

Unit 11. GRAPHS AND STATISTICS.

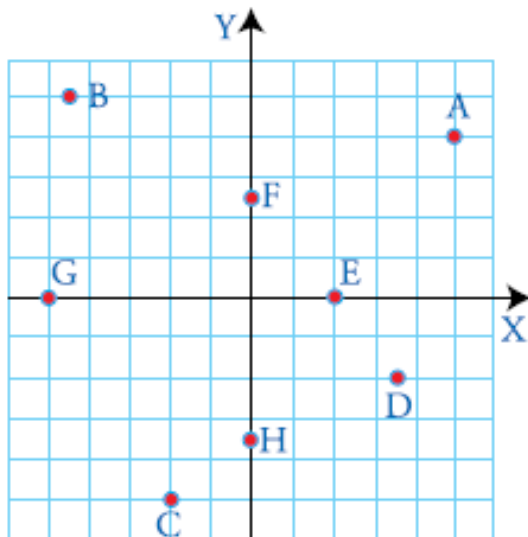
1.CARTESIAN COORDINATES.

Let's revise the following videos to revise something about plotting points in the Cartesian axes.

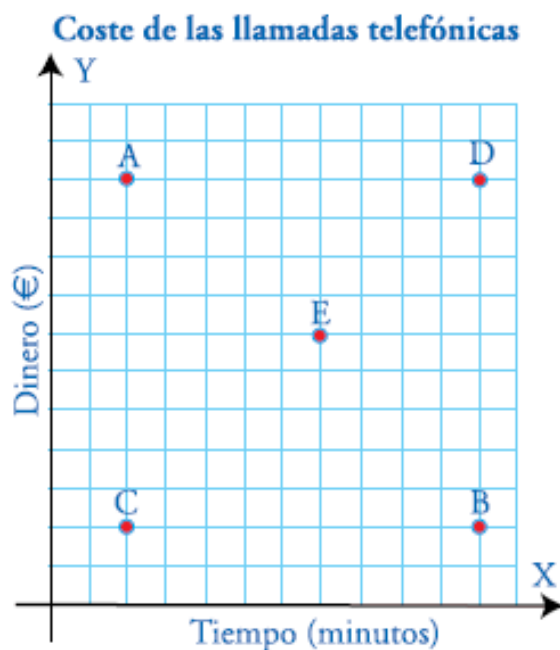
Video 1: <http://www.youtube.com/watch?v=7h74ad7IWil&feature=related>

Video 2: <http://www.brightstorm.com/math/algebra/graphs-and-functions/plotting-points-and-naming-quadrants>

Example 1: Write the coordinates of the following points:

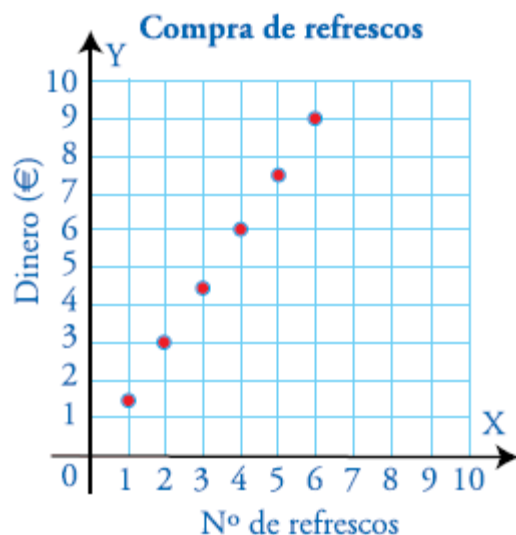


Example 2: Interpret these points in the following graph:



2. INTERPRETATION GRAPHS.

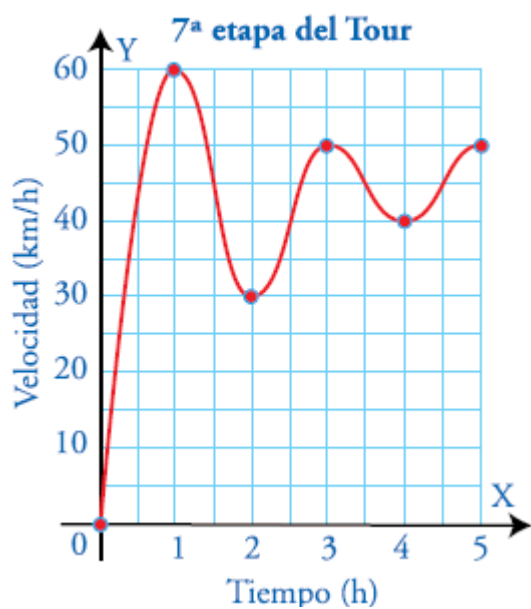
Example 1: Write everything you can about the graph:



Example 2: Write everything you can about the graph:



Example 3: Write everything you can about the graph:



Example 4: Page 267, exercise 4.

- a)
- b)
- c)

Example 5. Page 267, exercise 5.

Example 6: Page 267, exercise 6.

- a)
- b)
- c)
- d)
- e)

2. SOMETHING ABOUT STATISTIC.

2.1.What is Data?

Data is a collection of facts, such as values or measurements.

It can be numbers, words, measurements, observations or even just descriptions of things.

2.2. Qualitative vs Quantitative

Data can be qualitative or quantitative.

- ☐ **Qualitative data** is descriptive information (it *describes* something)
- ☐ **Quantitative data**, is numerical information (numbers).

And **Quantitative data** can also be [Discrete or Continuous](#):

- ☐ **Discrete data** can only take certain values (like whole numbers)
- ☐ **Continuous data** can take any value (within a range)

Put simply: **Discrete data** is counted, **Continuous data** is measured

Example: What do we know about Arrow the Dog?

Qualitative:



- ☐ He is brown and black
- ☐ He has long hair
- ☐ He has lots of energy

Quantitative:

- ☐ Discrete:
 - He has 4 legs
 - He has 2 brothers
- ☐ Continuous:
 - He weighs 25.5 kg
 - He is 565 mm tall

To help you remember think "**Quantitative** is about **Quantity**"

2.3. Collecting

Data can be collected in many ways. The simplest way is direct observation.

Example: you want to find how many cars pass by a certain point on a road in a 10-minute interval.

So: simply stand at that point on the road, and count the cars that pass by in that interval.

You collect data by doing a [Survey](#).

2.4. Census or Sample

A **Census** is when you collect data for **every** member of the group (the whole "population").

A **Sample** is when you collect data just for **selected members** of the group.

Example: there are 120 people in your local football club.

You can ask everyone (all 120) what their age is. That is a census.

Or you could just choose the people that are there this afternoon. That is a sample.

A census is accurate, but hard to do. A sample is not as accurate, but may be good enough, and is a lot easier.

QUESTION 1. Which one of the following is quantitative data?

- A . She is black and white.
- B. She has two ears.
- C. She has short hair.
- D. She has a long tail.

QUESTION 2. Which one of the following is continuous data?

- A. She has two eyes.
- B. She has five kittens.
- C. She weighs 5.4 kg.
- D. She has four paws.

QUESTION 3. Which one of the following is discrete data?

- A.he is 45.2 cm long.
- B. She is 22.3 cm high.
- C. She weighs 5.4 kg.

D. She has 30 teeth

CUESTION 4. A census collects information about:

(Don't worry if you get it wrong ... you can learn from your mistakes.)

A. All members of the population.

B. All adult members of the population.

C. A large sample of the population.

D. A small sample of the population.

2.5. FREQUENCY DISTRIBUTION TABLE.

When you collect data in a statistic study it is used table of frequency to sum up and organize the information. Look the following example:

Example: Asking for the pupils in 1º B, how many brothers and sisters they have got, we get the following answers:

2, 1, 1, 1, 2, 3, 4, 1, 1, 2, 3, 2, 2, 4, 2, 3, 2, 3, 1, 1, 1, 2, 1, 1, 3

Let's fill the gaps in the table:

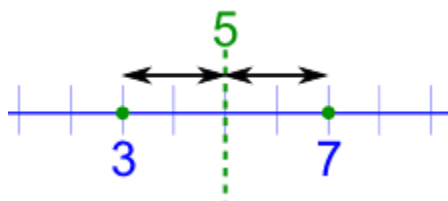
Nº Brothers	Frecuencia Absoluta	Frecuencia Relativa

2.6. Finding a Central Value

When you have two or more numbers it is nice to find a value for the "center".

Example: what is the central value for 3 and 7?

Answer: Half-way in-between, which is 5.



You can calculate it by adding 3 and 7 and then dividing the result by 2:

$$(3+7) / 2 = 10/2 = 5$$

What about 3 or More Numbers?

You can use the same idea when you have 3 or more numbers:

Example: what is the central value of 3, 7 and 8?

Answer: You calculate it by adding 3, 7 and 8 and then dividing the results by 3 (because there are 3 numbers):

$$(3+7+8) / 3 = 18/3 = 6$$



Notice that we divided by 3 because we had 3 numbers ... very important!

2.7. The Mean or Average.

So far we have been calculating the [Mean](#) (or the Average):

Mean: Add up the numbers and divide by how many numbers.

But sometimes the Mean can let you down:

Example: Birthday Activities

Uncle Bob wants to know the average age at the party, to choose an activity.

There will be 6 kids aged 13, and also 5 babies aged 1.

Add up all the ages, and divide by 11 (because there are 11 numbers):

$$(13+13+13+13+13+13+1+1+1+1+1) / 11 = 7.5...$$



The mean age is about $7\frac{1}{2}$, so he gets a **Jumping Castle!**

The 13 year olds are embarrassed,
and the 1-year olds can't jump!

The Mean was **accurate**, but in this case it was **not useful**.

2.8. The Median

But you could also use the [Median](#): simply list all numbers in order and choose the middle one:

Example: Birthday Activities (continued)

List the ages in order:

1, 1, 1, 1, 1, 13, 13, 13, 13, 13, 13

Choose the middle number:

1, 1, 1, 1, 1, **13**, 13, 13, 13, 13, 13

The Median age is **13** ... so let's have a **Disco**!

Sometimes there are **two** middle numbers. Just average them:

Example: What is the Median of 3, 4, 7, 9, 12, 15

There are two numbers in the middle:

3, 4, 7, 9, 12, 15

So we average them:

$$(7+9) / 2 = 16/2 = 8$$

The Median is **8**

2.9. The Mode

The [Mode](#) is the value that occurs most often:

Example: Birthday Activities (continued)

Group the numbers so we can count them:

1, 1, 1, 1, 1, 13, 13, 13, 13, 13, 13

"13" occurs 6 times, "1" occurs only 5 times, so the mode is **13**.

But Mode can be tricky, there can sometimes be more than one Mode.

Example: What is the Mode of 3, 4, 4, 5, 6, 6, 7

Well ... 4 occurs twice but 6 **also** occurs twice.

So **both 4 and 6** are modes.

When there are two modes it is called "bimodal", when there are three or more modes we call it "multimodal".

Conclusion

There are other ways of measuring central values, but **Mean, Median and Mode** are the most common.

Use the one that best suits your data. Or better still, use all three!

CUESTION 5. In his end of year exams, Joe scored the following:

Science 3.4

English 9.

History 8.7

Math 3.4

Geography 5.5

What was the mean?

CUESTION 6. In his end of year exams, Joe scored the following:

Science 3.4

English 9.

History 8.7

Math 3.4

Geography 5.5

What was the median?

CUESTION 7. In his end of year exams, Joe scored the following:

Science 3.4

English 9.

History 8.7

Math 3.4

Geography 5.5

What was the mode?

QUESTION 8. In The table shows the average temperatures for London, England, for each month of the year.

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Average temperature (°F)	38	39	43	46	52	58	62	62	57	51	44	42

a)What is the mean of these values?

b) What is the median of these values?

c) What is the mode of these values?

EXERCISE 9. Exercise 9. Page 269.

EXERCISE 10.

Sam's team has scored the following numbers of goals in the recent games:

2, 3, 1, 2, 1, 3, 2, 3, 4, 5, 4, 2, 2, 3

a) Calculate the frequency distribution table.

b) Calculate the average or mean.

c) Calculate the median.

d) Calculate the mode.

2.9. GRAPHS