

UNIT 8. PROPORTIONALITY AND PERCENTAGES 2º ESO

INFORMATION ABOUT PROPORCIONALITY AND PERCENTAGES

The concept of proportionality has appeared in all cultures. It was related in particular to practical situations, such as 'one yoke fits two oxen; three yokes fit six oxen' and so on.

The ancient Greeks reflected on theories and rules about proportions and percentages as part of their mathematical and philosophical enquiries, rather than for its practical use.

Much later, during the Renaissance, an increase in commerce meant that people needed to understand proportions and percentages well to do business. It was during this period that commercial mathematics, that is, percentages, discounts, debts and payment periods for example, developed very quickly.

— *If I lend you 100 doubloons for one month, you will owe me 106.*

— *If you borrow 200 doubloons from me for one year, you will owe me...*


Today, understanding proportions and percentages is necessary in any field of applied science, such as physics, chemistry, biology and statistics.

If you pay attention, you will see that you already use them in many everyday situations, such as buying, sharing, predicting and estimating.

ACTIVITIES ABOUT THE PREVIOUS TEXT

Find the word(s) in the text that mean...

- 1 ... a frame that is attached to the heads or necks of work animals.
- 2 ... a member of the bovine family.
- 3 ... trade, doing business.
- 4 ... to give something to somebody that they will later return to you.
- 5 ... to take something from somebody that you will later return to them.

-  Work with a partner and follow the instructions.
- 1 What is the difference between lending and borrowing?
 - 2 Who charges interest, the lender or the borrower?
 - 3 Investigate current interest rates that are applied to borrowing money. Do they benefit the lender or the borrower?

VOCABULARY & EXPRESSIONS

- Ratio
- Proportion
- $\frac{a}{b} = \frac{c}{d}$ a is to b as c is to d
- Constant of proportionality
- Extremes: a and d
- Means: b and c
- Cross multiplication
- The direct or inverse rule of three
- Direct proportionality
- Directly proportional magnitudes
- Inverse proportionality
- Inversely proportional magnitudes
- Compound proportionality
- Directly proportional distribution
- Inversely proportional distribution
- Percentages
- Percentage increases
- Percentage decreases



DIRECT AND INVERSE PROPORTIONALITY

- ✓ Two magnitudes are **directly proportional** when they change in the same way. I mean, if one of them increases or decreases, the other increases or decreases.
- ✓ Two magnitudes are **inversely proportional** when they change in a different way. I mean, if one of them increases the other decreases, and vice versa.

→ Here, there are more examples. Can you practise direct and inverse proportionality?

- The number of kilos sold and the money earned. (Directly proportional)
- The number of workers doing a job and the time spent (Inversely proportional)
- The speed of a vehicle and the distance travelled in half an hour (Directly Proportional)

VIDEOGAMES SALE !!!!!!!!!!!



In a videogame store, there are 3 very famous videogames with these prices:


- Minecraft -> 24.90 \$
- FIFA 2021 -> 41.90 \$
- Fortnite -> 29.95 \$

We can buy them separately, but also we can buy them with these sales:

- You buy 3 videogames and you get 50 % off.
- 2 for 1: you get 2 videogames and you pay only one (most expensive).
- In your second purchase, you get 50 % off.
- 3 for 2: you get 3 videogames and you pay only two (most expensive).

- How much are these videogames with these sales?
- What would be your shopping strategy to get 3 videogames with the lowest price?

PROBLEM BY YOURSELF

 The graph shows the proportion of the indigenous population compared to the immigrant population in an agricultural village in Spain.



- Indigenous
- Immigrants

- What fraction of the population are immigrants?
- How many immigrants are there for every 1 000 people?
- How many immigrants are there for every 100 people?
- What percentage of the population are immigrants?

