11 people. Christine,



Dale, Carlos, and Joanna



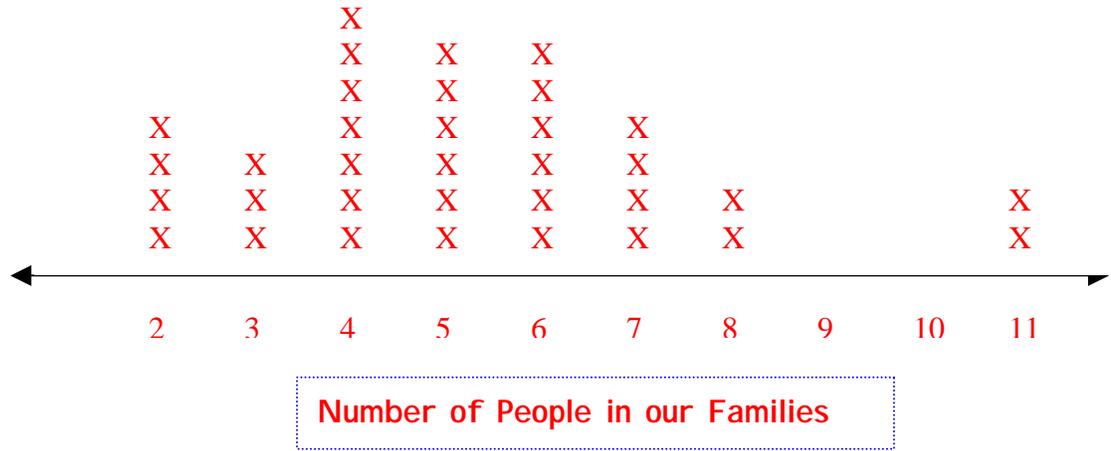
have seven people in their families. Six

students had six members in their families.

Finally, Susie and Mario have eight members in their

families.

*Ms. Hansen's Class' Family Tree*



## Lesson 2

**Preassessment-** Students will arrange a set of data (31, 22, 15, 20, 15) in order from least to greatest. Posted the data on the board. Students will discuss the terms range, median, mode, and mean and see if they can relate them to every day life. At this point students will not have the definitions.

**Launch-** Students will be given the definitions (range, median, mode, and mean) and will use the data from preassessment to solve for each.

**Teacher Facilitation** – Using the data from (SR6), explain range, median, mode, and mean, define the terms, and show how to solve for each. Give visual clues for students to use.

**Student Application-** In pairs, students will analyze the data and solve for range, median, mode, and mean using SR7.

**Embedded Assessment-** Students will solve for the mean, median, mode and range from one set of data on SR 7 and explain their results in their math journals. Examples of criteria should include: paragraph form explaining how data was analyzed and interpreted (example: Scores for the DC United Soccer team were 12, 17, 17, and 15). Students will then explain how they found the range, median, mode, and mean of that data and what that means for the stats of the team. Answers may be found on TR3.

### **Reteaching/Extension-**

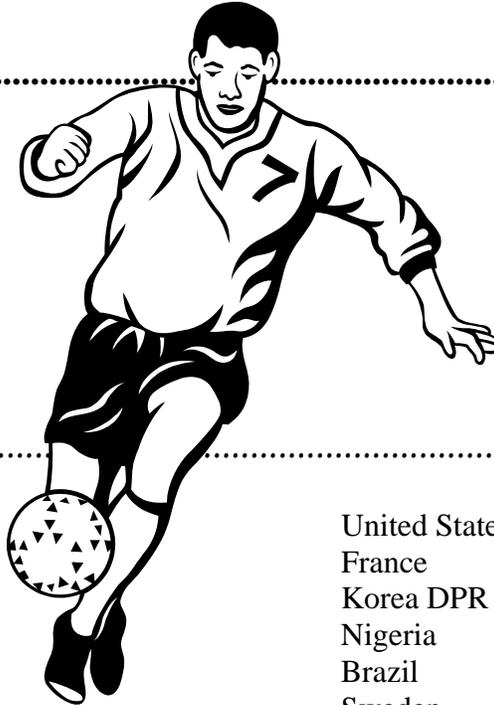
**Reteaching:** Students will review addition, subtraction, and division skills on the chalkboard. Given a set of data and answers, students will identify range, median, mode, and mean by matching the term to its correct answer (SR8). Answers may be found on TR4.

**Extension:** Students will use the information from the line plot in lesson one to find the range, median, mode, and mean.

SR7

**DC United Soccer Scores .....**

New England	15
Chicago	17
Chicago	12
Metro Stars	19
Dallas	17



*Argentina's Soccer.....*

Racing Club	28
Boca Juniors	36
San Lorenzo	26
River Plate	40
Banfield	32
Quilmes	39

United States	9
France	6
Korea DPR	3
Nigeria	0
Brazil	7
Sweden	6

**Los Angeles Soccer Scores .....**

Kansas	16
San Jose	22
Kansas	24
Colorado	15
Columbus	17

*Range, Median, Mode, and Mean Vocabulary*

**Range** – difference between high and low numbers



**Median** – the number that is the middle of data  
when the data is arranged from smallest to largest.



**Mode** – the number that appears most

**MOST**

**Mean** – found by adding all the values and dividing by  
the total number of values

**+ / ÷**



**DC United Soccer Scores** .....

New England	15	Range	7
Chicago	17	Median	17
Chicago	12	Mode	17
Metro Stars	19	Mean	16
Dallas	17		

*Argentina's Soccer*.....

Racing Club	28	Range	14
Boca Juniors	36	Mode	no mode
San Lorenzo	26	Median	32
River Plate	40	Mean	32
Banfield	32		

United States	9	Range	9
France	6	Median	6
Korea DPR	3	Mode	no mode
Nigeria	0	Mean	5
Brazil	7		

**Los Angeles Soccer Scores** .....

Kansas	24	Range	9
San Jose	22	Mode	24
Kansas	24	Median	22
Colorado	15	Mean	20
Columbus	17		

SR8

Grades for Mrs. Zoo's Classroom

Zebras	15
Lions	18
Monkeys	13
Cougars	19
Seals	15



MODE 16

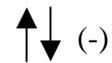
MEAN 15

MEDIAN 6

RANGE 15

### *Range, Median, Mode, and Mean Vocabulary*

**Range** – difference between high and low numbers



**Median** – the number that is the middle of data  
when the data is arranged from smallest to largest.



**Mode** – **the number that appears most**

**MOST**

*Mean* – found by adding all the values and dividing by  $+ / \div$   
the total number of values

TR4

Grades for Mrs. Zoo's Classroom

Zebra	15
Lions	18
Monkeys	13
Cougars	19
Seals	15



MODE ● → 16

MEAN ● → 15

MEDIAN ● → 6

RANGE ● → 15

**NOTE—Median and mode are the same answer. Students may draw a line to either answer and it will be correct!**

### Lesson 3

**Preassessment-** Students will review measurement by measuring different items using the inches ruler (SR9). Answers may be found on TR5.

**Launch-** HaPla's Shoes is trying to open a factory in Accokeek, MD. They are interested in the 8-10 year old market. They would like our help in determining the correct shoe size for this area. Discuss with the class what HaPla Shoes will need in order to appropriately service our community. Discussion should include: create a line plot of the specific grade levels' shoe sizes, find the mean, median, range, and mode of the sizes, write a letter to HaPla Shoes explaining our data

**Teacher Facilitation-** Go over the directions and answer any questions that the children have as a review of the concepts taught in the previous lessons.

**Student Application-** Students will measure their left foot and complete the chart with the class data in their journals that the teacher has written on the board (TR10). Students will use the measurement data to make a line plot and give the range, median, mode, and mean of the data set (SR11). Answers may be found on TR6.

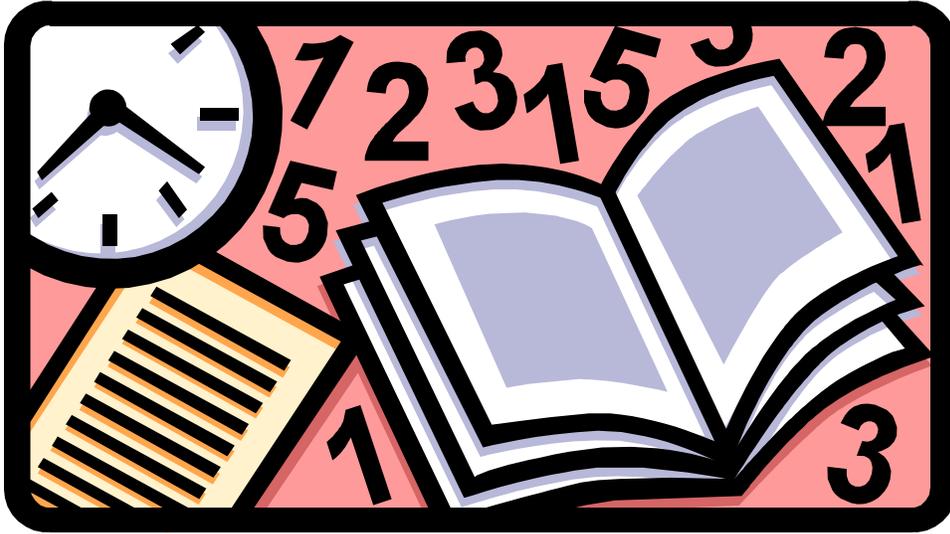
**Embedded Assessment** - Students will write a letter to HaPla Shoes in their journals explaining their data and what shoe sizes they think the company should make based on the information they found.

**Reteaching/Extension-**

**Reteach-** Work with students needing extra assistance in a small group to complete the "Student Application and Embedded Assessment" to monitor progress and offer support where needed.

**Extension-** Students will design a shoe and create a "sales pitch" and include both in their letters to HaPla Shoes.

SR 9—Directions- Use inch ruler to measure each picture. Write your answer on the line.  
REMEMBER to label your answer.



---

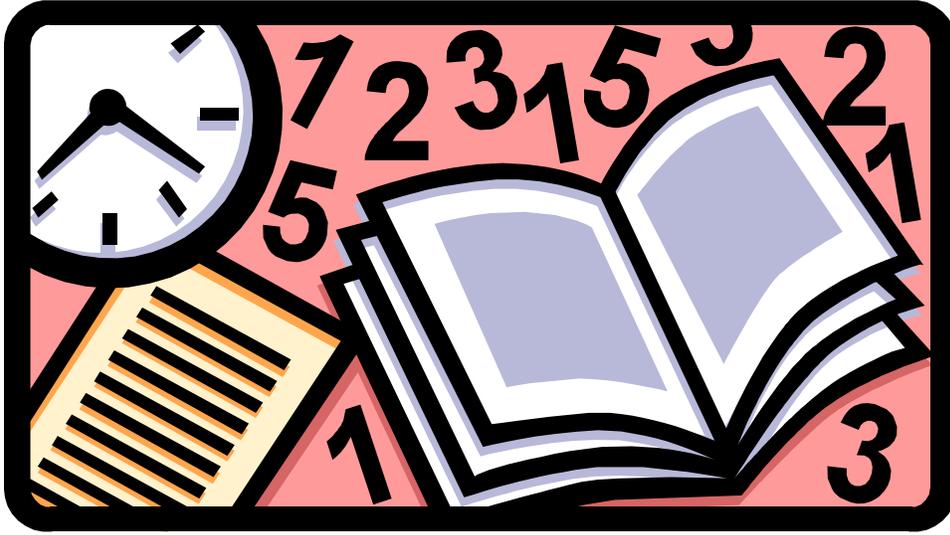


---



---

TR 5 Directions- Use inch ruler to measure each picture. Write your answer on the line.  
REMEMBER to label your answer.



---



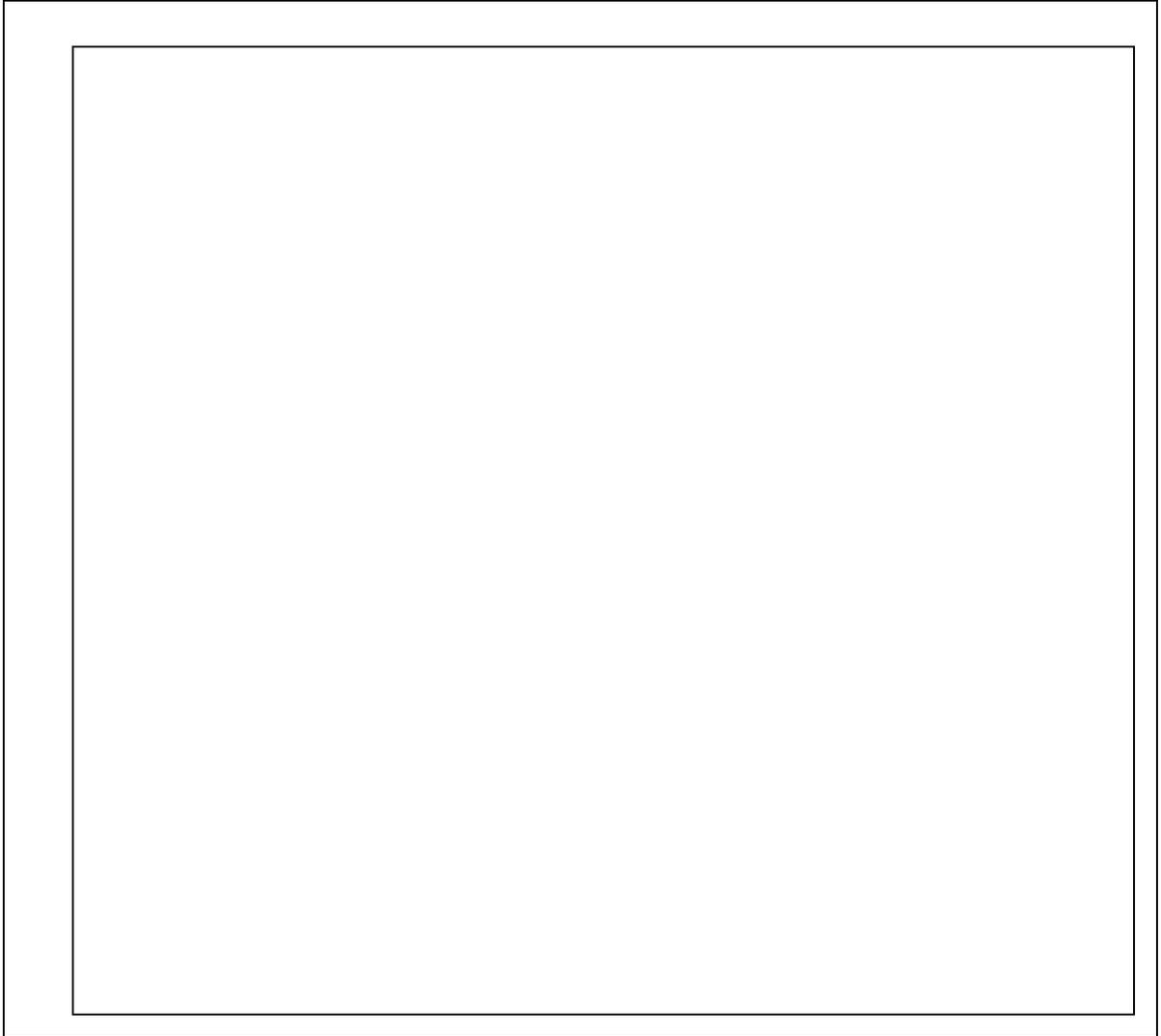
---



---

TR 10

EXAMPLE OF LEFT FOOT DATA



SR 11

Help HaPla Shoes by creating a line plot and finding the mode, median, range, and mean shoe sizes in your classroom.



Range: \_\_\_\_\_

Median: \_\_\_\_\_

Mode: \_\_\_\_\_

Mean: \_\_\_\_\_

TR6

Key Points should be present. Information on chart will vary depending on students in your class.

TITLE



LABEL

Range: \_\_\_\_\_

Median: \_\_\_\_\_

Mode: \_\_\_\_\_

Mean: \_\_\_\_\_

**Summative Assessment:**

Students will answer seven selected response questions and one brief constructed response question as an evaluation of line plots, range, median, mode and mean (Student Resource 12). See Teacher Summative Assessment for answers (TR7).

**Authors:**

Alisha Monique Plater  
Henry G. Ferguson Elementary School  
Prince George's County

Christine R. Hansen  
Manassas Park Elementary School  
Manassas Park City Schools

Student Resource 12

Summative Assessment

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

Date: \_\_\_\_\_

Line Plots/Range, Median, Mode, and Mean Quiz

Directions: Use the set of data to answer numbers 1-4. Circle the appropriate answer choice.

*Alyssa's basketball team scored the following number of points during the playoff games:*

**102, 98, 60, 110, and 50**

1. What is the team's mean score?

- A. 84
- B. 60
- C. 98
- D. 110

2. What is the range of the team's scores?

- A. 10
- B. 60
- C. 50
- D. 40

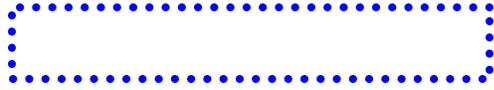
3. What is the median of the team's scores?

- B. 98
- C. 110
- D. 50
- E. 102

4. What is the mode of the team's scores?

- A. 98
- B. 84
- C. no mode
- D. 60

Directions: Use the Line Plot to answer numbers 5-7. Circle the appropriate answer choice.



5. How many students were surveyed?

- A. 11
- B. 29
- C. 30
- D. 28

6. What is the mode of the data?

- A. 9
- B. 3 and 7
- C. 11
- D. 4 and 5

7. How many students have an even number of family members?

- A. 17
- B. 29
- C. 2
- D. 5

Brief Constructed Response

Mr. Dale's class took a spelling test on Friday. Their scores were 65, 82, 95, 100, 77, 82, and 90. Find the range, median, mode, and mean of the scores.

Part A  
Question?

Range: \_\_\_\_\_

Mode: \_\_\_\_\_

Median: \_\_\_\_\_

Mean: \_\_\_\_\_

Part B

Use what you know about range, median, mode, and mean to explain why your answer is correct. Use number and/or words in your explanation.

---

---

---

---

---

**TEACHER Summative Assessment**

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

Date: \_\_\_\_\_

**Line Plots/Range, Median, Mode, and Mean Quiz**

Directions: Use the set of data to answer numbers 1-4. Circle the appropriate answer choice.

*Alyssa's basketball team scored the following number of points during the playoff games:*

**102, 98, 60, 110, and 50**

1. What is the team's mean score?

- A. 84
- B. 60
- C. 98
- D. 110

A. 84

2. What is the range of the team's scores?

- A. 10
- B. 60
- C. 50
- D. 40

B. 60

3. What is the median of the team's scores?

- A. 98
- B. 110
- C. 50
- D. 102

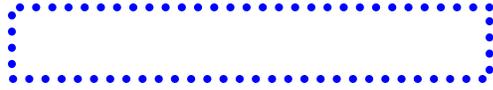
A. 98

4. What is the mode of the team's scores?

- A. 98
- B. 84
- C. no mode
- D. 60

C. no mode

Directions: Use the Line Plot to answer numbers 5-7. Circle the appropriate answer choice.



5. How many students were surveyed?

- A. 11
- B. 29
- C. 30
- D. 28

B. 29

6. What is the mode of the data?

- A. 9
- B. 3 and 7
- C. 11
- D. 4 and 5

B. 3 and 7

7. How many students have an even number of family members?

- A. 17
- B. 29
- C. 2
- D. 5

A. 17

Brief Constructed Response

Mr. Dale's class took a spelling test on Friday. Their scores were 65, 82, 95, 100, 77, 82, and 90. Find the range, median, mode, and mean of the scores.

Part A  
Question?

Range: 35

Mode: 82

Median: 82

Mean: 84

Part B

Use what you know about range, median, mode, and mean to explain why your answer is correct. Use number and/or words in your explanation.

Answers will vary.

---

---

---

---

---

**MSA Brief Constructed Response “Kid Speak”  
Mathematics Rubric  
Grades 1 through 8**

Score	
<b>2</b>	<p><b>My answer shows I completely understood the problem and how to solve it:</b></p> <ul style="list-style-type: none"><li>• <b>I used a very good, complete strategy to correctly solve the problem.</b></li><li>• <b>I used my best math vocabulary to clearly explain what I did to solve the problem. My explanation was complete, well organized and logical.</b></li><li>• <b>I applied what I know about math to correctly solve the problem.</b></li><li>• <b>I used numbers, words, symbols or pictures (or a combination of them) to show how I solved the problem.</b></li></ul>
<b>1</b>	<p><b>My answer shows I understood most of the problem and how to solve it:</b></p> <ul style="list-style-type: none"><li>• <b>I used a strategy to find a solution that was partly correct.</b></li><li>• <b>I used some math vocabulary and most of my reasons were correct to explain how I solved the problem. My explanation needed to be more complete, Well organized or logical.</b></li><li>• <b>I partly applied what I know about math to solve the problem.</b></li><li>• <b>I tried to use numbers, words, symbols or pictures (or a combination of them) to show how I got my answer, but these may not have been completely correct.</b></li></ul>
<b>0</b>	<p><b>My answer shows I didn't understand the problem and how to solve it:</b></p> <ul style="list-style-type: none"><li>• <b>I wasn't able to use a good strategy to solve the problem.</b></li><li>• <b>My strategy wasn't related to what was asked.</b></li><li>• <b>I didn't apply what I know about math to solve the problem.</b></li><li>• <b>I left the answer blank.</b></li></ul>