

Unit 5. DECIMAL NUMBERS.

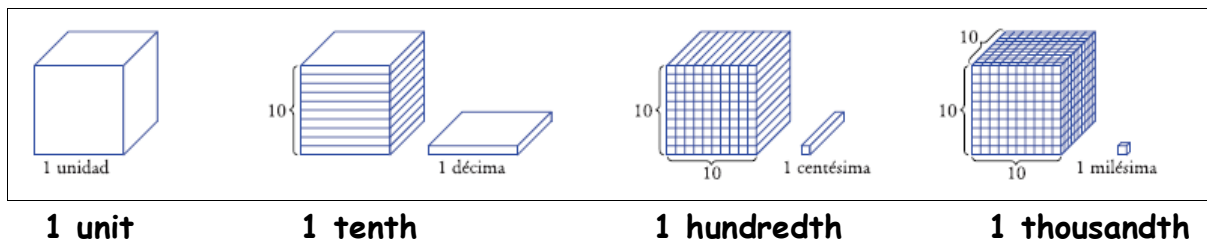
1. DECIMAL NUMBERS.

Think about this:

FRACTION	DECIMAL NUMBER
$\frac{1}{2}$	0.5
$\frac{1}{3}$	0.333333...
$\frac{1}{5}$	0.2
$\frac{102}{90}$	1.13333333.....

Check it (do the divisions):

Remember:



The **decimal numerals system** (sistema de numeración decimal) consists of the unit, and its multiples 10 by 10, and its divisors 10 by 10.



E.g.: 23 units = 23·10 hundredths = 230 hundredths
 45.1 tenths = 45.1:10 units = 4.51 units
 13 units = tenths = hundredths
 25 thousandths = units

Decomposition of a decimal number:

E.g.: 7.456

U	d (tenth)	c (hundredth)	m (thousandth)
7	4	5	6

Representation on the line:

E.g.:



Arrange decimal numbers:

E.g.:

23,458 < 23,472 because 5 < 7 .

125.578 > 125.563 because 7 > 6

Decimal fractions: A fraction is decimal if the denominator is the unit followed by zeros.

E.g.: $\frac{2}{100}$ or $\frac{52}{100000}$ → 0.02 or 0.00052 (exact decimal numbers)

Homework: Page 89, exercises 1, 2, 3, 4, 5, 6, 7.

2. CLASSIFICATION OF DECIMAL NUMBERS.

There are three kinds of decimal numbers:

➤ Terminating decimals (exact decimal numbers):

E.g. : 3.25 or 4.07 or 0.12345

➤ Infinite decimals:

a) Repeating: The decimal part is repeated.

E.g. : $*2.727272 = 2.72 \rightarrow$ decimal periódico puro.

$*1.344444 = 1.34 \rightarrow$ decimal periódico mixto.

b) Non-repeating: The decimal part is not repeated.

E.g. : $\pi = 3.141592\dots$;

$\sqrt{2} = 1,4142135623730950488016887242097\dots$

More examples: Choose the solution:

a) $\frac{13}{3} =$

Exact Decimal

Periódico Puro

Periódico Mixto

Irracional

b) $\frac{16}{3} =$

Exact Decimal

Periódico Puro

Periódico Mixto

Irracional

c) $\frac{31}{12} =$

Exact Decimal

Periódico Puro

Periódico Mixto

Irracional

$$d) \frac{71}{11} =$$

Exact Decimal

Periódico Puro

Periódico Mixto

Irracional

3. OPERATIONS WITH DECIMAL NUMBERS.

We will revise operations with decimal numbers, doing some examples.

Example 1.

a) $45,23 + 7,842$

b) $136,25 + 7,8 + 38,967$

Example 2:

a) $2,567 - 0,58$

b) $823,7 - 97,234$

Example 3:

a) $34,89 \cdot 20,5$

b) $0,00678 \cdot 0,05$

Example 4: Multiply in your head (mentally):

a) $7,45 \cdot 100$

b) $0,00876 \cdot 1\,000$

c) $456,783 \cdot 10\,000$

d) $0,00876 \cdot 1\,000$

d) $8,19 \cdot 0,01$

e) $234,56 \cdot 0,001$

f) $0,023 \cdot 0,1$

g) $659,23 \cdot 0,0001$

Example 5: Do the following divisions calculating two decimal numbers:

a) $31 : 8$

Checking:

b) $5 : 13$

Checking:

c) $83,5 : 9$

Checking:

d) $8,345 : 3,47$

Checking:

e) $0,485 : 3,25$

Checking:

d) In your head: $76,34 : 10\,000$

e) In your head: $34,2 : 1\,000$

f) In your head: $3,2 : 0,0001$

g) In your head: $678,5 : 0,1$

Example 6: Do the following combined operations:

a) $7,5 + 4,8 \cdot 9,3$

b) $40,02 : 5,8 - 1,55$

c) $4,5(33,88 + 60,4)$

d) $(56,3 - 13,55) : 2,5$

Exercise 1. Check all the previous operations using a calculator. How many mistakes have you made?.....

If you need to revise operations, do more examples.

4. APPROXIMATION OF DECIMALS. TRUNCATION AND ROUNDING.

4.1. ROUNDING. (Redondeo)

Redondear un número consiste en aproximarlos mediante otro de forma que si la primera cifra que se suprime es:

a) 0, 1, 2, 3 o 4 la cifra que se redondea no varía.

b) 5, 6, 7, 8 o 9 la cifra que se redondea aumenta en uno.

Rounding is the process of reducing the number of significant digits in a number.

a) If the following digit is 5 or bigger, we add one to the place value.

↓
E.g. Round to the hundredths: 1.3**4**790123 → 1.35

↓
E.g. Round to the thousandths: 3.25**6**98 → 3.257

b) If the following digit is smaller than 5, we keep the same digit.

↓
E.g. Round to the thousandths: 1.34**4**3 → 1.344

↓
E.g. Round to the hundredths: 5.7**8**1523 → _____

4.1. TRUNCATION. (Truncamiento)

The process for limiting the number of digits to the right of the decimal point, by discarding the least significant ones.

E.g. Truncate to one decimal digit or to tenths: $1.946 \cong 1.9$
 $25.89763 \cong 25.8$

E.g. Truncate to two decimal digits or to hundredths : $1.876 \cong 1.87$
 $25.89763 \cong 25.89$

4.3. ESTIMATION OF OPERATIONS WITH DECIMALS. (Estimación de operaciones con decimales)

Para **estimar el resultado de una operación con decimales**, se redondean las cantidades a las unidades, y luego se efectúan las operaciones.

Example 1:

$$5,23 \cdot 6,8 \approx 5 \cdot 7 = 35 \quad \text{however} \quad 5,23 \cdot 6,8 = 35,564$$

Example 2:

$$35,874 : 9,15 \approx 36 : 9 = 4 \quad \text{however} \quad 35,874 : 9,15 = 3,92$$

Example 3:

$$45.456 \cdot 2,5 \cong \dots\dots\dots$$

Example 4:

$$7.756 \cdot 5,34 \cong \dots\dots\dots$$

4.4. ROUNDING WITH THE CALCULATOR.

For rounding with the calculator we choose:

MODE Fix

And then we write the number of decimal digits that we want, for example 2:

MODE Fix 2

Example:

This division: $26/3$ rounded to two decimal digits is equal to $8.66666\dots = 8.\widehat{6}$, and now in the calculator, this is the approximation:

$$\frac{26}{3} \cong 8.67$$

To remove the rounding mode in the calculator:

MODE	Norm
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Exercise: Practise in your calculator. Calculate, rounding to two decimal digits:

a) $\frac{100}{3} \cong$ _____

b) $\frac{18}{7} \cong$ _____

4.5. RESOLUTION OF PROBLEMS.

Remember:

- Understand the wording. → Entiende el enunciado.
- Read it as many times as you need. → Léelo tantas veces como necesites.
- Do the operations.
- Indicate the solution clearly. → Indica claramente la solución.
- Check the solution. → Comprueba la solución.

Example 1: To go on a trip, a group of 24 students buy a box of 24 bottles of soft drinks for 7.28 €, and they order 24 sandwiches, for 25.6 €. How much does everyone have to pay?

Translation:.....

Example 2: Three people set up a company. The first year, they earn €37,000. How much is there for each one? Give the solution approximating to the units.

Translation:.....

Example 3: Antonio buys a farm for € 315,670 and he divides it into 7 plots. If he wants to sell the plots and earn € 2,350 with each one, how much money must he sell each plot for?

Traslation:.....
.....
.....

Homeworks. Page 98. Exercise 79, 80, 81, 82, 83, 84, 85, 86, 87.

**FOR MORE PRACTICE COMPARING DECIMALS, FRACTIONS
AND PERCENTAGES**



1. Watch this video and you will learn how to change fraction and decimals into percentages

http://www.mathplayground.com/howto_perfracdec.html

2. Now do the following interactive activities to check what you know about this

<http://www.quia.com/cb/34887.html>

3. Do the following exercises in your notebook

<http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/comparing/comparingall3/worksheet13.shtml>

<http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/comparing/comparingall3/worksheet15.shtml>

4. Now check the answers of exercise number 3.

<http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/comparing/comparingall3/worksheet14.shtml>

<http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/comparing/comparingall3/worksheet16.shtml>

FOR MORE PRACTICE EXERCISES THAT YOU CAN DO ON THE INTERNET,
VISIT THIS USEFUL AND ENJOYABLE WEBSITE. COME ON! TRY IT!



<http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/decimals/usingdecimals/quiz.shtml>

<http://www.bbc.co.uk/skillswise/numbers/fractiondecimalpercentage/comparing/comparingall3/quiz.shtml>

<http://www.bbc.co.uk/schools/ks2bitesize/maths/tests/decimals.shtml>

I hope you have learnt a lot!