

## **Title: All Aboard! Hop on the Averaging Train**

### **Brief Overview:**

This unit focuses on calculating mean using the theme of trains. Before teaching this lesson, the students must be familiar with the following topics; mode, median, range, line plots, stem and leaf plots, and measurement in inches. The unit gives the option of using technology if it is available; however, if technology is not available, printable activities and manipulatives are included. Students will be using different graphical representations and methods of analyzing data.

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

Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them

- collect data using observations, surveys, and experiments
- represent data using tables and graphs such as line plots, bar graphs, and line graphs

Select and use appropriate statistical methods to analyze data

- use measures of center, focusing on the median, and understand what each does and does not indicate about the data set
- compare different representations of the same data and evaluate how well each representation shows important aspects of the data.

### **Grade/Level:**

Grades 4-5

### **Duration/Length:**

3 Days (60 minutes each day)

### **Student Outcomes:**

Students will:

- calculate the mean, median, mode, and range of a set of data.
- represent data on a line plot.
- represent data on a stem and leaf plot.
- determine which plot makes it easier to identify mean, median, mode, and range.

## **Materials and Resources:**

### Day 1

- Calculators (class set)
- Graph paper
- Train cut outs (copied, cut, and laminated)
- Dry erase markers
- Envelopes or plastic baggies
- White boards
- Student Resources 1 through 7
- Teacher Resources 1 through 7

### Day 2

- Calculators (class set)
- Sentence strips
- Crayons, markers, or colored pencils
- Scissors
- Rulers
- Approximately 30 feet of string/rope (not yarn because it stretches)
- Computers (optional)
- Student Resources 1 and 8 through 9
- Teacher Resources 1 and 8 through 9

### Day 3

- Calculators (class set)
- Computers (optional)
- Student Resources 1 and 10 through 14
- Teacher Resources 1 and 10 through 14

## **Development/Procedures:**

### Day 1

- Pre-assessment  
Students should be familiar with finding range and the averages, median and mode. The pre-assessment, Student Resource 3 consists of four questions. The four questions ask the students to calculate the mean, median, mode, and range of a data set. The answer key can be found on Teacher Resource 3.

If students are not proficient in the skills of mean, median, mode, and range, consider interventions or reteaching before continuing instruction.

- Engagement  
Distribute a calculator to each student. Read the directions on Teacher Resource 4 to the class. (It may make it easier for the students to follow

the directions if they are projected by using a transparency and overhead or a document camera.) Explain that they will be using calculators for most of this unit.

[http://dcstone01.newsvine.com/\\_news/2009/05/04/2771350-a-chocolate-calculator-your-age-by-chocolate-math-](http://dcstone01.newsvine.com/_news/2009/05/04/2771350-a-chocolate-calculator-your-age-by-chocolate-math-)

- Exploration

Start the lesson by presenting the vocabulary to the class by distributing and using Teacher Resource 1 (definitions) or Student Resource 1 (blank). \*Be sure to copy 1a and 1b front to back. To assemble either flip book, the student must cut on the dotted lines before folding it down the middle along the solid black line.

Using Student Resource 4 and Teacher Resource 5, the students will calculate the mean number of train cars per train. Have the students start by pulling the train cars numbered 16, 18, and 20 from their envelope or baggie. Discuss what number they think would be a good representation of the mean of these three numbers. Together, calculate the mean of 16, 18, and 20. (18)

After discussing the methods used to find the mean of 16, 18, and 20, have the students determine and explain how they found the mean of 15, 18, and 24. (19)

- Explanation

Using Teacher Resource 2A-C, model how to calculate the mean of a set of data. Before starting instruction, label each of the four train pieces, using a dry erase marker, with a number between 1 and 100 (Preferably use 4 numbers where the mean is a whole number). Model the steps of finding the mean by using all four pieces of data to find the sum and then dividing by the total number of pieces of this data (4).

Choose four new numbers between 1 and 100 and encourage the students to find the mean independently using white boards or other student response tools.

Student Resource 2 is available for students to make their own averaging trains.

- Application

Using Student Resources 5 and 6, distribute copies of the data showing the number of people who ride the train each hour. Based on the students' performances during the Exploration and Explanation, separate them by skill level by using the direction of the trains (5, the reteach, points to the

left and 6, the enrichment, points to the right). The answer key is located on Teacher Resource 6.

- Differentiation

- Reteach

- Provide these students with the vocabulary flip book with the definitions, Teacher Resource 1.

- During the exploration, have the struggling students start with train numbers 15, 16, and 17 before choosing their own trains to calculate the mean.

- Using a number line to represent the data may help the students when visualizing the mean of these three numbers.

- Enrich

- During the exploration, students can select their own numbers and/or increase the amount of trains used as they are being successful.

- Discuss the results of choosing two even numbers and an odd number or three odd numbers (non-whole number answer).

- Assessment

- Distribute the Exit Ticket, Student Resource 7 and have the students complete the examples. An answer key can be found on Teacher Resource 7.

## Day 2

- Engagement

- Distribute a sentence strip, crayons, and scissors to each student. Assign a specific measurement to each student that they will use to make a sentence strip (Fourth grade will measure to the nearest  $\frac{1}{4}$  inch; Fifth grade will measure to the nearest  $\frac{1}{8}$  inch). Measurements should have a range of approximately 10 inches.

- On the back of the train, have the students write the exact number of inches they were assigned to measure. Also, have the students round that number to the nearest whole inch to make it easier for them to calculate the mean.

- Divide the students into groups of four if possible. Give each group of four students one piece of string/rope that is longer than the sum of all four of their train measurements.

- Model the following steps:

- Using a ruler and scissors, cut the sentence strip to the assigned measurement.
- Decorate the sentence strip to look like a train.

After modeling, answer any questions before allowing them to continue working with their group on the activity.

○ Exploration

Model the following steps:

- 1.) Show the students how to line up all four trains in their group (in one long horizontal line).
- 2.) Use the string/rope to measure the length of their four trains together.
- 3.) Fold the string into four parts (half and then half again).
- 4.) Ask what this represents (the typical length or mean of all four of their trains).
- 5.) Measure the string in inches based on the assessment limits of the grade.
- 6.) Ask: If we used a calculator to find the mean of our four trains, would we get the same answer?
- 7.) Use a calculator to calculate the mean.
- 8.) Compare results.

After modeling, answer any questions before allowing them to continue working with their group on the activity.

○ Explanation

- Ask: If we wanted to find the mean of all the trains in this classroom, would lining them up and then using the string/rope be the most efficient way?
- Ask: What would be an easier way to represent a large amount of data? Guide them to making a chart, graph, table, etc.
- Review line plots using the vocabulary flipbook, Student Resource 1 and Teacher Resource 1.
- Draw a line plot on the board, overhead projector, or document camera.
- Have each student place an X above the number representing the length of his or her train on the line plot.
- Once the line plot is complete, discuss how to use the line plot to find the mean, median, mode, and range. Calculate the mean, median, mode, and range.

○ Application

Student Resources 8 provides the students an opportunity to independently practice constructing a line plot and finding measurements of center (mean, median, and mode). The answer key can be found on Teacher Resource 8.

Optional: If there are students who finish early, discuss the term outliers with them before having them visit the following website for additional practice:

[http://www.glencoe.com/sites/common\\_assets/mathematics/mc2/cim/interactive\\_labs/M2\\_02/M2\\_02\\_dev\\_100.html](http://www.glencoe.com/sites/common_assets/mathematics/mc2/cim/interactive_labs/M2_02/M2_02_dev_100.html)

- Differentiation

- Reteach

- When doing the Engagement, use to the nearest inch, or half inch before moving on to quarter inch or eighth of an inch.

For an additional teacher resource or reteaching, use the following website:

[http://www.learner.org/courses/learningmath/data/session2/part\\_b/making.html](http://www.learner.org/courses/learningmath/data/session2/part_b/making.html)

- Enrich

- When doing the Engagement, have the students measure to the nearest eighth of an inch or sixteenth of an inch.

- Assessment

Distribute the Exit Ticket, Student Resource 9 and Teacher Resource 9 for the students to complete.

### Day 3

- Engagement

If the class has access to computers, you may choose to use the website below on making a line plot using the data on Student Resource 10. The answer key can be found on Teacher Resource 10. If the class does not have access to computers, use the same resource to complete the Engagement. (If you do use the website, when the students finish, have them press the Print Screen key on the keyboard and paste it into a word processing document.

<http://www.shodor.org/interactivate/activities/PlopIt/>

- Exploration

After sharing the answers, ask the students: Can you think of a better way to represent the data?

What ways could we group the numbers? (by the tens place)

Guide students towards the idea of displaying the data in a stem and leaf plot.

- Explanation
  - Using the data from the Engagement, model the process of creating a stem and leaf plot using the board, overhead projector, or document camera. Use Student Resource 11A. An answer key can be found on Teacher Resource 11A.
  - Discuss the idea that data should be represented in the easiest way for the audience to use. At the first glance, the audience should be able to draw conclusions easily based on the graph that is used.
  - Use the stem and leaf plot to find the mean, median, mode, and range.
  - Sample discussion questions:
    - 1.) How many train passengers are 40 years old or older? (8)
    - 2.) How many passengers are younger than 30 years old? (10)
    - 3.) What is different about question 1 and question 2? (greater than and equal to; less than)
    - 4.) Is it easier to find the mean, median, mode, and range with the line plot or the stem and leaf?
    - 5.) Which is the easiest to find at first glance on the stem and leaf, mean, median, mode, or range?
  
- Application
 

Use Student Resources 12A-C. The Enrichment group will use the bar graph on 12A to create a stem and leaf plot on 12B. The rest of the class will use the table on 12C to create a stem and leaf plot on 12D. The answer key can be found on Teacher Resource 12B and 12D.
  
- Differentiation
  - Reteach
 

While the students work on the Engagement, select a small group of students to work on it with you. If you choose to use the computer version of the engagement, assign a partner to the students who need extra assistance.

During the Application activity, complete the first set of train data with the students, and have them complete the next two sets of train data on their own.
  
  - Enrich
 

During the Application, these students will be assigned Student Resource 12 to review data on train speed in a bar graph and use it to create a stem and leaf plot.

Have the students who were successful in completing Student Resource 12A complete Student Resource 13. It uses the calculation of elapsed time and solving for an unknown time before plotting the points on a stem and leaf plot. The key can be found on Teacher Resource 13.

**Summative Assessment:**

This assessment, Student Resource 14A-E and Teacher Resource 14A-E (answer key), is a collection of six selected response questions and an extended response question. It assesses the students' ability to calculate mean when given a set of data in a table or graph. It also assesses their ability to construct and/or answer questions pertaining to a line plot and a stem and leaf plot. The extended response question asks the students to find the mean of a set of data. It then gives them additional data to use in the recalculation of the mean. The students are permitted to use calculators on this assessment.

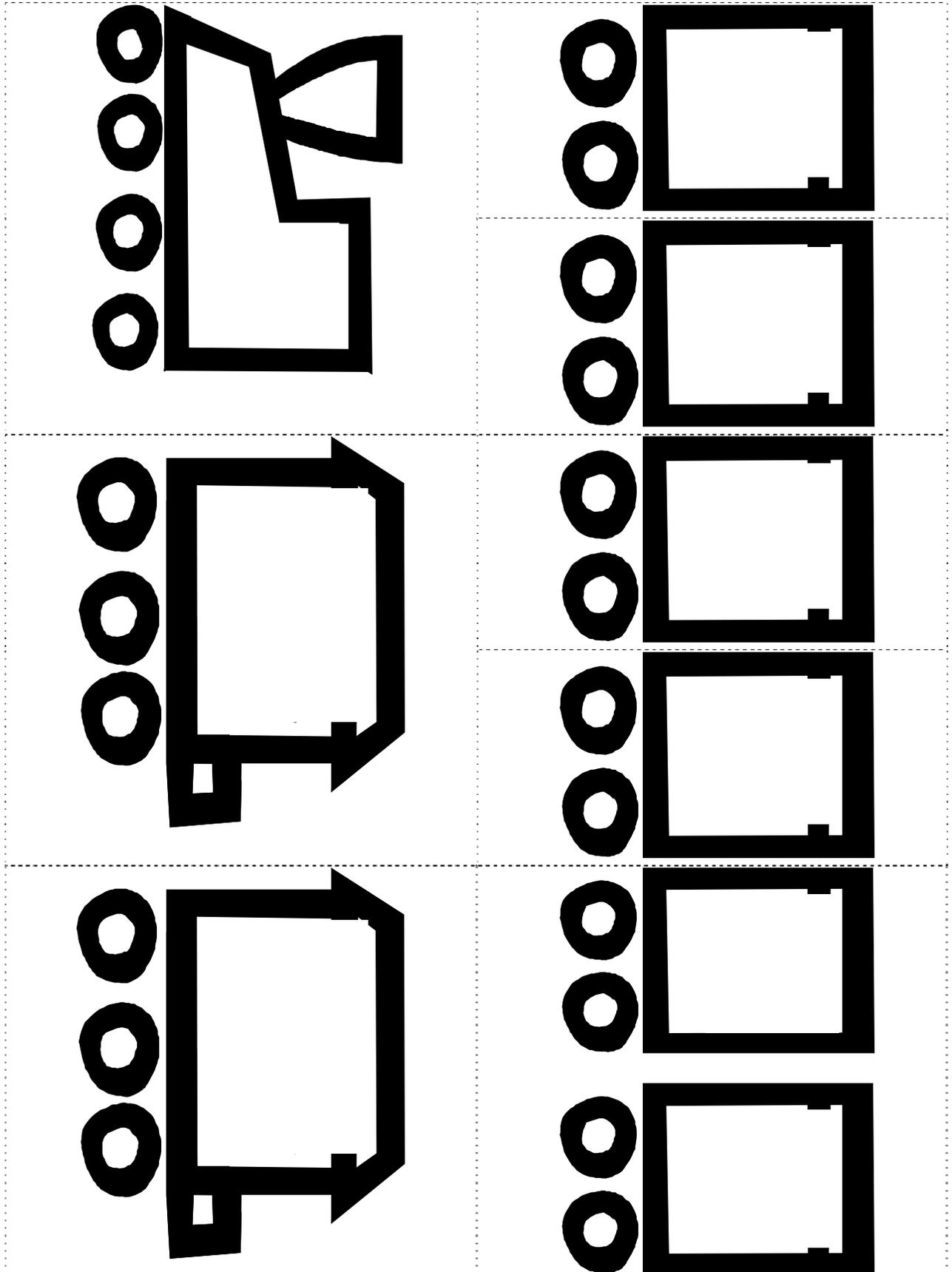
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<b>Data</b>	
<b>Mean</b>	
<b>Median</b>	
<b>Mode</b>	
<b>Range</b>	
<b>Line Plot</b>	
<b>Stem and Leaf Plot</b>	

	<b>Data</b>
	<b>Mean</b>
	<b>Median</b>
	<b>Mode</b>
	<b>Range</b>
	<b>Line Plot</b>
	<b>Stem and Leaf Plot</b>



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

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

## Pre-test

Directions: Answer each of the following questions. Show your work!

1. A die was rolled 10 times. What is the mode for these rolls?  
{ 3, 6, 12, 7, 4, 8, 7, 9, 8, 7 }

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

2. Below are the ages of the students in the band. What is the median age of students in the band?  
{ 11, 8, 10, 9, 11, 8, 9, 9, 8, 10, 9 }

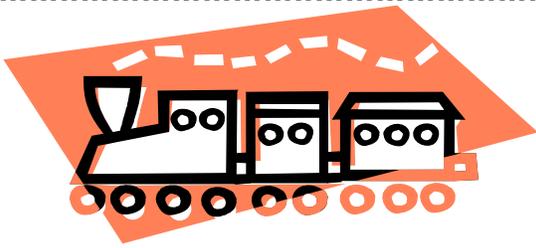
**Median:** \_\_\_\_\_

3. What is the range of temperatures in Orlando, Florida during the last week of May?  
{ 98°, 87°, 102°, 99°, 92°, 91°, 98° }

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

4. Eight fifth grade students were surveyed about the number of pets they own. Find the mean of the data.  
{ 4, 0, 2, 1, 3, 1, 0, 5 }

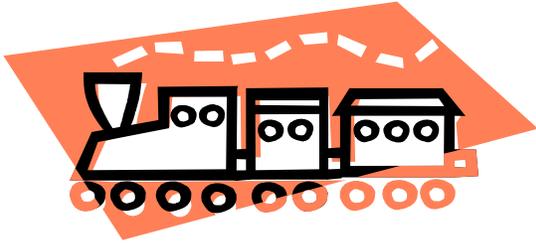
**Mean:** \_\_\_\_\_



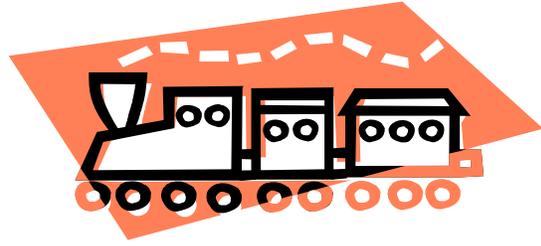
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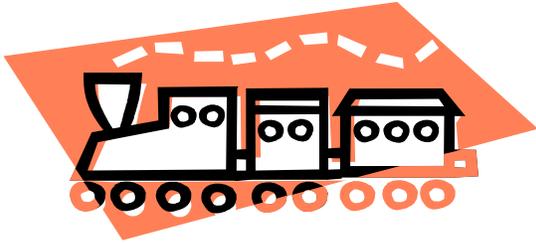
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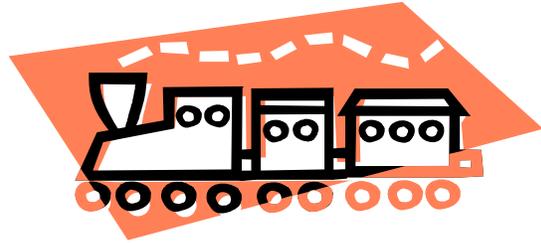
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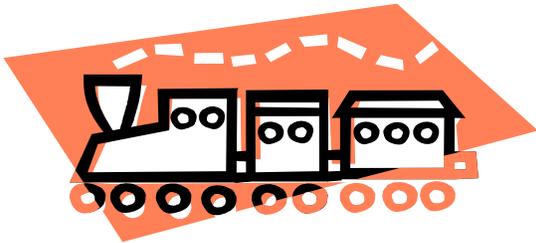
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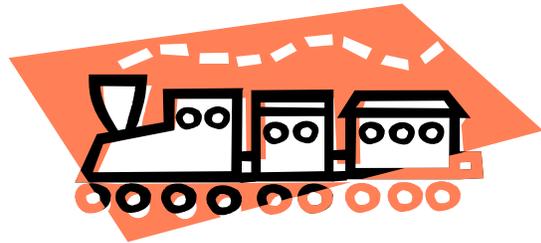
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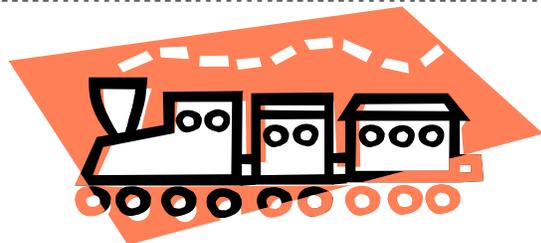
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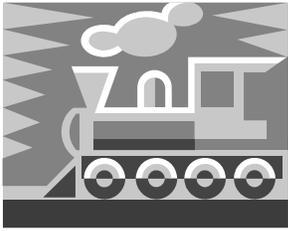
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23



24



Each day the trains take people to and from work in the city. The chart below lists how many people rode the trains into work.

Time	Riders
7:00 am	50
8:00 am	62
9:00 am	35
10:00 am	25
11:00 am	39
12:00 pm	50
1:00 pm	20
2:00 pm	9
3:00 pm	33
4:00 pm	35
5:00 pm	47
6:00 pm	59

1. What is the mean number of riders in the morning?

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2. What is the mean number of riders in the afternoon?

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3. What is the mean number of riders all day?

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4. If the average number of riders from 5:00 pm to 6:00 pm was 650, how many people rode the train at 7:00 pm?

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5. How would adding the number of people who rode the train at 7:00 pm affect the mean for the whole day?



Each day the trains take people to and from work in the city. The chart below lists how many people rode the trains into work.

Time	Riders
7:00 am	315
8:00 am	468
9:00 am	772
10:00 am	433
11:00 am	287
12:00 pm	609
1:00 pm	280
2:00 pm	301
3:00 pm	330
4:00 pm	403
5:00 pm	498
6:00 pm	732

1. What is the mean number of riders in the morning?  

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2. What is the mean number of riders in the afternoon?  

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3. What is the mean number of riders all day?  

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---
4. If the average number of riders from 5:00 pm to 6:00 pm was 650, how many people rode the train at 7:00 pm?  

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5. How would adding the number of people who rode the train at 7:00 pm affect the mean for the whole day?  

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As the owner of your train company, it is important for you to have a good public image. In order to do so, you need money and a lot of it. You need to charge for rides on your trains. You offer lots of different deals on tickets and special trains, so you have lots of different ticket prices. Below are the prices of the tickets people bought yesterday in dollars.

**12,18,12,17,14,15,18,11,12,10,13,17,14,14,19**  
**14,18,18,13,14,12,17,12,13,16,19,16,12,13,13**

Construct a line plot that represents the data above. Be sure to include:

- A scale
- Data
- Title
- Axis label

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Find the mean: \_\_\_\_\_ Find the mode: \_\_\_\_\_

Find the median: \_\_\_\_\_ Find the range: \_\_\_\_\_

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

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

# Exit Ticket

Directions: Use a calculator and the data in the line plot below to identify the mean, median, mode, and range of the data.

\*Round the mean to the nearest whole number.

## Hours Spent on the Train per Week

			X						
X			X						
X			X					X	
X			X					X	
X			X	X				X	
X		X	X	X	X			X	
X	X	X	X	X	X			X	
X	X	X	X	X	X		X	X	
15	16	17	18	19	20	21	22	23	24

Mean:

Median:

Mode:

Range:

If the numbers 23, 24, 24, 24 were added to the line plot above, how would this change the mean?

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How are these two questions similar? How are these two questions different?

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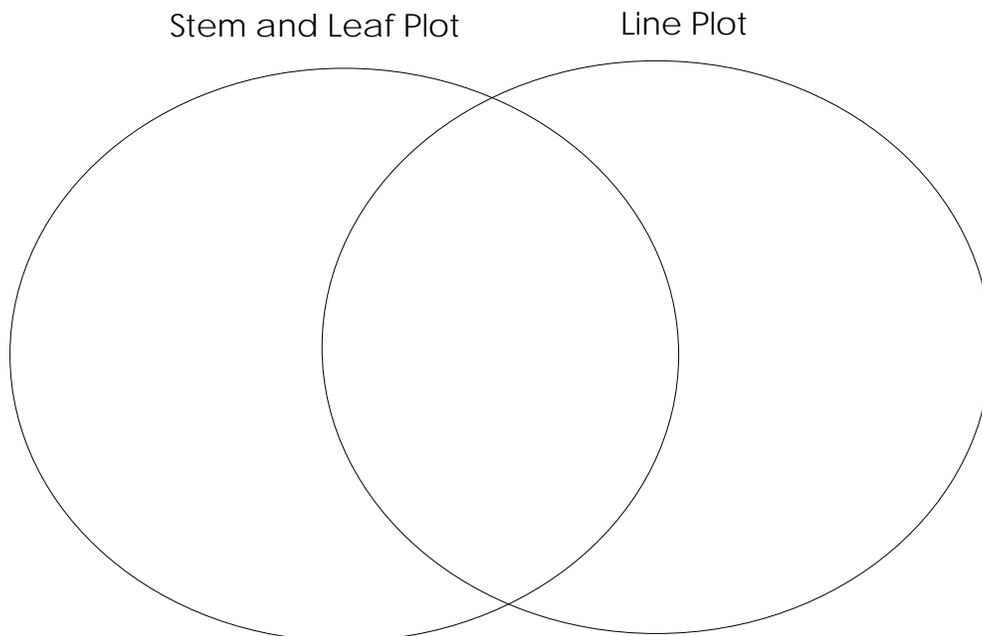
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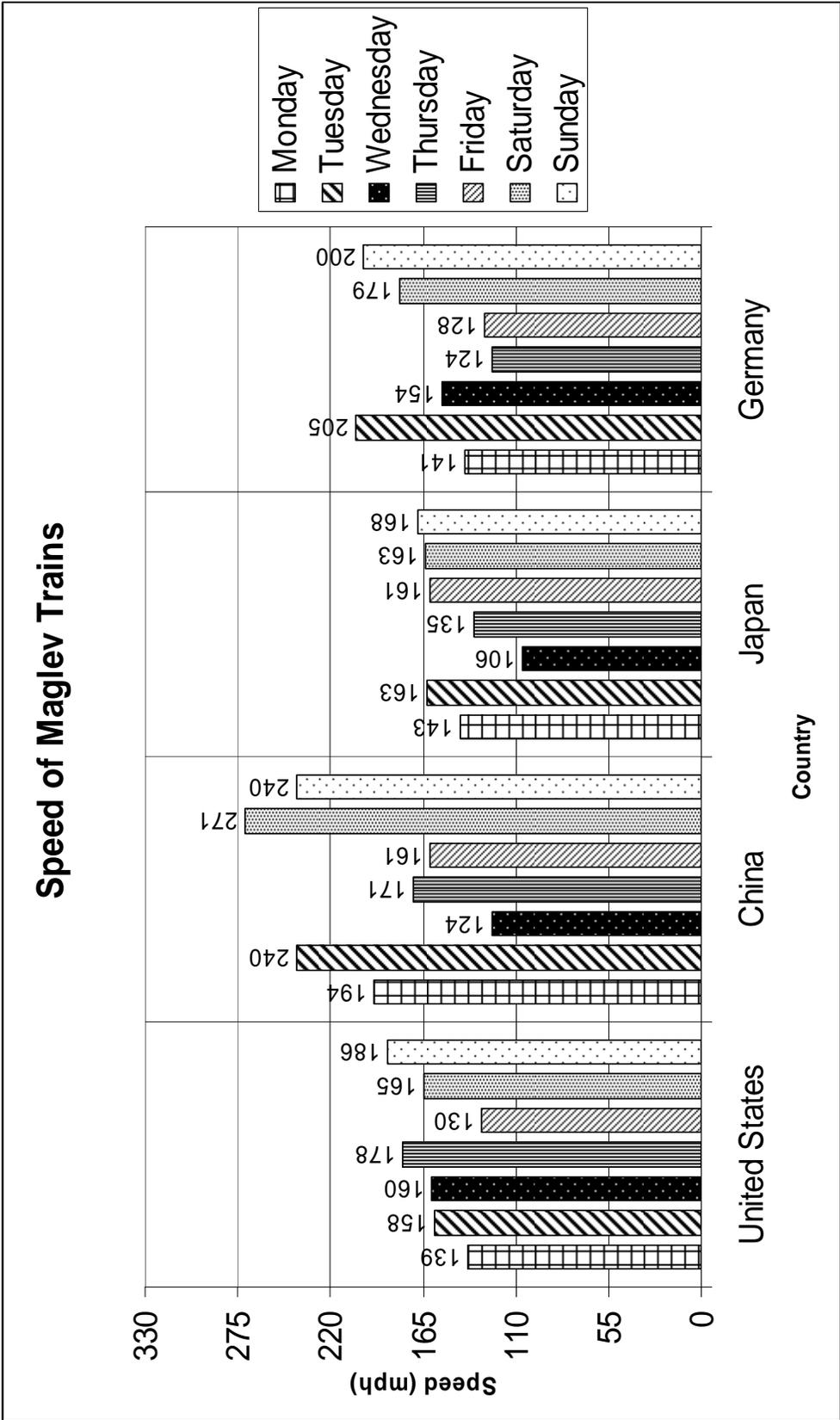
Suppose another passenger got on the train and the mean age of the passengers changed to 35.1. What is the age of the passenger that got on the train? How does the passenger's age affect the Stem and Leaf Plot? Change the Stem and Leaf Plot to represent this passenger.

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Speed of Public Transportation in the United States (mph)							
	Sun	Mon	Tues	Wed	Thurs	Fri	Sat
NYC Subway	63	1	62	31	14	39	12
DC Metro	31	30	33	9	36	43	13
Disney Monorail	34	34	33	19	40	19	13

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

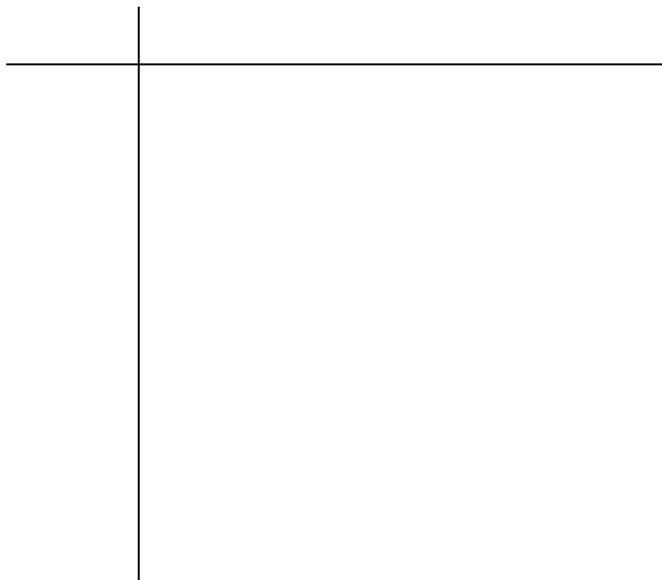
Date: \_\_\_\_\_

Directions: Calculate the elapsed time for each train or solve for the variable. Once you complete the table, plot the elapsed time values on the stem and leaf plot below.

**On Time!**

Train:	Departure time:	Arrival time:	Elapsed time:
Blue	9:39 am	10:31 am	
Red	11:58 am	12:52 pm	
Green	3:09 pm	X =	33 minutes
Yellow	5:15 pm	6:01 pm	
Black	6:29 pm	7:02 pm	
Purple	X=	8:18 pm	35 minutes
Orange	8:25 pm	8:31 pm	
White	9:14 pm	10:03 pm	

Show your work!



Summative Assessment

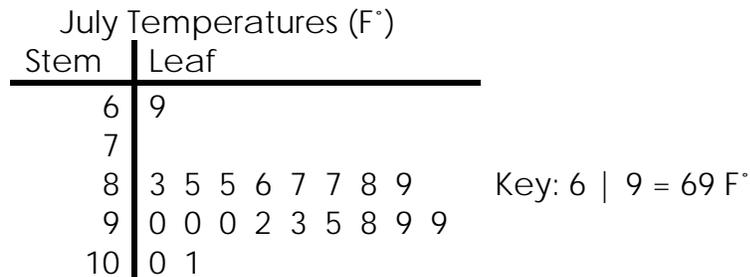
1. Chris played in 6 basketball games. The number of points he scored in each game is shown in the table.

Game	Points Scored
1	66
2	35
3	54
4	17
5	45
6	35

What is the mean number of points Chris scored?

- Ⓐ 35
- Ⓑ 252
- Ⓒ 42
- Ⓓ 46

2. The Stem and Leaf plot below shows the daily temperatures for July.



How many days was the temperature in July ninety-two degree Fahrenheit or lower?

- Ⓐ 8
- Ⓑ 12
- Ⓒ 13
- Ⓓ 20



4. The number of minutes students read at home are show below.

39	16	35	14	43
18	16	33	15	3
31	44	36	8	44

Which stem and leaf plot shows the number of minutes students read?

Ⓐ **Number of Minutes Students Read**

Stem	Leaf
0	3 8
1	4 5 6 8
2	
3	1 3 5 6 9
4	3 4

key = 0 | 3 = 3 minutes

Ⓑ **Number of Minutes Students Read**

Stem	Leaf
0	3 8
1	4 5 6 6 8
2	
3	1 3 5 6 9
4	3 4 4

key = 0 | 3 = 3 minutes

Ⓒ **Number of Minutes Students Read**

Stem	Leaf
0	3 8
1	4 5 6 6 8
3	1 3 5 6 9
4	3 4 4

key = 0 | 3 = 3 minutes

Ⓓ **Number of Minutes Students Read**

Stem	Leaf
1	4 5 6 6 8
3	1 3 5 6 9
4	3 4 4

key = 0 | 3 = 3 minutes

5. Find the mode of the data below.

Pounds of Potato Chips Consumed by Fourth Grade

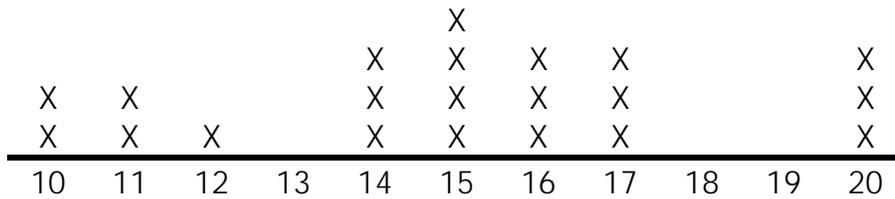
Stem	Leaf				
0	4				
1	0	0	9		
2	1	2	3	4	5
3	1	3	6	8	
4	4	4	8		

Key: 0 | 5 = 5 pounds of potato chips

- Ⓐ 27
- Ⓑ 44
- Ⓒ 24.5
- Ⓓ 62

6. Find the mean of the data below.

Number of M&M's per snack bag



Number of M&M's

- Ⓐ 15
- Ⓑ 16
- Ⓒ 17
- Ⓓ 10

7. Eric spent a month touring Europe. Twenty out of the thirty of his days were spent riding on a train to a different city or country. Below are the prices of Eric’s train tickets in dollars.

20	32	61	19
42	71	16	29
37	56	39	37
42	28	34	58
35	43	31	30

Step A

What is the mean of his train ticket prices?

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Step B

- Explain how you found the mean cost of Eric’s train tickets. Use what you about determining the mean of a set of data. Use words, numbers, and/or letters in your explanation.
- If Eric includes the cost of his 52 dollar train ticket to the airport and his 46 dollar train ticket from the airport home, how will this change the Eric’s mean ticket price? Explain why your answer is correct. Use what you know about determining the mean of a set of data. Use words, number, and/or symbols in your explanation.

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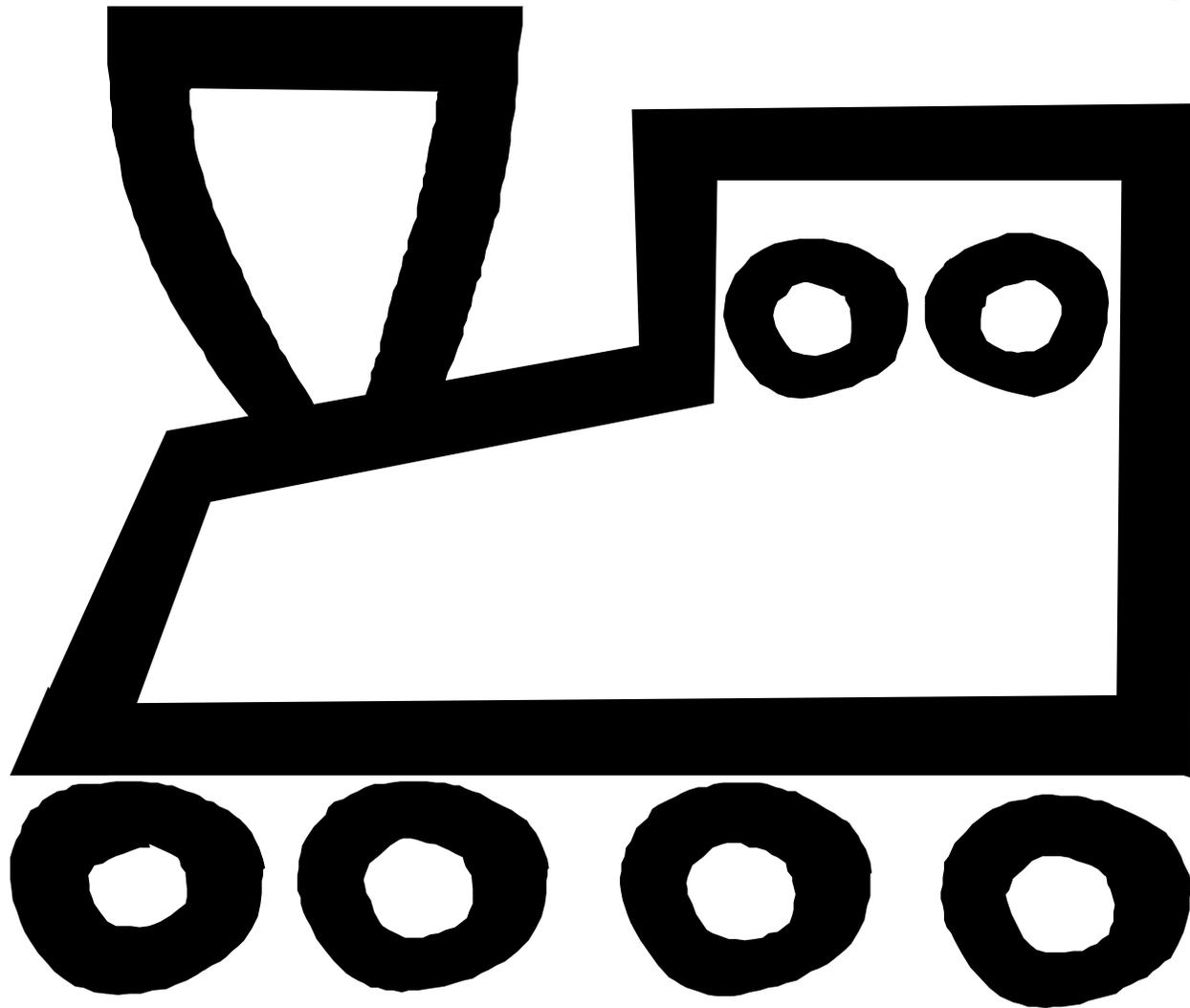
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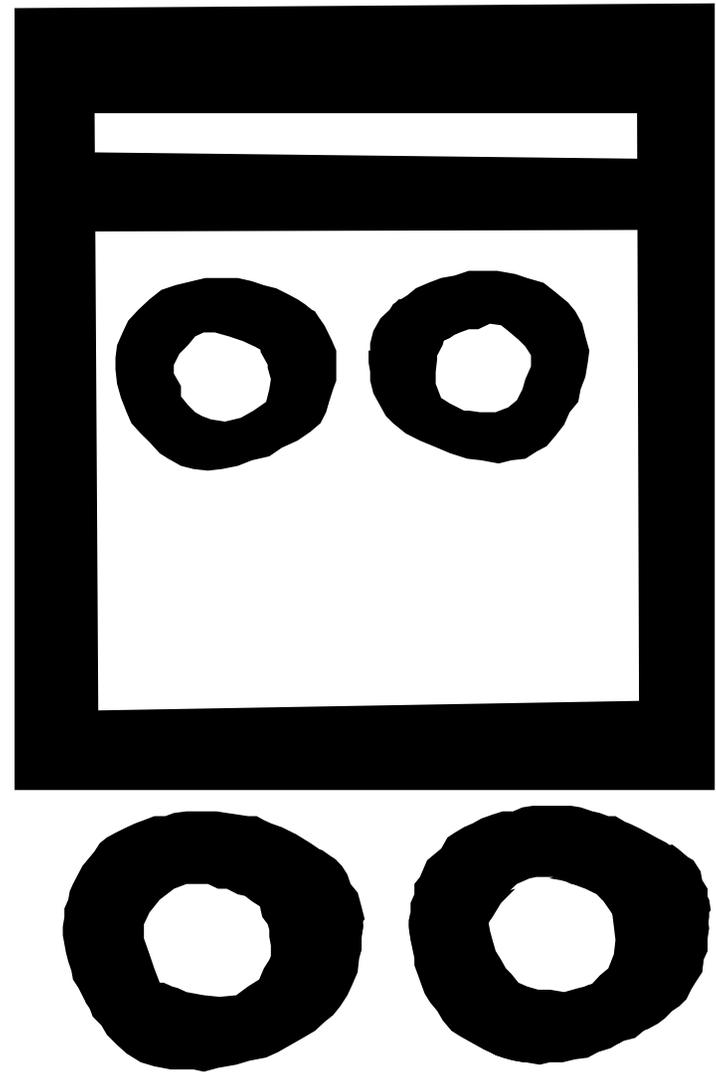
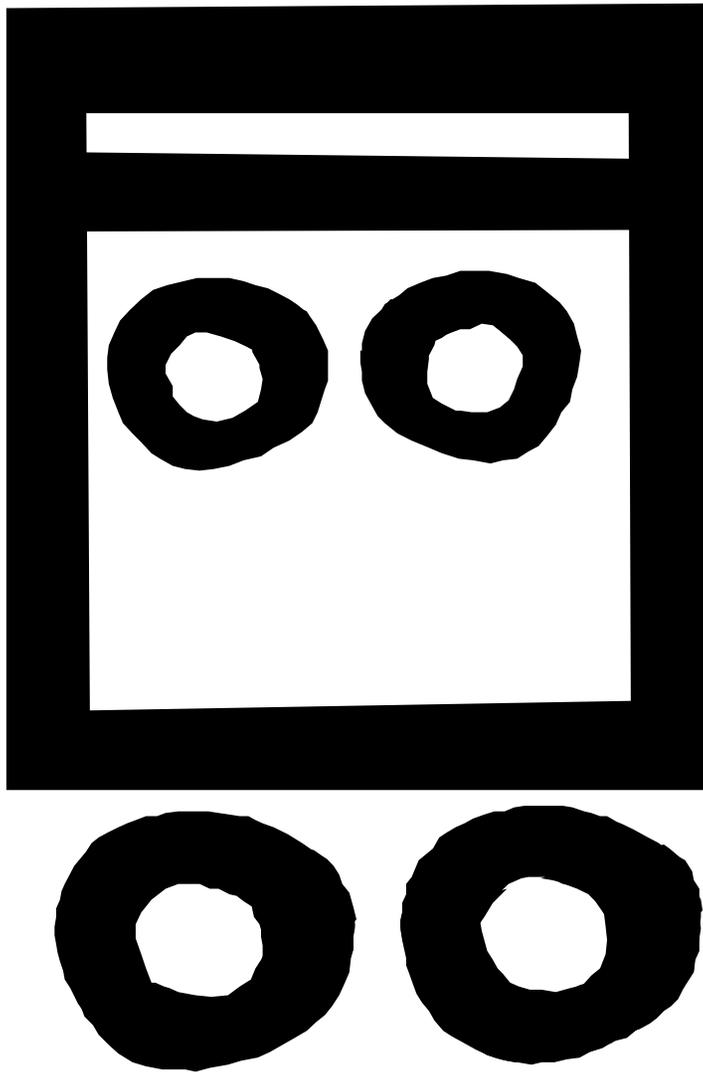


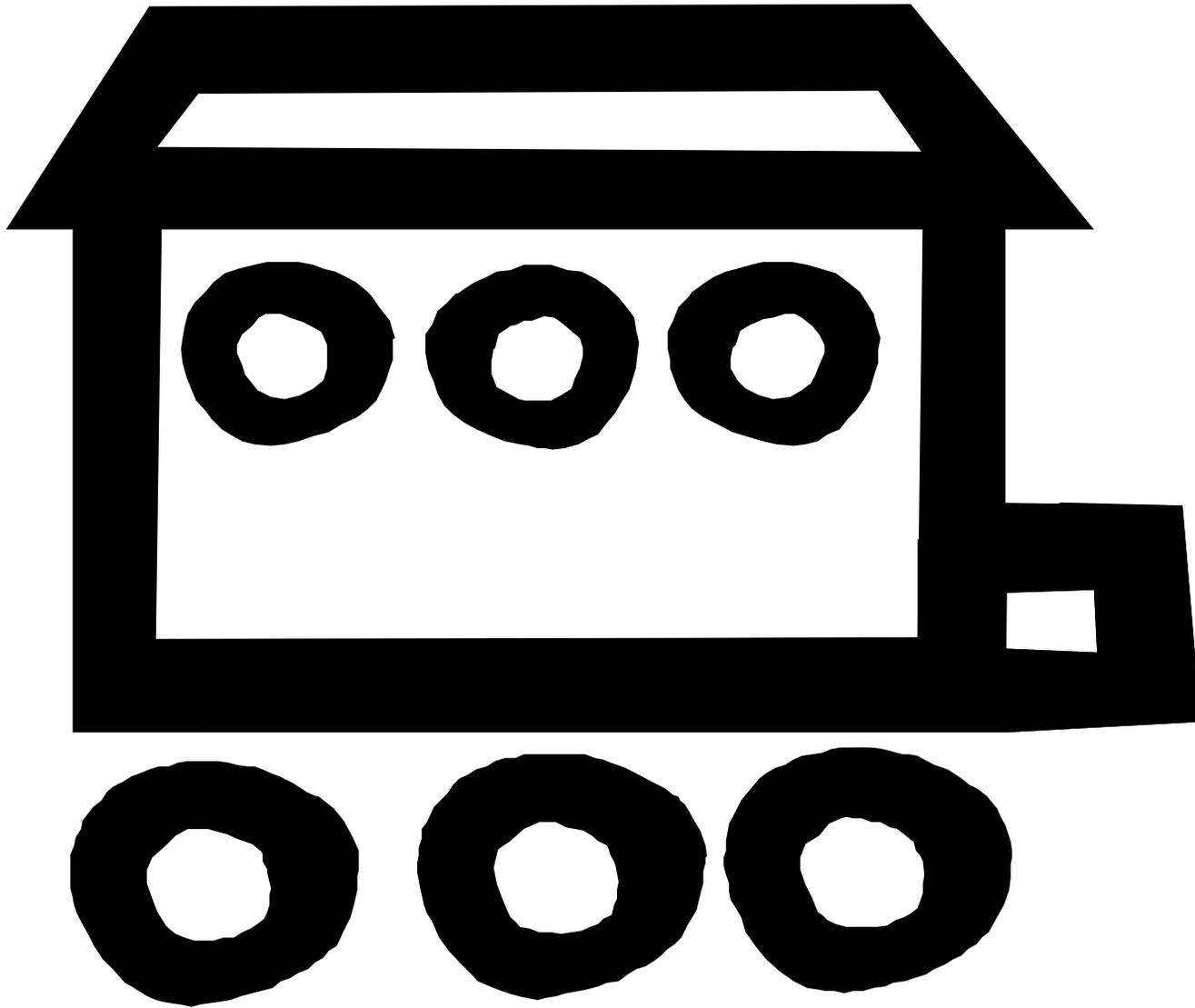
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<b>Data</b>	<p>Collected information.</p> <p>Ex. 17, 15, 21, 25, 17</p>																																								
<b>Mean</b>	<p>The number found by adding all of the data values and dividing by the total number of data.</p> <p>Ex. <math>17 + 15 + 21 + 25 + 17 = 95</math>  <math>95 \div 5 = 19</math></p>																																								
<b>Median</b>	<p>The middle number in an ordered set of data.</p> <p>Ex. 17, 15, 21, 25, 17</p> <p style="text-align: center;"><del>15, 17, 17, 21, 25</del></p>																																								
<b>Mode</b>	<p>The data value that occurs the most.</p> <p>Ex. ⑰, 15, 21, 25, ⑰</p> <p style="text-align: center;">Mode = 17</p>																																								
<b>Range</b>	<p>The difference between the largest value and the smallest value.</p> <p>Ex. 17, <u>15</u>, 21, <u>25</u>, 17</p> <p style="text-align: center;"><math>25 - 15 = 10</math></p>																																								
<b>Line Plot</b>	<p style="text-align: center;">Ants in Pants</p> <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td></td><td></td><td></td><td style="text-align: center;">X</td><td style="text-align: center;">X</td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td style="text-align: center;">X</td><td style="text-align: center;">X</td><td style="text-align: center;">X</td><td style="text-align: center;">X</td><td style="text-align: center;">X</td><td></td> </tr> <tr> <td style="text-align: center;">X</td><td></td><td style="text-align: center;">X</td><td style="text-align: center;">X</td><td style="text-align: center;">X</td><td style="text-align: center;">X</td><td style="text-align: center;">X</td><td></td> </tr> <tr> <td style="text-align: center;">X</td><td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">130</td><td style="text-align: center;">140</td><td style="text-align: center;">150</td><td style="text-align: center;">160</td><td style="text-align: center;">170</td><td style="text-align: center;">180</td><td style="text-align: center;">190</td><td></td> </tr> </table> <p style="text-align: center;">Number of Ants in your Pants</p>				X	X						X	X	X	X	X		X		X	X	X	X	X		X	X	X	X	X	X	X	X	130	140	150	160	170	180	190	
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X	X	X	X	X	X	X	X																																		
130	140	150	160	170	180	190																																			
<b>Stem and Leaf Plot</b>	<table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="border-right: 1px solid black; padding: 5px;">Stem</th> <th style="padding: 5px;">Leaf</th> </tr> </thead> <tbody> <tr> <td style="border-right: 1px solid black; padding: 5px;">1</td> <td style="padding: 5px;">2 8</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">2</td> <td style="padding: 5px;">3 5 5 6 8 8</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">3</td> <td style="padding: 5px;">0 1 2 7</td> </tr> </tbody> </table>	Stem	Leaf	1	2 8	2	3 5 5 6 8 8	3	0 1 2 7																																
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	<b>Data</b>
	<b>Mean</b>
	<b>Median</b>
	<b>Mode</b>
	<b>Range</b>
	<b>Line Plot</b>
	<b>Stem and Leaf Plot</b>







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

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

### Pre-test

Directions: Answer each of the following questions. Show your work!

2. A die was rolled 10 times. What is the mode for these rolls?  
{ 3, 6, 12, 7, 4, 8, 7, 9, 8, 7 }

Mode: 7

2. Below are the ages of the students in the band. What is the median age of students in the band?  
{ 11, 8, 10, 9, 11, 8, 9, 9, 8, 10, 9 }

Median: 9

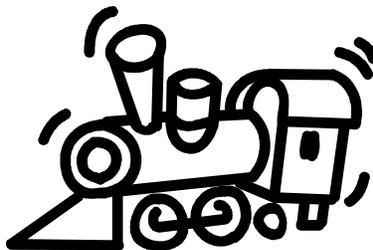
5. What is the range of temperatures in Orlando, Florida during the last week of May?  
{ 98°, 87°, 102°, 99°, 92°, 91°, 98° }

Range: 15°

6. Eight fifth grade students were surveyed about the number of pets they own. Find the mean of the data.  
{ 4, 0, 2, 1, 3, 1, 0, 5 }

Mean: 2

## Train Math

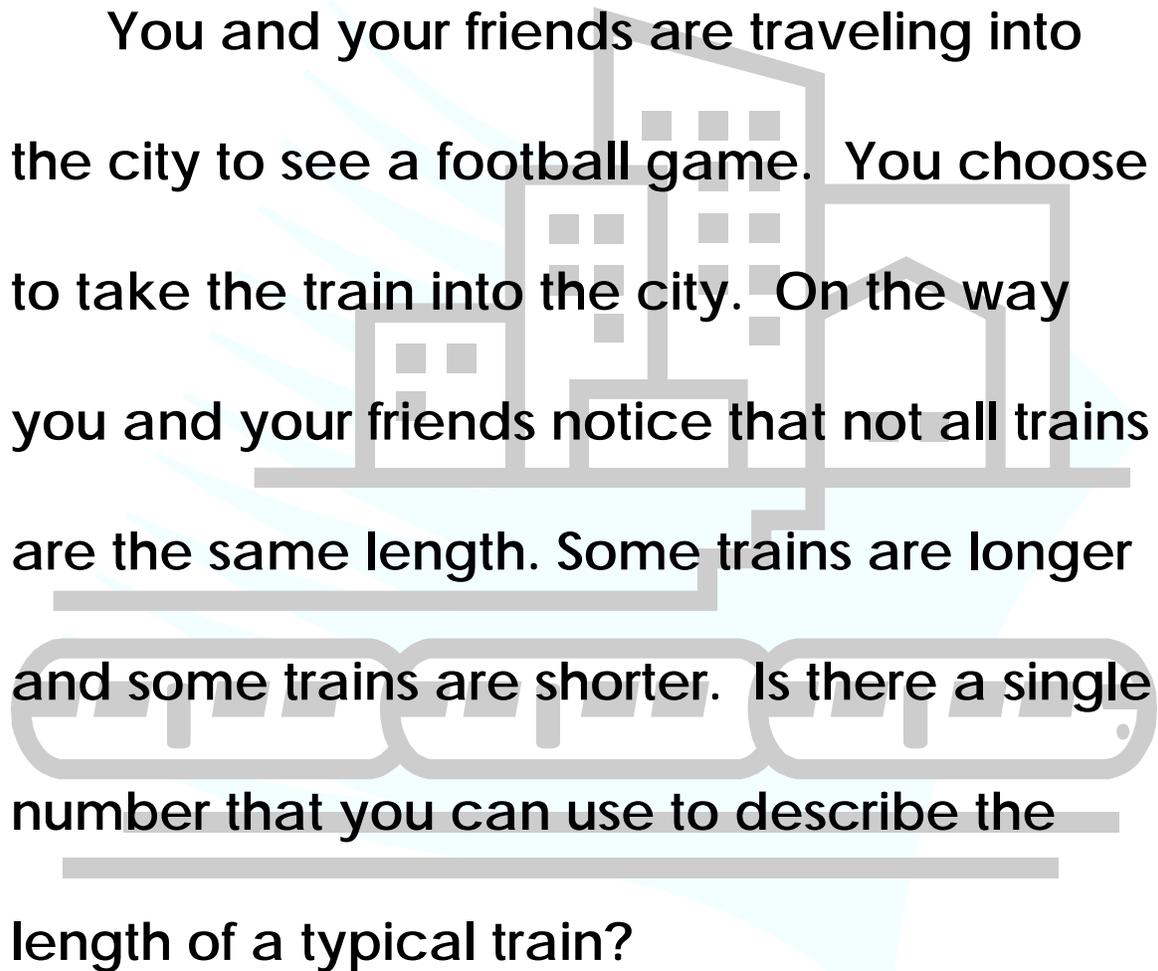


Directions: Distribute calculators to the students before you begin reading the steps.

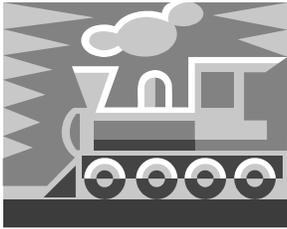
1. First of all, pick the number of times a week that you would like to ride on a train. (Choose a number greater than one, but less than 10.)
2. Multiply this number by 2
3. Add 5
4. Multiply it by 50
5. If you have already had your birthday this year add 1759. If you haven't, add 1758.
6. Now subtract the four digit year that you were born. (If you remember!)

You should now have a three digit number. The first digit is your original number (i.e., how many times you want to have chocolate each week). The second two digits are your age.

Adapted from: [http://dcstone01.newsvine.com/\\_news/2009/05/04/2771350-a-chocolate-calculator-your-age-by-chocolate-math-](http://dcstone01.newsvine.com/_news/2009/05/04/2771350-a-chocolate-calculator-your-age-by-chocolate-math-)

A faint, stylized illustration in the background shows a city skyline with several buildings of varying heights and a train with three cars on tracks in the foreground. The illustration is light gray and serves as a decorative backdrop for the text.

You and your friends are traveling into the city to see a football game. You choose to take the train into the city. On the way you and your friends notice that not all trains are the same length. Some trains are longer and some trains are shorter. Is there a single number that you can use to describe the length of a typical train?



Each day the trains take people to and from work in the city. The chart below lists how many people rode the trains into work.

Time	Riders
7:00 am	50
8:00 am	62
9:00 am	35
10:00 am	25
11:00 am	39
12:00 pm	50
1:00 pm	20
2:00 pm	9
3:00 pm	33
4:00 pm	35
5:00 pm	47
6:00 pm	59

1. What is the mean number of riders in the morning?

$$50 + 62 + 35 + 25 + 39 = 211 \div 5 = 42.2 \text{ riders}$$

2. What is the mean number of riders in the afternoon?

$$50 + 20 + 9 + 33 + 35 + 47 + 59 = 253 \div 7 = 36.14 \text{ riders}$$

3. What is the mean number of riders all day?

$$211 + 253 = 464 \div 12 = 38.67 \text{ riders}$$

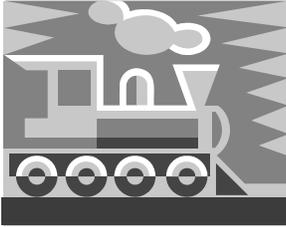
4. If the average number of riders from 5:00 pm to 7:00 pm was 50, how many people rode the train at 7:00 pm?

$$50 \times 3 = 150 - 47 = 103 - 59 = 44 \text{ riders}$$

5. How would adding the number of people who rode the train at 7:00 pm affect the mean for the whole day?

**It would increase the mean because 44 is greater than 38.**

$$464 + 44 = 508 \div 13 = 39.07 \text{ riders}$$



Each day the trains take people to and from work in the city. The chart below lists how many people rode the trains into work.

Time	Riders
7:00 am	315
8:00 am	468
9:00 am	772
10:00 am	433
11:00 am	287
12:00 pm	609
1:00 pm	280
2:00 pm	301
3:00 pm	330
4:00 pm	403
5:00 pm	498
6:00 pm	732

1. What is the mean number of riders in the morning?

$$315 + 468 + 772 + 433 + 287 = 2275 \div 5 = 455 \text{ riders}$$

2. What is the mean number of riders in the afternoon?

$$609 + 280 + 301 + 330 + 403 + 498 + 732 = 3153 \div 7 = 450.42 \text{ riders}$$

3. What is the mean number of riders all day?

$$2275 + 3153 = 5428 \div 12 = 452.33 \text{ riders}$$

4. If the average number of riders from 5:00 pm to 7:00 pm was 650, how many people rode the train at 7:00 pm?

$$650 \times 3 = 1950 - 498 = 1452 - 732 = 720 \text{ riders at 7:00 pm}$$

5. How would adding the number of people who rode the train at 7:00 pm affect the mean for the whole day?

**It would increase the mean because 720 is greater than 452.**

$$5428 + 720 = 6148 \div 13 = 472.92 \text{ riders}$$



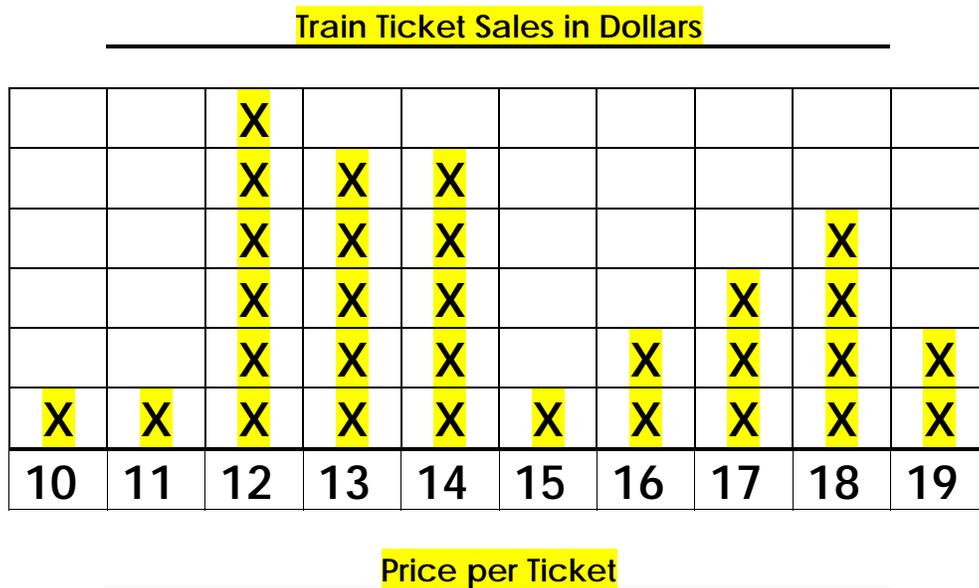


As the owner of your train company, it is important for you to have a good public image. In order to do so, you need money and a lot of it. You need to charge for rides on your trains. You offer lots of different deals on tickets and special trains, so you have lots of different ticket prices. Below are the prices of the tickets people bought yesterday in dollars.

12,18,12,17,14,15,18,11,12,10,13,17,14,14,19  
 14,18,18,13,14,12,17,12,13,16,19,16,12,13,13

Construct a line plot that represents the data above. Be sure to include:

- A scale
- Data
- Title
- Axis label



Find the mean:     \$15          Find the mode:     \$12      
 Find the median:     \$14          Find the range:     \$9

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

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

# Exit Ticket

Directions: Use a calculator and the data in the line plot below to identify the mean, median, mode, and range of the data.

\*Round the mean to the nearest whole number.

## Hours Spent on the Train per Week

			X						
X			X						
X			X					X	
X			X					X	
X			X	X				X	
X		X	X	X	X			X	
X	X	X	X	X	X			X	
X	X	X	X	X	X		X	X	
15	16	17	18	19	20	21	22	23	24

<u>Mean</u> :	<b>18</b>
---------------	-----------

<u>Median</u> :	<b>18</b>
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<u>Mode</u> :	<b>18</b>
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<u>Range</u> :	<b>9</b>
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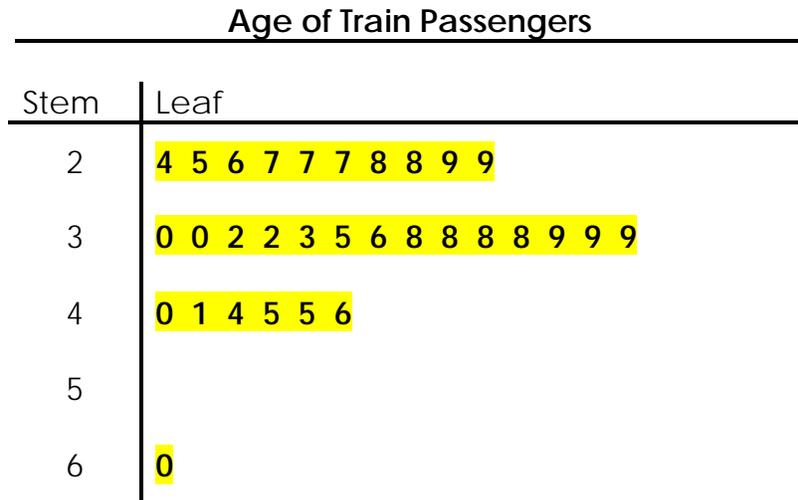
If the numbers 23, 24, 24, 24 were added to the line plot above, how would this change the mean?

**The mean would change to 19. Student responses as to why may vary.**



Do you think that there would be a better way of representing this data?

29, 46, 32, 46, 27, 33, 38, 36, 44, 39, 28, 39, 27, 38, 41  
 27, 38, 30, 38, 32, 29, 39, 45, 24, 26, 40, 25, 30, 28, 36



Key: 2 | 4 = 24 years old

Find the mean: 34.3 Find the mode: 38

Find the median: 34 Find the range: 22

How many train passengers are 40 years old or older?

6 passengers

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How many train passengers are younger than 30 years old?

10 passengers

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How are these two questions similar? How are these two questions different?

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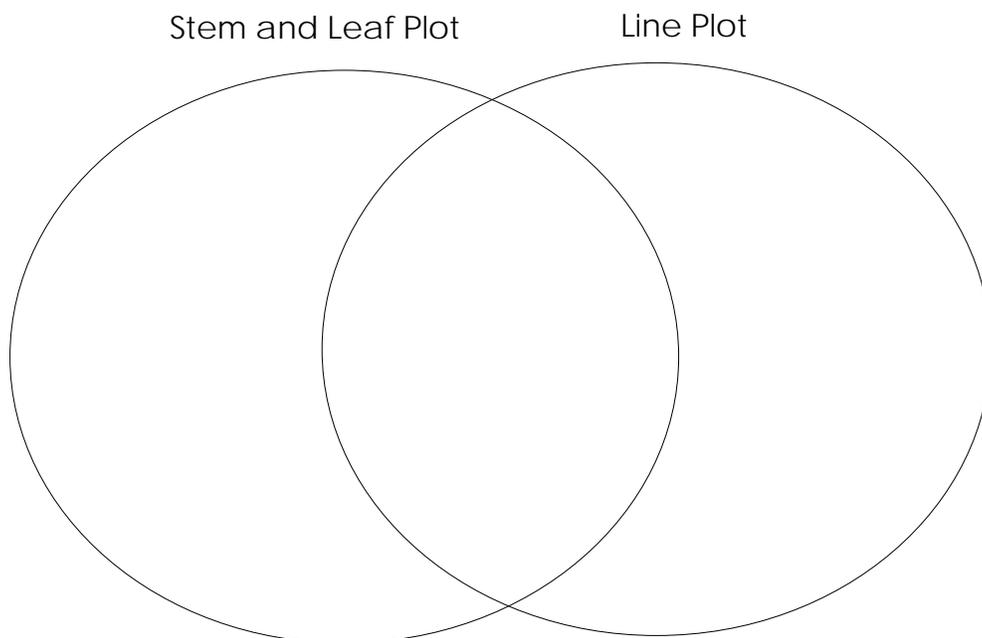
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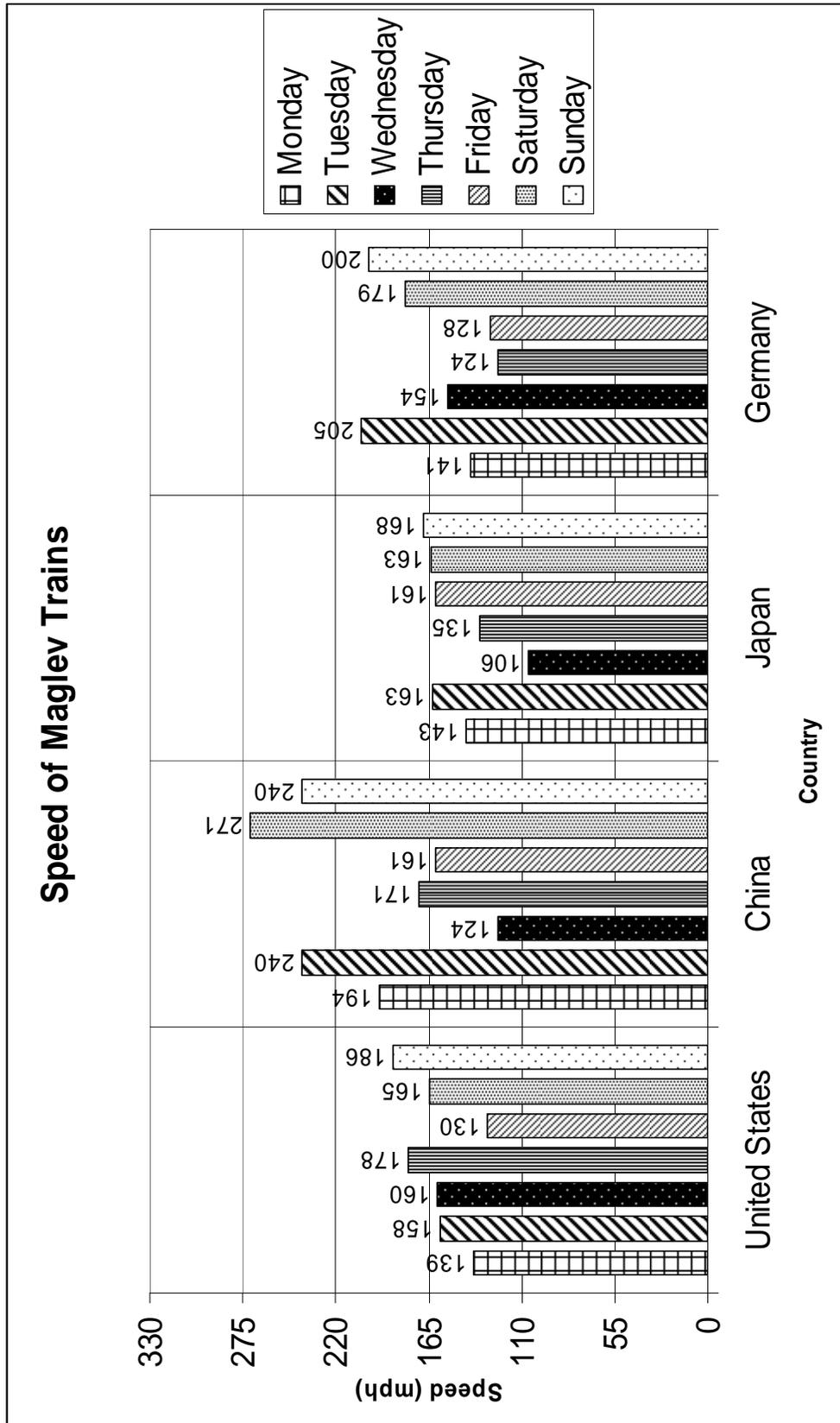
Suppose another passenger got on the train and the mean age of the passengers changed to 35.1. What is the age of the passenger that got on the train? How does the passenger's age affect the Stem and Leaf Plot? Change the Stem and Leaf Plot to represent this passenger.

60 years old

There will be added stems for 5 and 6, with no leaves for 5 and only a 0

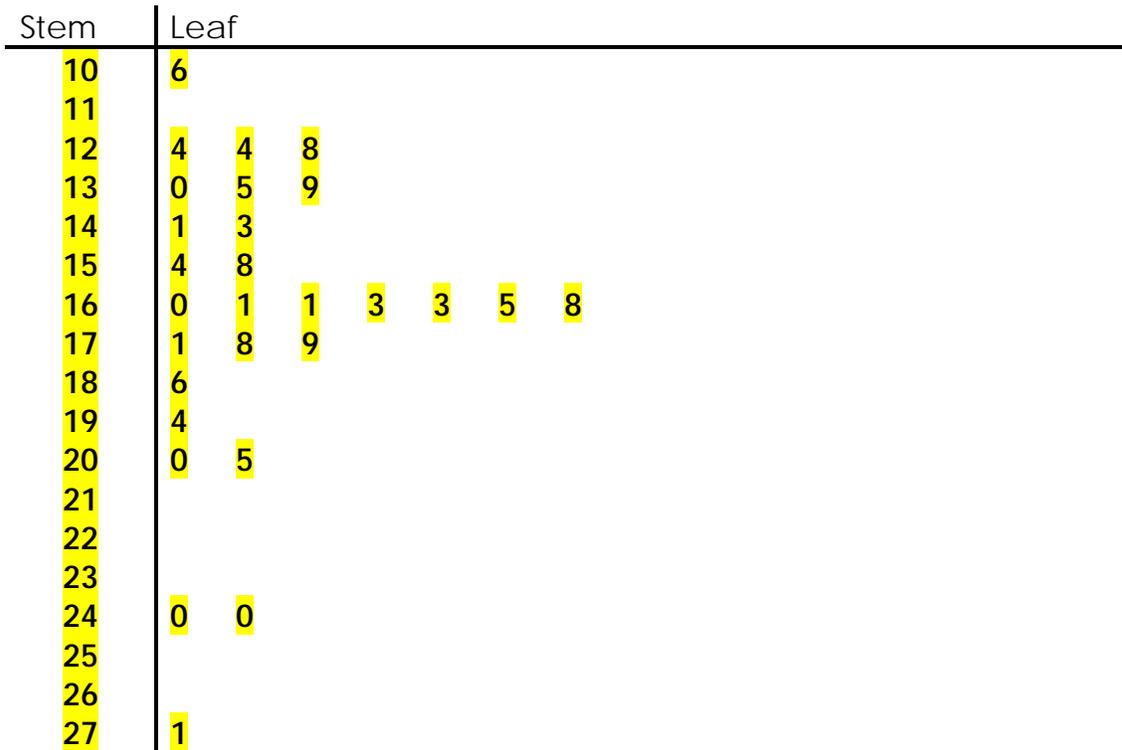
stem for 6





Use your data to complete a Stem and Leaf Plot. Be sure to include a title and a key for your STEM and Leaf Plot.

Speed of Maglev Trains



**Key: 10 | 6 = 106 miles per hour**

Using your Stem and Leaf Plot, find these measures of center.

Mean	<u>167</u>	Median	<u>162</u>
Mode	<u>124, 161, 163,</u>	Range	<u>165</u>
	<u>240</u>		

Looking at the data that you have plotted, write a conclusion about the data. Include information from the graph along with the measures of center that you calculated.

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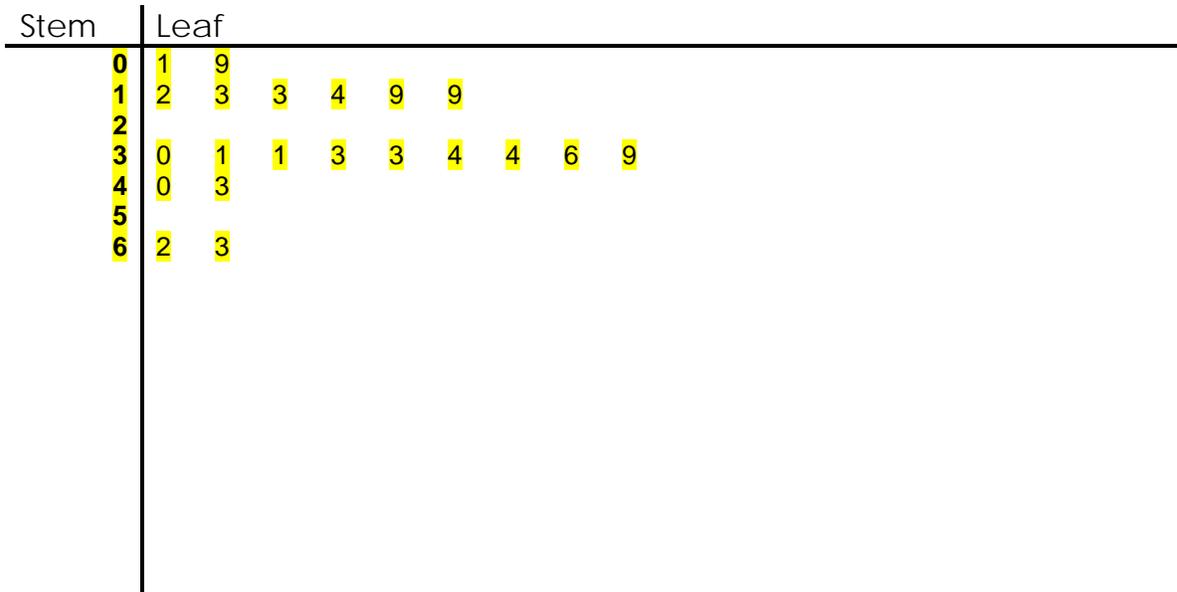
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Speed of Public Transportation in the United States (mph)							
	Sun	Mon	Tues	Wed	Thurs	Fri	Sat
NYC Subway	63	1	62	31	14	39	12
DC Metro	31	30	33	9	36	43	13
Disney Monorail	34	34	33	19	40	19	13

Use your data to complete a Stem and Leaf Plot. Be sure to include a title and a key for your STEM and Leaf Plot.

**Speed of Public Transportation in the  
United States (mph)**

---



**Key: 0 | 1 = 1 miles per hour**

Using your Stem and Leaf Plot, find these measures of center.

Mean 29 Median 31

Mode 13, 19, 31, 33, 34 Range 62

Looking at the data that you have plotted, write a conclusion about the data. Include information from the graph along with the measures of center that you calculated.

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

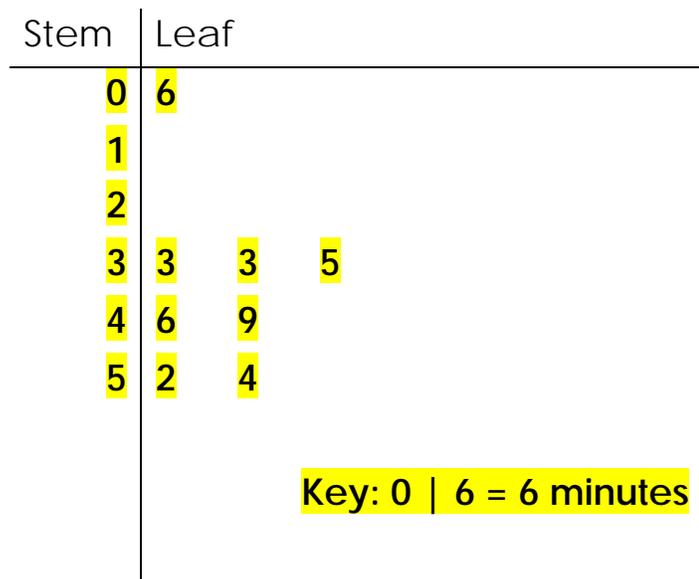
Date: \_\_\_\_\_

Directions: Calculate the elapsed time for each train or solve for the variable. Once you complete the table, plot the elapsed time values on the stem and leaf plot below.

**On Time!**

Train:	Departure time:	Arrival time:	Elapsed time:
Blue	9:39 am	10:31 am	52 minutes
Red	11:58 am	12:52 pm	54 minutes
Green	3:09 pm	X = 3:42 pm	33 minutes
Yellow	5:15 pm	6:01 pm	46 minutes
Black	6:29 pm	7:02 pm	33 minutes
Purple	X = 7:43 pm	8:18 pm	35 minutes
Orange	8:25 pm	8:31 pm	6 minutes
White	9:14 pm	10:03 pm	49 minutes

Show your work!



Summative Assessment

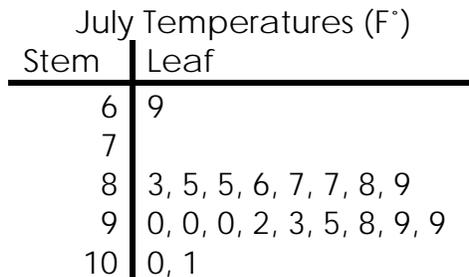
1. Chris played in 6 basketball games. The number of points he scored in each game is shown in the table.

Game	Points Scored
1	66
2	35
3	54
4	17
5	45
6	35

What is the mean number of points Chris scored?

- Ⓐ 35
- Ⓑ 42
- Ⓒ 252
- Ⓓ 46

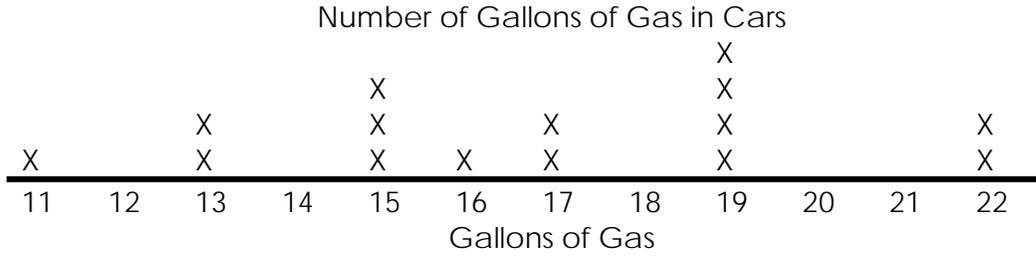
2. The Stem and Leaf plot below shows the daily temperatures for July.



How many days was the temperature in July ninety-two degree Fahrenheit or lower?

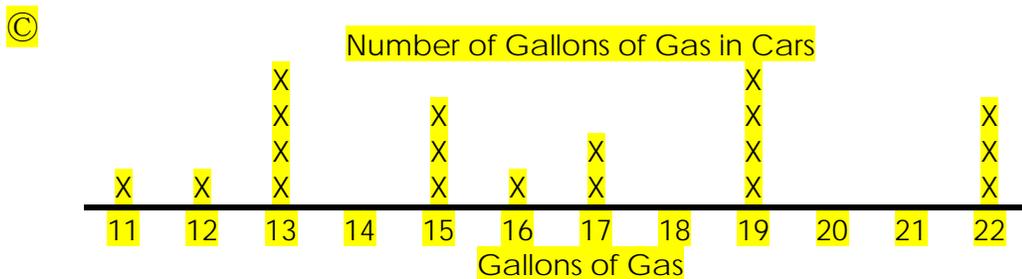
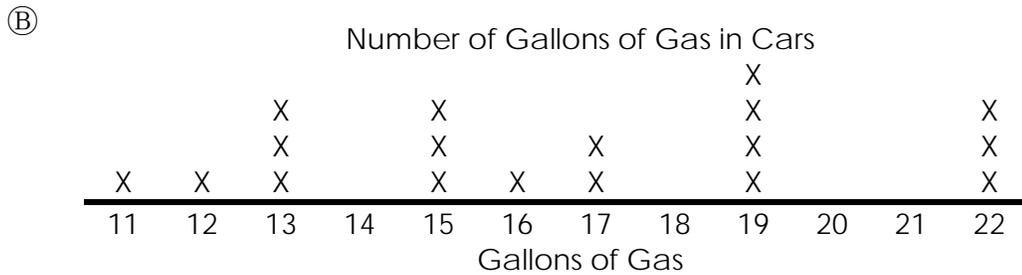
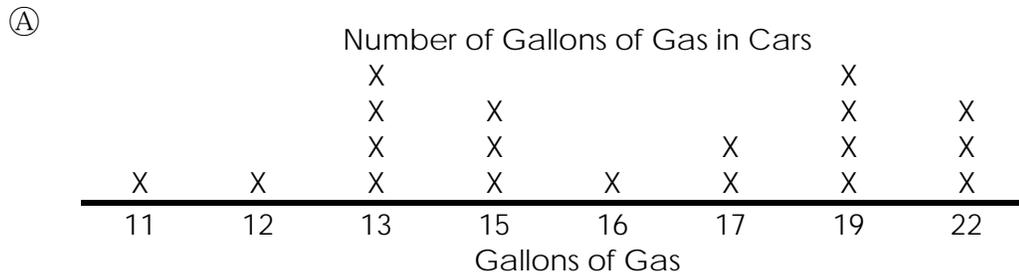
- Ⓐ 8
- Ⓑ 12
- Ⓒ 13
- Ⓓ 20

3. The line plot below shows the number of gallons of gas in 15 cars.



Five more cars have 12, 13, 13 and 22.

Which line plot correctly shows the data added to the line plot?





Ⓓ

key = 0 | 3 = 3 minutes

**Number of Minutes Students Read**

Stem	Leaf
1	4 5 6 6 8
3	1 3 5 6 9
4	3 4 4

key = 0 | 3 = 3 minutes

5. Find the mode of the data below.

Pounds of Potato Chips Consumed by Fourth Grade

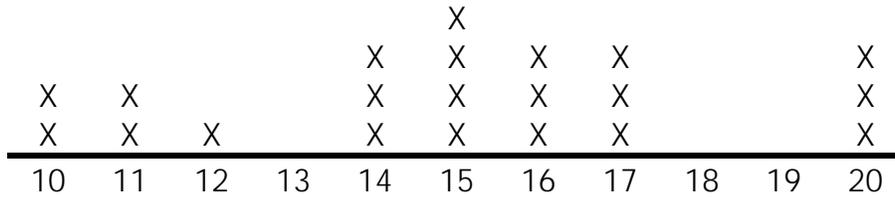
Stem	Leaf				
0	4				
1	0	0	9		
2	1	2	3	4	5
3	1	3	6	8	
4	4	4	8		

Key: 0 | 5 = 5 pounds of potato chips

- (A) 27
- (B) 44
- (C) 24.5
- (D) 62

6. Find the mean of the data below.

Number of M&M's per snack bag



Number of M&M's

- (A) 15
- (B) 16
- (C) 17
- (D) 10

6. Eric spent a month touring Europe. Twenty out of the thirty of his days were spent riding on a train to a different city or country. Below are the prices of Eric's train tickets in dollars.

20	32	61	19
42	71	16	29
37	56	39	37
42	28	34	58
35	43	31	30

Step A

What is the mean of his train ticket prices?

38 dollars

Step B

- Explain how you found the mean cost of Eric's train tickets. Use what you about determining the mean of a set of data. Use words, numbers, and/or letters in your explanation.
- If Eric includes the cost of his 52 dollar train ticket to the airport and his 46 dollar train ticket from the airport home, how will this change the Eric's mean ticket price? Explain why your answer is correct. Use what you know about determining the mean of a set of data. Use words, number, and/or symbols in your explanation.

$$20 + 32 + 61 + 19 + 42 + 71 + 16 + 29 + 37 + 56 + 39 + 37 +$$

$$42 + 28 + 34 + 58 + 35 + 43 + 31 + 30 = 760$$

$$760 \div 20 = 38 \text{ dollars}$$

$$760 + 52 + 46 = 858$$

$$858 \div 22 = 39 \text{ dollars}$$

