Box-and-Whisker Diagram

Look at the numbers:

12 17 22 24 25   28   29 31 32 33 35

median of
the lower
half is 22

median
of entire
list is 28
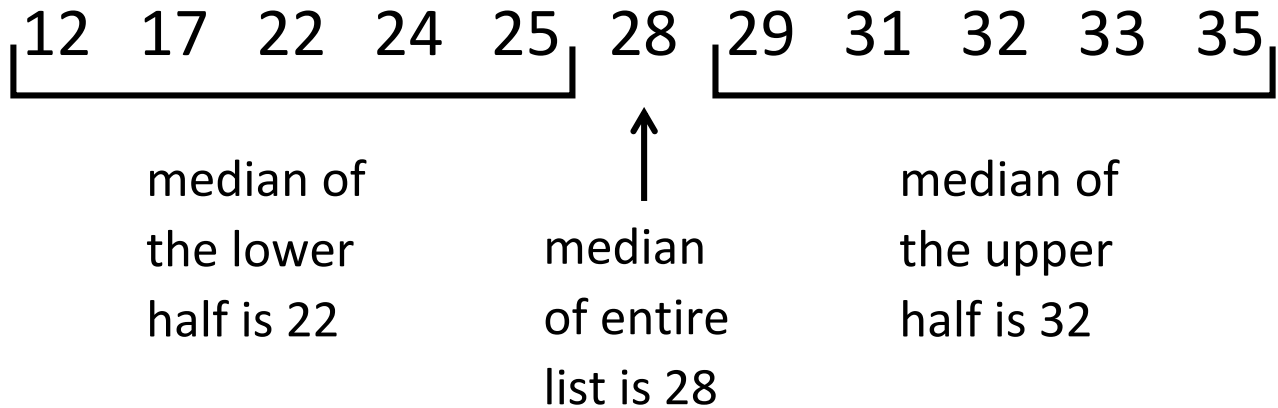
median of
the upper
half is 32

| lower quartile | middle quartile | upper quartile |
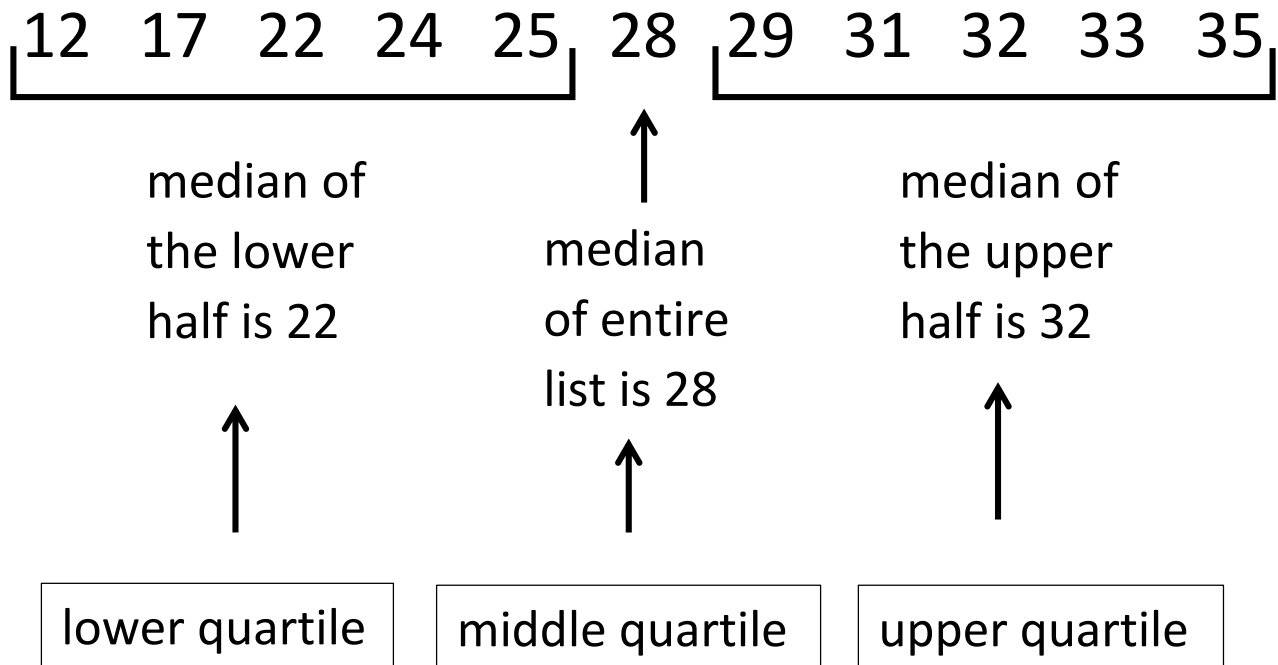
- The <u>lower quartile</u> is the median for the lower half.
- The <u>middle quartile</u> is the median for the entire list.
- The <u>upper quartile</u> is the median for the upper half.

Note: If there is an even number of numbers in the list, include the lower of the 2 median numbers in the lower quartile and the higher of the 2 median numbers in the upper quartile.

Make a box-and-whisker diagram for

12 17 22 24 25 28 29 31 32 33 35

median of
the lower
half is 22

median
of entire
list is 28

median of
the upper
half is 32

1. Find the range of the data and draw a number line from the smallest number to the largest number. Put a point on the number line for both values.

2. Put points on the number line for all 3 quartile numbers.

3. Label all points.

4. Draw a box between the lower and upper quartile.

5. Draw a hash mark at the middle quartile.

12   22   28   32   35

12   22   28   32   35
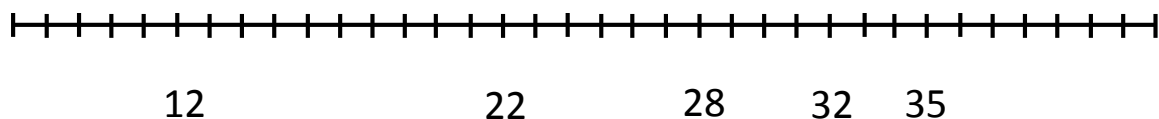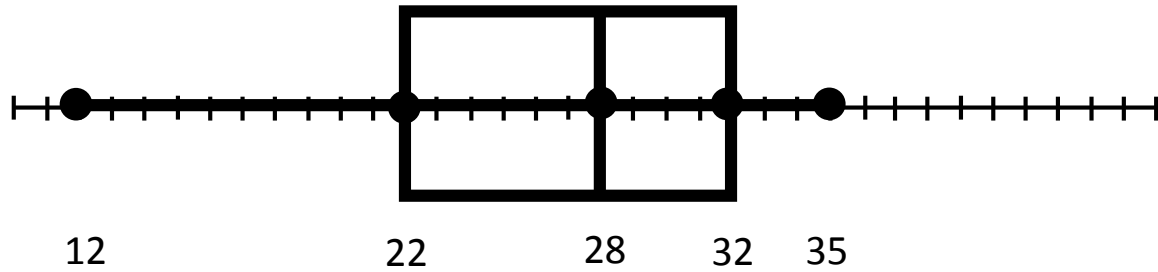
## Sample problem: Make a box-and-whisker diagram for:

16 29 29 30 35 39 40 44 46 50 51 70

1. Draw a line through the median and calculate if necessary.
2. Draw a line through the median of each quartile and calculate if necessary.
3. Draw your number line and put points for the lowest and highest numbers.
4. Find the range of the data and draw a number line from the smallest number to the largest number. Put a point on the number line for both values.
5. Put points on the number line for all 3 quartile numbers.
6. Label all points.
7. Draw a box between the lower and upper quartile.
8. Draw a hash mark at the middle quartile.

Note: Since the numbers are quite spread out, let's let each hash mark stand for 5 units instead of 1 unit.
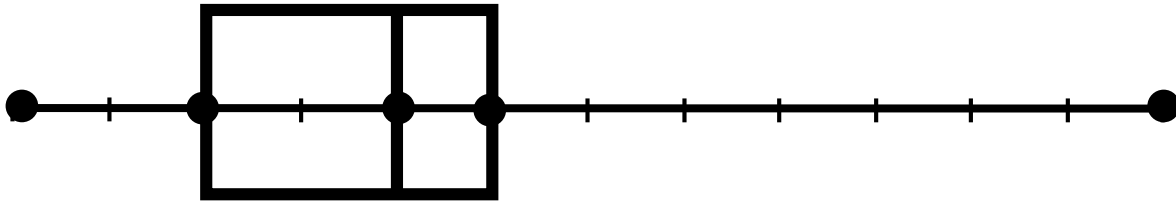

16   29.5   39.5   48   70

Solution:

16   29.5   39.5   48   70
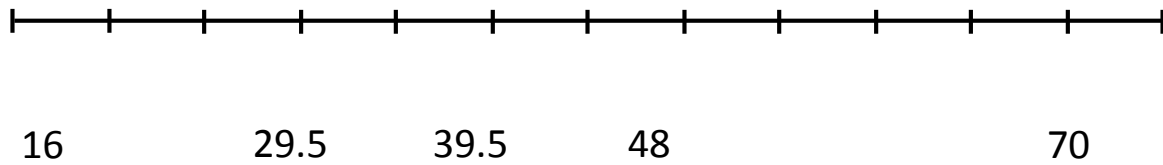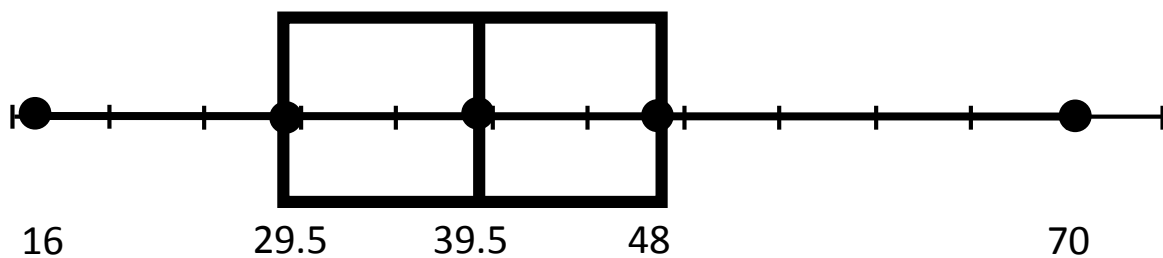
The interquartile range is 48 - 29.5 = 18.5

Look at

What conclusions can you draw?

There is at least one extreme value on the high end.

The data is more concentrated between the middle quartile and upper quartile.

Stem-and-Leaf Diagram

A <u>stem-and-leaf diagram</u> is a type of bar graph in which data points in each interval are listed in order to illustrate statistical data. Each number is divided into 2 parts – a "stem" and a "leaf."

Example: Make a stem-and-leaf diagram for

{16, 29, 29, 30, 35, 39, 40, 44, 46, 50, 51, 70}

Since the numbers are all two-digits, the stem will be the tens digits and the leaves will be the ones digits.

Write in each of the ones digits in the correct row.

```
1 |
2 |
3 |
4 |
5 |
6 |
7 |
```

- The 6 was not used but it's helpful to put it in the diagram.

- You can quickly see where the bulk of your numbers are clustered using a stem-and-leaf diagram.

Example: Make a stem-and-leaf for {33, 34, 40, 44, 44, 45, 51, 60}

Solution:

```
3 | 3 4
4 | 0 4 4 5
5 | 1
6 | 0
```

Key: 3|4 means 34.

Example: Make a stem-and-leaf for {182, 197, 221, 222, 225, 238, 240}

Solution:

```
18 | 2
19 | 7
20 |
21 |
22 | 1 2 5
23 | 8
24 | 0
```

Key: 18|2 means 182

Example of a Scatter Plot

Hours Per Week Watching TV	Grade Point Average
4	3.7
8	3.5
11	3
10	2.8
15	2.7
12	2.6
20	2.6
18	2.4
25	1.9
20	1.5
15	1.3
25	1.1

When your data involves a relationship between 2 variable, we graph the ordered pairs to get an idea of the relationship. We can even come up with an equation for a line or curve that best fits the data, allowing us to make predictions.

Graph the points:

TV and GPA

Grade Point Average

Hours Per Week Watching TV

TV and GPA
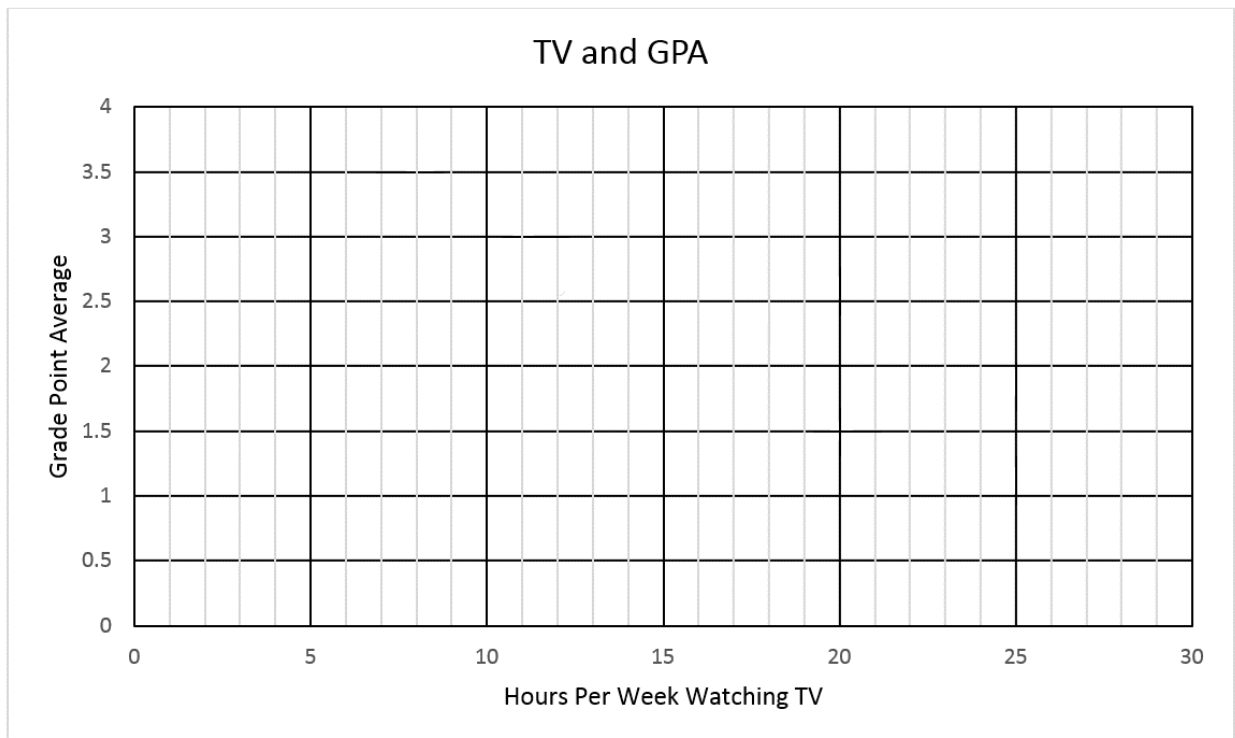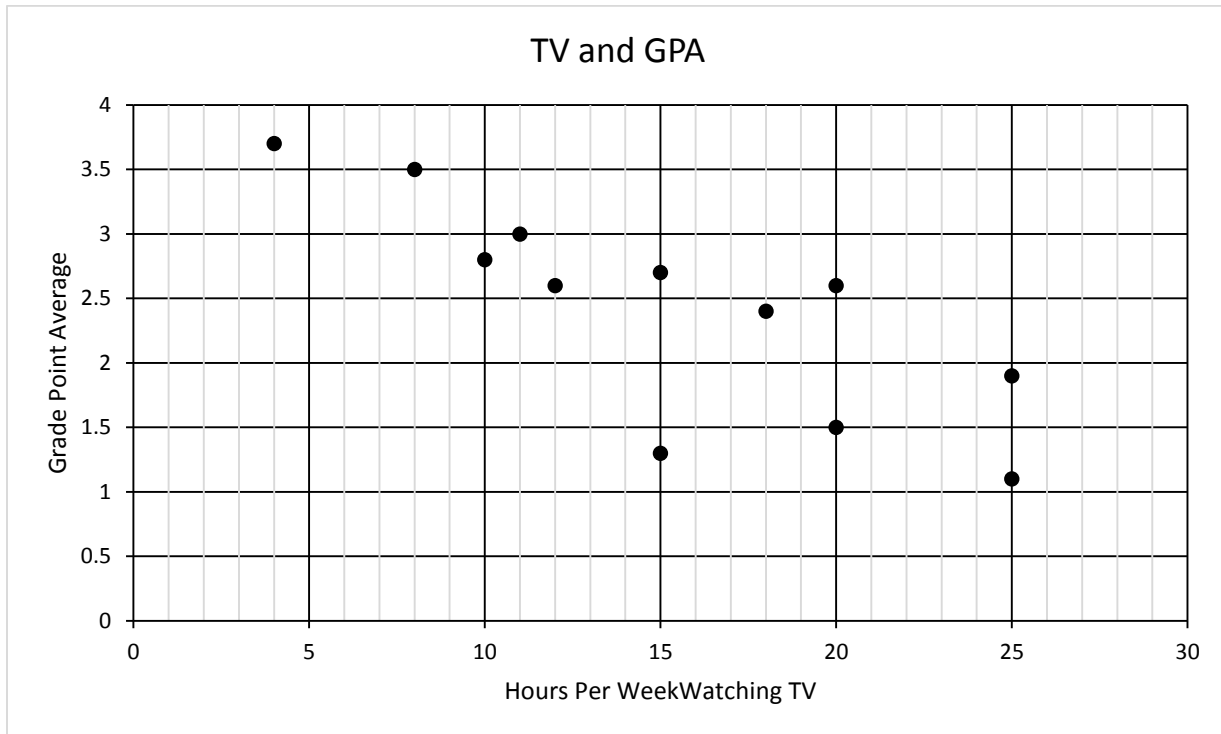
Draw a line that best fits the data.

Is the slope of the line positive or negative?

negative

We say that this graph shows a *negative correlation*. As the number of hours of TV goes **up**, the GPA goes **down**.