

# MATHEMATICS

## 1º ESO



PROGRAMA DE ENSEÑANZA BILINGÜE

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# 1 Numbers

## 1 Numbers

The **cardinal numbers** (one, two, three, etc.) are adjectives referring to **quantity**, and the **ordinal numbers** (first, second, third, etc.) refer to **distribution**.

Number	Cardinal	Ordinal
1	one	first (1 <sup>st</sup> )
2	two	second (2 <sup>nd</sup> )
3	three	third (3 <sup>rd</sup> )
4	four	fourth (4 <sup>th</sup> )
5	five	fifth
6	six	sixth
7	seven	seventh
8	eight	eighth
9	nine	ninth
10	ten	tenth
11	eleven	eleventh
12	twelve	twelfth
13	thirteen	thirteenth
14	fourteen	fourteenth
15	fifteen	fifteenth
16	sixteen	sixteenth
17	seventeen	seventeenth
18	eighteen	eighteenth
19	nineteen	nineteenth
20	twenty	twentieth
21	twenty-one	twenty-first
22	twenty-two	twenty-second
23	twenty-three	twenty-third
24	twenty-four	twenty-fourth
25	twenty-five	twenty-fifth
26	twenty-six	twenty-sixth
27	twenty-seven	twenty-seventh
28	twenty-eight	twenty-eighth
29	twenty-nine	twenty-ninth

30	thirty	thirtieth
40	forty	fortieth
50	fifty	fiftieth
60	sixty	sixtieth
70	seventy	seventieth
80	eighty	eightieth
90	ninety	ninetieth
100	one hundred	hundredth
1,000	one thousand	thousandth
100,000	one hundred thousand	hundred thousandth
1,000,000	one million	millionth

Beyond a million, the names of the numbers differ depending where you live. The places are grouped by thousands in America and France, by the millions in Great Britain, Germany and Spain.

Name	American-French	English-German-Spanish
million	1,000,000	1,000,000
billion	1,000,000,000 (a thousand millions)	1,000,000,000,000 (a million millions)
trillion	1 with 12 zeros	1 with 18 zeros
quadrillion	1 with 15 zeros	1 with 24 zeros

## 2 More about reading numbers

**AND** is used before the last two figures (tens and units) of a number.

325: three hundred **and** twenty-five  
 4,002: four thousand **and** two

### **A and ONE**

The words *hundred*, *thousand* and *million* can be used in the singular with “a” or “one”, but not alone. “A” is more common in an informal style; “one” is used when we are speaking more precisely.

I want to live for **a** hundred years  
 The journey took exactly **one** hundred years  
 I have **a** thousand euros

“A” is also common in an informal style with *measurement-words*

A kilo of oranges costs **a** euro  
 Mix **one** litre of milk with **one** kilo of flour...

"A" is only used with *hundred, thousand*, etc at the beginning of a number

146      **a** hundred and forty-six

3,146    three thousand, **one** hundred and forty-six

We can say "*a thousand*" for the round number 1,000, and we can say "*a thousand*" before "*and*", but we say "*one thousand*" before a number of hundreds.

1,000 **a** thousand

1,031 **a** thousand and thirty-one

1,100 **one** thousand, one hundred

1,498 **one** thousand, four hundred and ninety-eight

Compare also:

**A** metre *but* one metre seventy (centimetres)

**A** euro *but* one euro twenty (cents)

### Exercises I

1. Write in words the following numbers:

37 → \_\_\_\_\_

27 → \_\_\_\_\_

28 → \_\_\_\_\_

84 → \_\_\_\_\_

62 → \_\_\_\_\_

13 → \_\_\_\_\_

15 → \_\_\_\_\_

158 → \_\_\_\_\_

38 → \_\_\_\_\_

346 → \_\_\_\_\_

89 → \_\_\_\_\_

461 → \_\_\_\_\_

35 → \_\_\_\_\_

703 → \_\_\_\_\_

73 → \_\_\_\_\_

102 → \_\_\_\_\_

426 → \_\_\_\_\_

1,870 → \_\_\_\_\_

363 → \_\_\_\_\_

1,015 → \_\_\_\_\_

510 → \_\_\_\_\_

1,013 → \_\_\_\_\_

769 → \_\_\_\_\_

6,840 → \_\_\_\_\_

468 → \_\_\_\_\_

8,900 → \_\_\_\_\_

686 → \_\_\_\_\_

6,205 → \_\_\_\_\_

490 → \_\_\_\_\_

9,866 → \_\_\_\_\_

671 → \_\_\_\_\_

7,002 → \_\_\_\_\_

804 → \_\_\_\_\_

5,676 → \_\_\_\_\_

3,750 → \_\_\_\_\_

77 → \_\_\_\_\_

### 3 [ 0 ] nought, zero, o, nil, love

The figure 0 is normally called **nought** in UK and **zero** in USA

- When numbers are said figure by figure, 0 is often called like the **letter O**

Examples:

My telephone number is nine six seven double two **o** four six **o** (967 220460)

My telephone number is nine six seven double two **o** treble/triple six (967 220666)

- In measurements (for instance, of temperature), 0 is called **zero**

Water freezes at **zero** degrees Celsius

- Zero scores in team-games are usually called **nil** in UK and **zero** in USA.

- In tennis, table-tennis and similar games the word **love** is used (this is derived from the French l'oeuf, meaning the egg, presumably because zero can be egg-shaped)

Examples:

Albacete three Real Madrid **nil (nothing)**

Nadal is winning forty-**love**

#### 2. Write in words and read the following telephone numbers:

967252438	
678345600	
961000768	
918622355	
0034678223355	
0034963997644	

### 4 Decimals

Decimal fractions are said with each figure separate. We use a full stop (called "**point**"), not a comma, before the fraction. Each place value has a value that is one tenth the value to the immediate left of it.

0.75 (nought) **point** seventy-five or seventy-five hundredths

3.375 three **point** three seven five



## 5 Fractions and percentages

Simple fractions are expressed by using "ordinal numbers" (third, fourth, fifth...) with some exceptions:

1/2	One half / a half
1/3	One third / a third
2/3	Two thirds
3/4	Three quarters
5/8	Five eighths
4/33	Four <b>over</b> thirty-three

### Percentages:

We don't use the article in front of the numeral

10% of the people                      Ten **per cent** of the people

## 6 Roman numerals

Examples:

I=1	(I with a bar is not used)
V=5	$\bar{V}$ =5,000
X=10	$\bar{X}$ =10,000
L=50	$\bar{L}$ =50,000
C=100	$\bar{C}$ = 100 000
D=500	$\bar{D}$ =500,000
M=1,000	$\bar{M}$ =1,000,000

1 = I	11 = XI	25 = XXV
2 = II	12 = XII	30 = XXX
3 = III	13 = XIII	40 = XL
4 = IV	14 = XIV	49 = XLIX
5 = V	15 = XV	50 = L
6 = VI	16 = XVI	51 = LI
7 = VII	17 = XVII	60 = LX
8 = VIII	18 = XVIII	70 = LXX
9 = IX	19 = XIX	80 = LXXX
10 = X	20 = XX	90 = XC
	21 = XXI	99 = XCIX

- There is no zero in the Roman numeral system.
- The numbers are built starting from the largest number on the left, and adding smaller numbers to the right. All the numerals are then added together.
- The exception is the subtracted numerals, if a numeral is before a larger numeral; you subtract the first numeral from the second. That is, IX is 10 - 1 = 9.
- This only works for one small numeral before one larger numeral - for example, IIX is not 8; it is not a recognized roman numeral.
- There is no place value in this system - the number III is 3, not 111.

## 7 Decimal notation and place value

Every digit represents a different value depending on its position. For example in 54 the digit 5 represents fifty units, in 5329 the digit 5 represents five thousand units.

**3. Write in words the following numbers as in the examples:**

BILLION	HUNDRED MILLION	TEN MILLION	MILLION	HUNDRED THOUSAND	TEN THOUSAND	THOUSAND	HUNDRED	TEN	UNIT
8	3	4	1	6	7	2	9	3	4
				5	8	3	4	0	0

- "Eight billion three hundred forty one million six hundred seventy two thousand nine hundred and thirty four".
- "Five hundred eighty three thousand four hundred".

2,538 \_\_\_\_\_

90,304 \_\_\_\_\_

762 \_\_\_\_\_

8,300,690,285 \_\_\_\_\_

593 \_\_\_\_\_

1,237,569 \_\_\_\_\_

3,442,567,321 \_\_\_\_\_

76,421 \_\_\_\_\_

90,304 \_\_\_\_\_

762 \_\_\_\_\_

8,321,678 \_\_\_\_\_

250,005 \_\_\_\_\_

**4. Read the following numbers:**

120,000.321      453,897      700,560      5,542,678,987  
 34,765      94,540      345,971      82,754  
 763,123      1,867,349      500,340      4,580,200,170

**5. Read the following numbers:**

8,300,345    3,000,000,000    678,987,112    30,000,000,000  
 678,234,900

**Use this table *only* if you need it.**

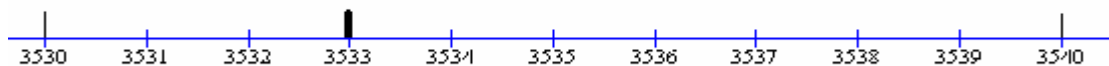
BILLION	HUNDRED MILLION	TEN MILLION	MILLION	HUNDRED THOUSAND	TEN THOUSAND	THOUSAND	HUNDRED	TEN	UNIT

**8 Rounding numbers**

When we use big numbers it is sometimes useful to approximate them to the nearest whole number

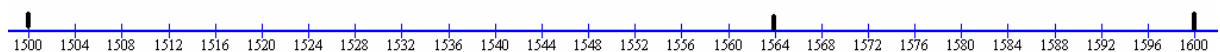
*Examples:*

1. Round 3533 to the nearest ten



3533 is closer to 3530 than 3540 so 3533 rounded to the nearest ten is 3530

2. Round 1564 to the nearest hundred



1564 is closer to 1600 than 1500 so 1564 rounded to the nearest hundred is 1600

**The rule is:**

1. Look at the digit which is one place on the right to the required approximation.
2. If the digit is less than 5, **cut the number** (change the digits on the right to zeros) as in the example 1.
3. If the digit is 5 or more than 5, **add one unit to the digit of the rounding position** and change the others to zeros like in the example 2.

### Exercises II

**1 Use the information of the table below to round the population to the nearest**

- a) Ten
- b) Hundred
- c) Ten thousand

**Round the land areas to the nearest**

- a) Hundred
- b) Thousand

City/Land	Population	a)	b)	c)	Area (km <sup>2</sup> )	a)	b)
Oxford	151,573				2605		
Worcester	93,353				1,741		
Edinburgh	451,710				263		
Hereford	50,468				2,180		
Glasgow	611,440				175		
Bristol	410,950				2,187		
London	7,355,420				1,577		
York	193,268				272		

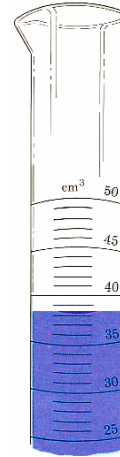
**2 Round the following numbers to the nearest indicated in the table**

Numbers	Ten	Hundred	Thousand
6,172			
18,776			
5,217			

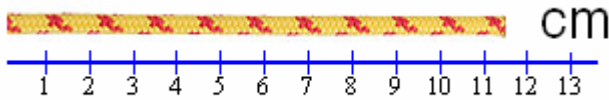
126,250			
5,208			
37,509			
8,399			
7,257			
129,790			
999			

**3 Write the answer in the following cases:**

a) What is the volume of liquid in the graduated cylinder to the nearest 10 ml?



b) How long is the rope to the nearest cm?



c) What is the weight of the bananas rounded to the nearest 100g and to the nearest kg?



d) If the capacity of this stadium is 75,638 people, round it appropriately to the nearest.

Ten

Hundred

Thousand



**Rounding helps us to estimate the answers to calculations****4 For each question**

- a) Estimate the answer by rounding each number appropriately.
- b) Find the exact answer.
- c) Check that both answers are similar.

**4.1 Anne bought a house for 76,595€ in 2001 and in 2007 sold it for 92,428€. Which was the profit?**

- a)
- b)
- c)

**4.2 In a shoe shop 3,670 boxes of shoes have to be organized. There are three employees at the shop. How many boxes does each employee have to organize?**



- a)
- b)
- c)

**4.3 Constance bought some furniture. She bought an armchair for € 499, a bed for 298€, a table for 189€ and four chairs at 97€ each. If she had a discount of 48€, how much did she have to pay?**



- a)
- b)
- c)

4.4 The "Instituto Andrés de Vandelvira" has 1,048 students, who have been distributed in 30 groups. How many students are there in each group?

a)

b)

c)

4.5 The number of votes for each party in an election was: Party A 20,446, party B 10,866, party C 7,994 and others 5,743.

How many people voted?

What was the difference between the highest and the lowest numbers of votes?

a)

b)

c)

## 9 Calculations

What's ...? ¿cuánto es..? / ¿cuántos son..?      It's ... es... /son...

### Addition



In small additions we say **and** for + and **is/are** for =

$2+6=8$  two **and** six **are** eight

**What's** eight **and** six? **It's** eight

In larger additions (and in **more formal style**) we use **plus** for +, and **equals** or **is** for =

$720 + 145= 865$  Seven hundred **plus** two hundred **equals / is** nine

**Subtraction**

With small numbers, people say

$7 - 4 = 3$  four **from** seven **leaves/is** three *or* seven **take away** four **leaves/is** three

In a more formal style, or with larger numbers, we use **minus** and **equals**

$510 - 302 = 208$  Five hundred and ten **minus** three hundred and two **equals /is** two hundred and eight

**Multiplication**

In small calculations we say

$3 \times 4 = 12$  three fours **are** twelve

$6 \times 7 = 42$  six sevens **are** forty-two

In larger calculations we can say

$17 \times 381 = 6,477$  17 **times** 381 **is/makes** 6,477, or in a more formal style 17 **multiplied by** 381 **equals** 6,477

**Division**

$270:3 = 90$

Two hundred and seventy **divided by** three **equals** ninety  
But in smaller calculations ( $8:2 = 4$ ) we can say two **into** eight **goes** four (times)

**Exercises III**

**1 Write the missing words. Write the answers in words**

Twelve minus seven equals \_\_\_\_\_

Six times five equals \_\_\_\_\_

Eighty minus seventeen is \_\_\_\_\_

Forty four minus nine plus twenty three equals \_\_\_\_\_

Three times fifteen divided by five equals \_\_\_\_\_

**2 Write the missing numbers and write the answers in words as in the example**

$3 + 14 = 17$  three plus fourteen equals seventeen



1.  $6x \underline{\quad} = 42$
2.  $18 \underline{\quad} = 11$
3.  $6 : \underline{\quad} + 7 = 10$
4.  $12 \times 3 - \underline{\quad} = 25$
5.  $(5x \underline{\quad} + 5) : 8 = 5$

**3 Write the missing operation symbols. Then write the answers in words**

1.  $6 \underline{\quad} 7 \underline{\quad} 2 = 40$
2.  $8 \underline{\quad} 2 \underline{\quad} 5 = 2$
3.  $28 \underline{\quad} 9 \underline{\quad} 1 = 18$
4.  $9 \underline{\quad} 3 \underline{\quad} 5 = 8$
5.  $49 \underline{\quad} 7 \underline{\quad} 3 = 10$
6.  $6 \underline{\quad} 4 \underline{\quad} 2 \underline{\quad} 8 = 0$

### Exercises IV

**1 A shop is open daily except on Sundays. The profit after a year was 96300€.**

a) Calculate the average (mean) per working day. (Total profit divided by the number of days)

b) Tony has worked in the shop every day for a year earning 294€ per week.

**How much has he earned in a year?**

**How much per day?**

**2 A car travels 17 km per litre of petrol. How many litres are needed to travel 560 km? If the capacity of the tank is 42 litres how far can the car travel on a full tank?**

**3 Find three consecutive numbers whose product is 4080.**

**4 Calculate:**

**a)**  $48 \div (3 + 5)$

**b)**  $(5 + 4) \times 14$

**c)**  $(40 + 30) \div 5$

**d)**  $(27 + 21) \div 3$

**e)**  $(22 + 33) \div 11$

**f)**  $(40 \div 20) \cdot 3$

**5 Calculate:**

**a)**  $3 + 6 \cdot 2 + 5$

**b)**  $(4 + 3) \cdot 5 - 2$

**c)**  $15 - 6 : 2 \times 4$

**d)**  $15 - 16 : (3 + 1)$

**e)**  $3 + 6 \times 2 + 10$

**f)**  $(58 - 18) \cdot (27 + 13)$

**g)**  $(32 - 8) : (6 - 3)$

**h)**  $(32 - 8) : 6 - 3$

**i)**  $67 + 16 \times 3$

**6 Insert brackets to make the following calculations correct**

**a)**  $5 + 4 \times 8 = 37$

**b)**  $5 + 4 \times 8 = 72$

**c)**  $6 + 15 \div 3 = 11$

**d)**  $6 + 15 : 3 = 7$

**e)**  $5 + 4 + 3 \times 7 = 54$

**f)**  $16 + 3 \times 2 + 5 = 37$

**g)**  $24 / 4 + 2 \cdot 7 = 28$

**h)**  $240 : 5 + 7 - 4 \times 3 = 8$

**7 Abel buys 35 litres of petrol at 0.98€ per litre.****a) Estimate how much that costs by rounding appropriately.****b) Find the exact answer.****c) Check that both answers are similar.**

## Solutions

### Exercises I

1.

**37** → thirty seven; **27** → twenty-seven; **28** → twenty-eight; **84** → eighty four  
**62** → sixty two; **13** → thirteen; **15** → fifteen; **158** → one hundred and fifty eight  
**38** → thirty eight; **346** → three hundred and forty six; **89** → eighty nine; **461** → four hundred and sixty one; **35** → thirty five; **703** → seven hundred and three; **73** → seventy three; **102** → one hundred and two; **426** → four hundred and twenty six  
**1,870** → one thousand, eight hundred and seventy; **363** → three hundred and sixty three; **1,015** → one thousand and fifteen; **510** → five hundred and ten; **1,013** → one thousand and thirteen; **769** → seven hundred and sixty nine; **6,840** → six thousand, eight hundred and forty; **468** → four hundred and sixty eight; **8,900** → eight thousand nine hundred; **686** → six hundred and eighty six; **6,205** → six thousand, two hundred and five; **490** → four hundred and ninety; **9,866** → nine thousand, eight hundred and sixty six; **671** → six hundred and seventy one; **7,002** → seven thousand and two; **804** → eight hundred and four; **5,676** → five thousand, six hundred and seventy six  
**3,750** → three thousand, seven hundred and fifty; **77** → seventy seven

2.

967252438	Nine six seven, two five two, four three eight
678345600	Six seven eight, three four five, six double oh
961000768	Nine six one, triple oh, seven six eight
918622355	Nine one eight, six double two, three double five
0034678223355	Double oh three four six, seven eight double two double three, double five
0034963997644	Double oh three four nine, six three double nine, seven six double four

3.

**2,538**: two thousand, five hundred and thirty eight; **90,304**: ninety thousand, three hundred and four; **762**: seven hundred and sixty two; **8,300,690,285**: Eight billion, three hundred million, six hundred ninety thousand, two hundred and eighty five; **593**: five hundred and ninety three; **1,237,569**: One million, two hundred [and] thirty seven thousand, five hundred and sixty nine; **3,442,567,321**: three billion, four hundred [and] forty two million, five hundred [and] sixty seven thousand, three hundred and twenty one; **76,421**: seventy six thousand, four hundred and twenty one; **90,304**: ninety thousand, three hundred and four; **762**: seven hundred and sixty two; **8,321,678**: eight million, three hundred [and] twenty one thousand, six hundred and seventy eight; **250,005**: two hundred [and] fifty thousand and five

**Exercises II****1**

Population			Area (km <sup>2</sup> )	
a)	b)	c)	a)	b)
151,570	151,600	152,000	2600	3000
93,350	93,400	93,000	1,700	2,000
451,710	451,700	452,000	200	0
50,470	50,500	50,000	2,100	2,000
611,440	611,400	611,000	100	0
410,950	411,000	411,000	2,100	2,000
7,355,420	7,355,400	7,355,000	1,500	2,000
193,270	193,300	193,000	200	0

**2**

Numbers	Ten	Hundred	Thousand
6,172	6,170	6,200	6,000
18,776	18,780	18,800	19,000
5,217	5,220	5,200	5,000
126,250	126,250	126,300	126,000
5,208	5,210	5,200	5,000
37,509	37,510	37,500	38,000
8,399	8,400	8,400	8,000
7,257	7,260	7,300	7,000
129,790	129,790	129,800	130,000
999	1000	1000	1000

**3**

a) 40; b) 12 cm; c) 300, 0; d) 75,640, 75,600, 76,000.

**4**

4.1 a)  $92,400\text{€} - 77,000\text{€} = 15,400\text{€}$ ; b)  $92,428\text{€} - 76,595\text{€} = 15,833$

c) The difference is of 433€ (not too much for a house)

4.2 a)  $3,600 : 3 = 1200$ ; b)  $3,670 : 3 \approx 1223$ ; c) They are very similar

4.3 a)  $500 + 300 + 200 + 400 - 50 = 1350\text{€}$ , b)  $499 + 298 + 189 + 4 \cdot 97 - 48 = 1326\text{€}$

c) There is not a big difference.

4.4 a)  $1,050 : 30 = 35$  students, b)  $1,048 : 30 = 34.93 = 35$  students

4.5 Number of people that voted a)  $20,000 + 11000 + 8000 + 6000 = 45000$

b)  $20,446 + 10,866 + 7,994 + 5,743 = 45,049$  c) They are very similar

Difference between the highest and the lowest numbers of votes

a)  $20,500 - 5,700 = 14,200$ , b)  $20,446 - 5,743 = 14,703$ , c) In this case there is a significant difference

### Exercises III

**1**

Five, thirty, sixty three, fifty four, nine

**2**

1.  $6 \times 7 = 42$  six times seven is forty two
2.  $18 - 7 = 11$  eighteen minus seven equals eleven
3.  $6 : 2 - 7 = 10$  six divided by two plus seven equals ten
4.  $12 \times 3 - 11 = 25$  twelve times three minus eleven is twenty five
5.  $(5 \times 7 + 5) : 8 = 5$  five times seven plus five, all divided by eight is five

**3**

1.  $6 \times 7 - 2 = 40$  six times seven minus two is forty
2.  $(8 + 2) : 5 = 2$  eight plus two, all divided by five is two
3.  $28 - 9 - 1 = 18$  twenty eight minus nine minus one is eighteen
4.  $9 + 3 - 5 = 8$  nine plus three minus five equals eight
5.  $49 : 7 + 3 = 10$  forty nine divided by seven plus three is ten
6.  $6 + 4 - 2 - 8 = 0$  six plus four minus two minus eight is zero

### Exercises IV

**1**

a) 370.38€ (260 working days); b) He has earned 15288€ in a year and 42€ per day

**2**

33l of petrol; 714km

**3**

15, 16 and 17

**4**

a) 6; b) 126; c) 14; d) 16; e) 5; f) 6.

**5**

a) 20; b) 33; c) 3; d) 11; e) 25; f) 1600; g) 8; h) 1; i) 115

**6**

a)  $5 + 4 \times 8 = 37$ ; b)  $(5 + 4) \times 8 = 72$ ; c)  $6 + 15 \div 3 = 11$ ; d)  $(6 + 15) : 3 = 7$   
 e)  $5 + (4 + 3) \times 7 = 54$  ; f)  $16 + 3 \times (2 + 5) = 37$ ; g)  $24 / (4 + 2) \cdot 7 = 28$ ;  
 h)  $240 : (5 + 7) - 4 \times 3 = 8$

**7**

a) 35€ (at 1€ per litre); b) 34.30€; c) The difference is 30 cents