

## Grade 6 Math Circles

### Winter 2013

### *Mean, Median, Mode*

#### Mean, Median and Mode

The word *average* is a broad term. There are in fact three kinds of averages: **mean, median, mode**.

#### Mean

The *mean* is the typical average. To find the mean, add up all the numbers you have, and divide by how many numbers there are in total.

Find the mean of the following numbers.

1, 2, 3

First, we add up all the numbers:  $1 + 2 + 3 = 6$

Then we divide by how many numbers we have: 3

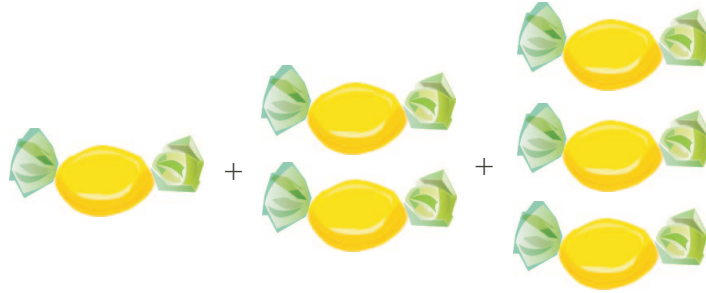
So,

$$\text{mean} = \frac{6}{3} = 2$$

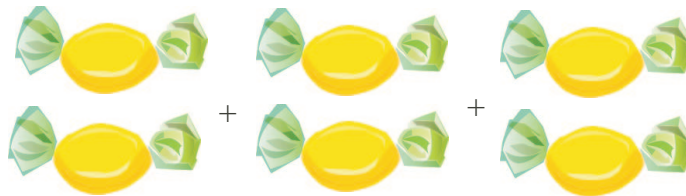
The mean of the number 1, 2, 3 is 2.

Why does this work?

Because having 1 candy + 2 candies + 3 candies is the same as,



having 2 candies + 2 candies + 2 candies.



For example, if I had 6 candies, I could eat 1 the first day, 2 the second day and 3 the third day.

But if I wanted to have the same amount of candies each day (I want an *average* amount), then I should have 2 candies each day (the mean amount).

## Median

The *median* is the middle number in a set of numbers. In order to find the median, you must order up the numbers in numerical order, and then identify the one in the middle.

Find the median of the following numbers.

3, 1, 2

First, arrange the numbers in numerical order: 1, 2, 3

Then we find the middle number: 2

So the median is 2.

What about if we have 4 numbers?

3, 4, 2, 1

Arrange the numbers in numerical order: 1, 2, 3, 4

What is the middle number? \_\_\_\_\_

Why?

Since we have 2 middle numbers, we need to find the middle of those two numbers to find the median value. To do this we add,

$$2 + 3 = 5$$

And divide by 2 to get what would be the middle between 2 and 3.

$$\frac{5}{2} = 2.5$$

## Mode

The *mode* is the most frequent number. In other words, the number that appears most often.

Find the mode of the following numbers.

1, 2, 2, 2, 3

How many 1's do we have? \_\_\_\_\_

How many 2's do we have? \_\_\_\_\_

How many 3's do we have? \_\_\_\_\_

So the mode is \_\_\_\_\_ because it came up the most often.

## Exercise

Find the mean, median, mode of the following set of numbers:

i) 5, 4, 2, 2, 1

mean: \_\_\_\_\_ median: \_\_\_\_\_, mode: \_\_\_\_\_

ii) 1, 4, 6, 7, 2, 3, 8, 2, 3, 57, 7, 3, 1

mean: \_\_\_\_\_, median: \_\_\_\_\_, mode: \_\_\_\_\_

iii) 3, 5, 7, 2, 3, 7, 9, 2

mean: \_\_\_\_\_, median: \_\_\_\_\_, mode: \_\_\_\_\_

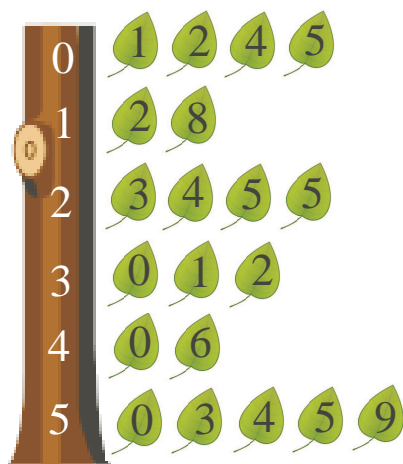
## Using Mean, Median, Mode

### Stem and Leaf Plots

Consider the following numbers:

1, 2, 4, 5, 12, 18, 23, 24, 25, 25, 30, 31, 32, 40, 46, 50, 53, 54, 55, 59

The Stem and Leaf Plot that corresponds is:



What is the mean? \_\_\_\_\_

What is the median? \_\_\_\_\_

What is the mode? \_\_\_\_\_

### Review

The **x-axis** is the horizontal line of a graph/chart.

The **y-axis** is the vertical line of a graph/chart.

### Bar Graphs

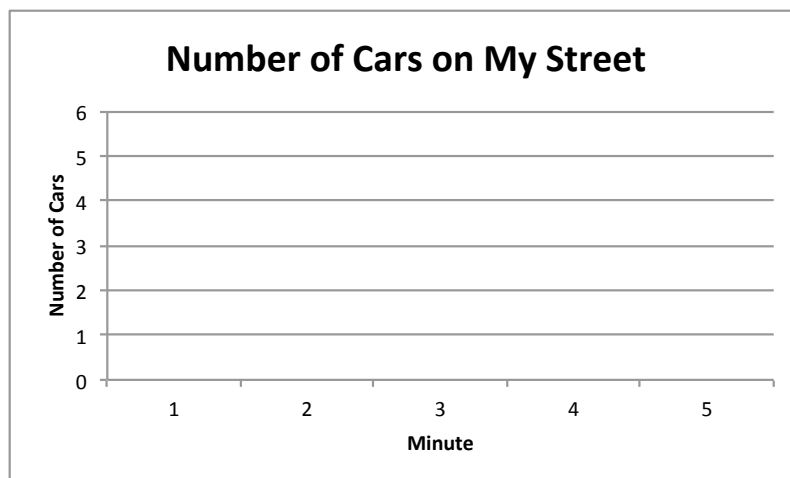
A *bar graph* is a graph consisting of vertical or horizontal bars whose lengths are equal to the values on the y-axis.

The table below represents how many cars I saw drive by on my street in so many minutes.

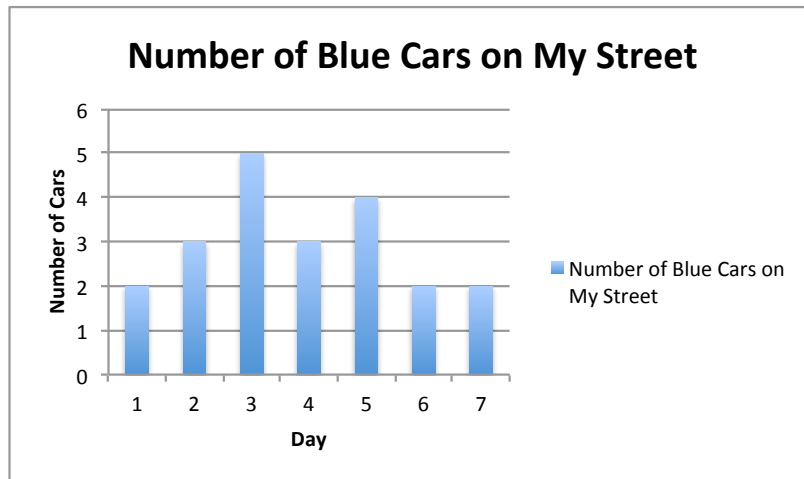
Minute	Number of Cars
1	3
2	1
3	5
4	3
5	2



Draw a bar graph to represent this data.

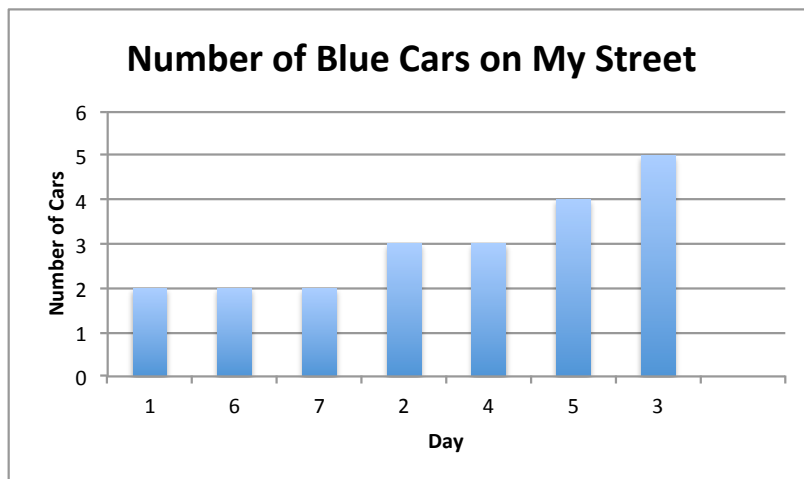


Below is a bar graph of how many blue cars I saw on my street after I counted for 7 days.



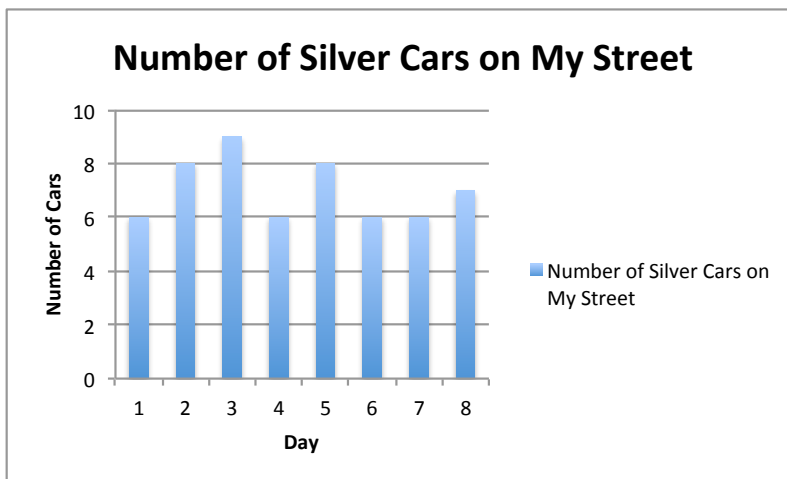
What is the mean? \_\_\_\_\_

What is the median? \_\_\_\_\_



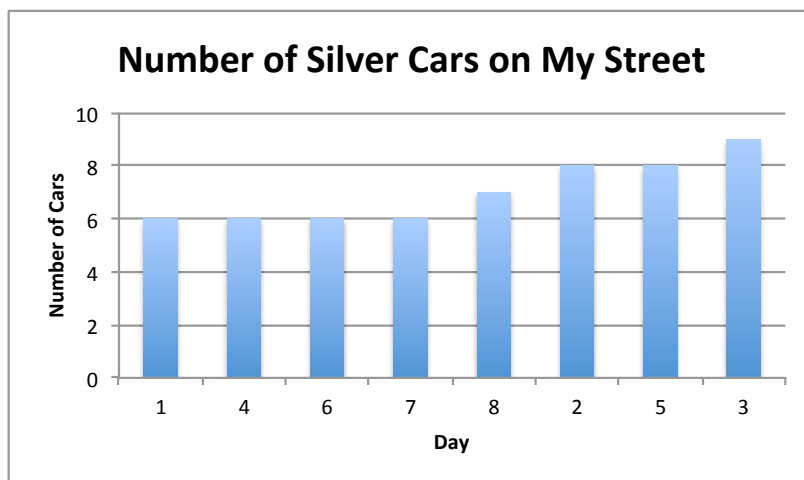
What is the mode? \_\_\_\_\_

Below is another bar graph of how many silver cars I saw on my street after I counted for 8 days.



What is the mean? \_\_\_\_\_

What is the median? \_\_\_\_\_



What is the mode? \_\_\_\_\_

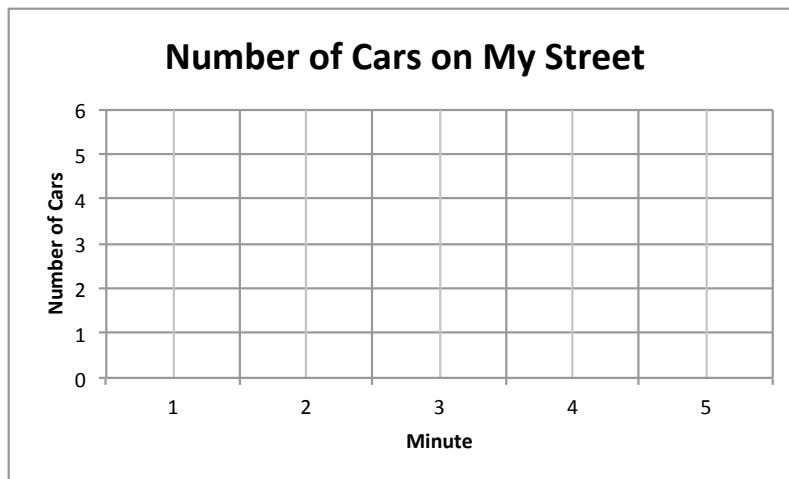
## Scatter Plots

A *scatter plot* is a graph of individual points of data.

If we take the data from before:

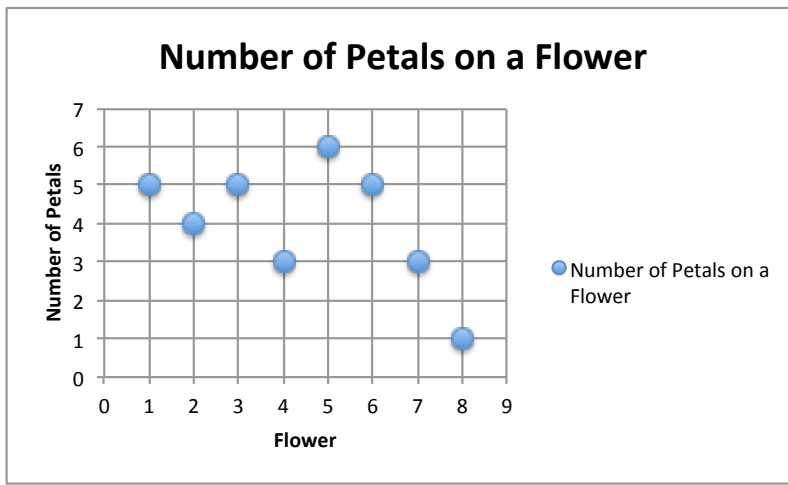
Minute	Number of Cars
1	3
2	1
3	5
4	3
5	2

A scatter plot of this would be:





When Sarah went to the park, she decided to count the number of petals on 8 flowers. What she found is displayed on the scatter plot below.



What is the mean? \_\_\_\_\_

What is the median? \_\_\_\_\_

What is the mode? \_\_\_\_\_

### Word Problems with Means

When trying to solve a word problem that involves mean:

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

**Example 1**

The mean of 6 numbers is 6. If you add a seventh number, the mean is still 6. What was the seventh number?

**Example 2**

The mean of a soccer team goals is 6 goals after 4 games. If the team scored 5 goals in the first game, 6 goals in the second game and 6 goals in the third game, how many goals did they score at the 4th game?

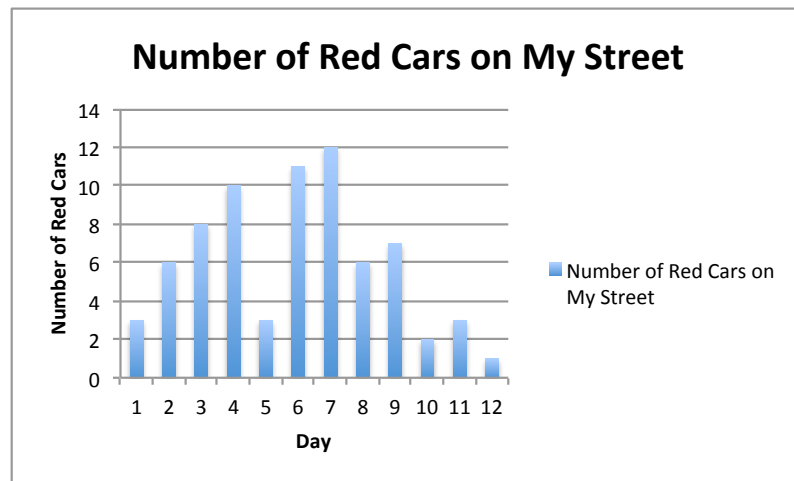
**Problem Set**

1. Find the mode of the following set of numbers.
  - (a) 4, 6, 10, 12, 8, 4, 2, 4, 4
  - (b) 3, 15, 18, 21, 6, 9, 15, 6, 21, 24, 15, 24
  - (c) 18, 25, 18, 36, 91, 25, 36, 5
2. Find the median of the following set of numbers.
  - (a) 17, 15, 18, 16, 54, 23, 23, 56, 45
  - (b) 1, 40, 3, 15, 3, 26, 3
  - (c) 5, 6, 2, 8, 1, 3, 1, 6, 2, 4
3. Find the mean of the following set of numbers.
  - (a) 1, 15, 8, 26, 4, 8, 7, 9, 12
  - (b) 5, 3, 14, 33, 24, 24, 24, 8, 3, 11, 5
  - (c) 1, 2, 5, 5, 9, 8, 6, 6

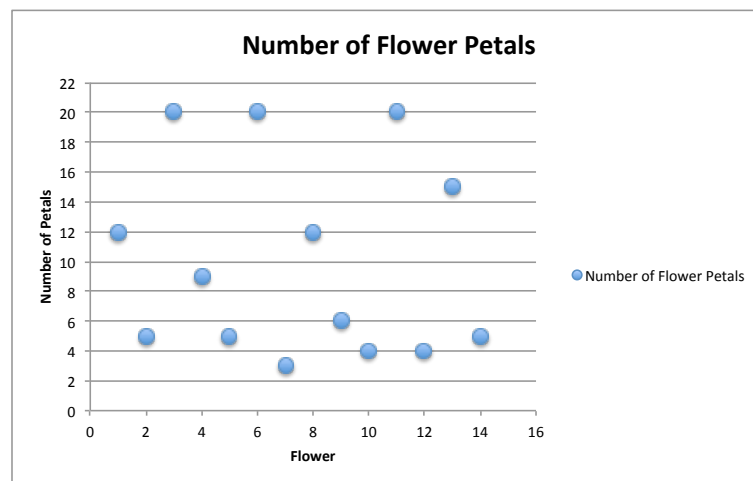
4. Draw a stem and leaf plot for the following set of numbers: 1, 4, 3, 26, 12, 24, 28, 38, 12, 16, 16, 51, 6, 54, 42, 67, 12, 88, 12, 8

- (a) What is the mean?
- (b) What is the mode?
- (c) What is the median?

5. Given the graph below, find the mean, median and mode of the data set.

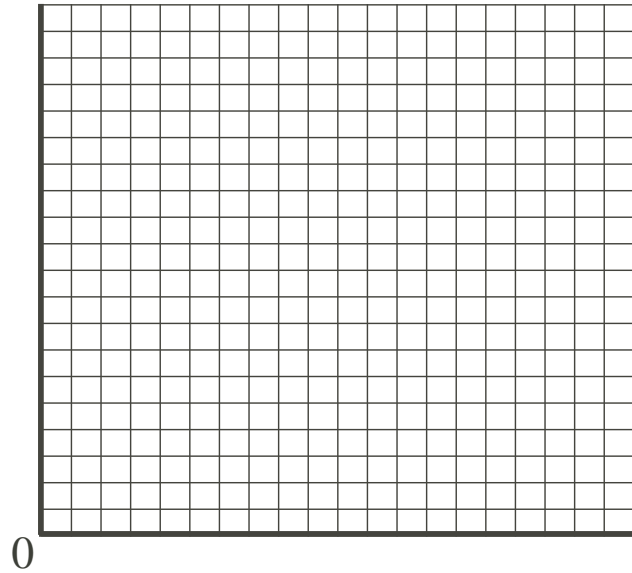


6. Given the graph below, find the mean, median and mode of the data set.



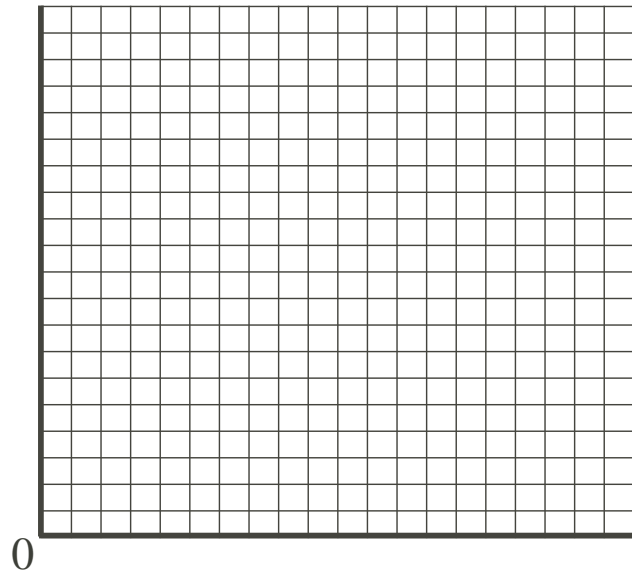
7. Draw a scatter plot from the data given and find the mean, median, and mode. Remember to label your graph.

Box	Number of Tutti Fruity Jelly Beans
1	5
2	10
3	6
4	6
5	8



8. Draw a bar graph from the data given and find the mean, median, and mode. Remember to label your graph.

Box	Number of Green Candies
1	16
2	12
3	12
4	11
5	19
6	20
7	11
8	12
9	13
10	14



9. Karl bought a pack of bouncy balls in assorted colours. There were six blue ones, six red ones, three pink ones, two purple ones, five green ones, six yellow ones, and four orange ones. What is the mode of this set of data?
10. Laura baked cupcakes one afternoon, iced them, and sprinkled them with different toppings. She sprinkled 12 of them in chocolate, 9 of them in hearts, 11 of them in stars, 8 of them in smily faces and 5 of them in regular sprinkles. What is the mean amount of sprinkles she used for each cupcake?

11. The mean weight for a group of eight students is 120 lbs. If 7 of the eight students have weights of 100 lbs, 110 lbs, 115 lbs, 120 lbs, 120 lbs, 130 lbs, 140 lbs, what is the weight of the 8th student?
12. The mean of five numbers is 56. If one of the numbers is excluded, the mean of the numbers is reduced by 4. What is the excluded number?
13. The mean height of a class of 30 grade 6 students is 132 cm. If the height of the teacher is included, the mean height increases to 133 cm. What is the teacher's height in m?
14. The mean number of points a soccer team has is 3 points after 3 games. A lose is 0 points, a tie is 1 point and a win is 3 points. Did the team lose, tie or win their fourth game, if after 4 games the mean is 3 points?
15. Mrs. Dolphin calculates her students' grades by taking the mean of three test scores. Alex's dad told him he can get a new bike if he gets a 90 in Mrs. Dolphin's class. Alex got a score of 85 on his first test, and 90 on his second. How much does he need to get on his third test to get a 90 in the class?
16. Megan is playing mini golf. She has a mean of 7 shots after 3 holes. If after 4 holes, she has a mean 6 shots, how many times did she shoot on the 4th hole? (A shot is one try to get the golf ball into the hole.)
17. Harry, Hermione, Ron and Ginny are working at George's shop and work for commission. That means they get paid based on how many items they sell per week. Below is a chart indicating how many items each of them sold throughout the month.

	Harry	Hermoine	Ron	Ginny
<b>Week 1</b>	30	24	20	22
<b>Week 2</b>	34	26	15	25
<b>Week 3</b>	40	30	23	27
<b>Week 4</b>	32	28	34	22

- (a) George gives an award to the employee with the highest weekly average of sales for the month. Who won?
- (b) What was the mean for the monthly sales of each employee?
- (c) What was the mean of all the weekly sales?
- (d) What was the median of all the weekly sales?
- (e) By how much does the mean of monthly sales drop if Ron quits?

18. The average on the Gauss Contest for one class of 20 was an average of 55%. Turns out one of the results were incorrectly copied as 40% when it was supposed to be 80%. What is the correct mean?
19. The mean of 27 observations was 37. The mean of the first 14 observations is 35 and the mean of the last 14 observations was 42. What is the 14th observation?
20. The mean monthly spending of the Duck family was \$6550 for the first 4 months, \$7210 for the next 5 months and \$6182 for the last three months. If the family saved \$5604 throughout the year, how much did was their mean monthly income?