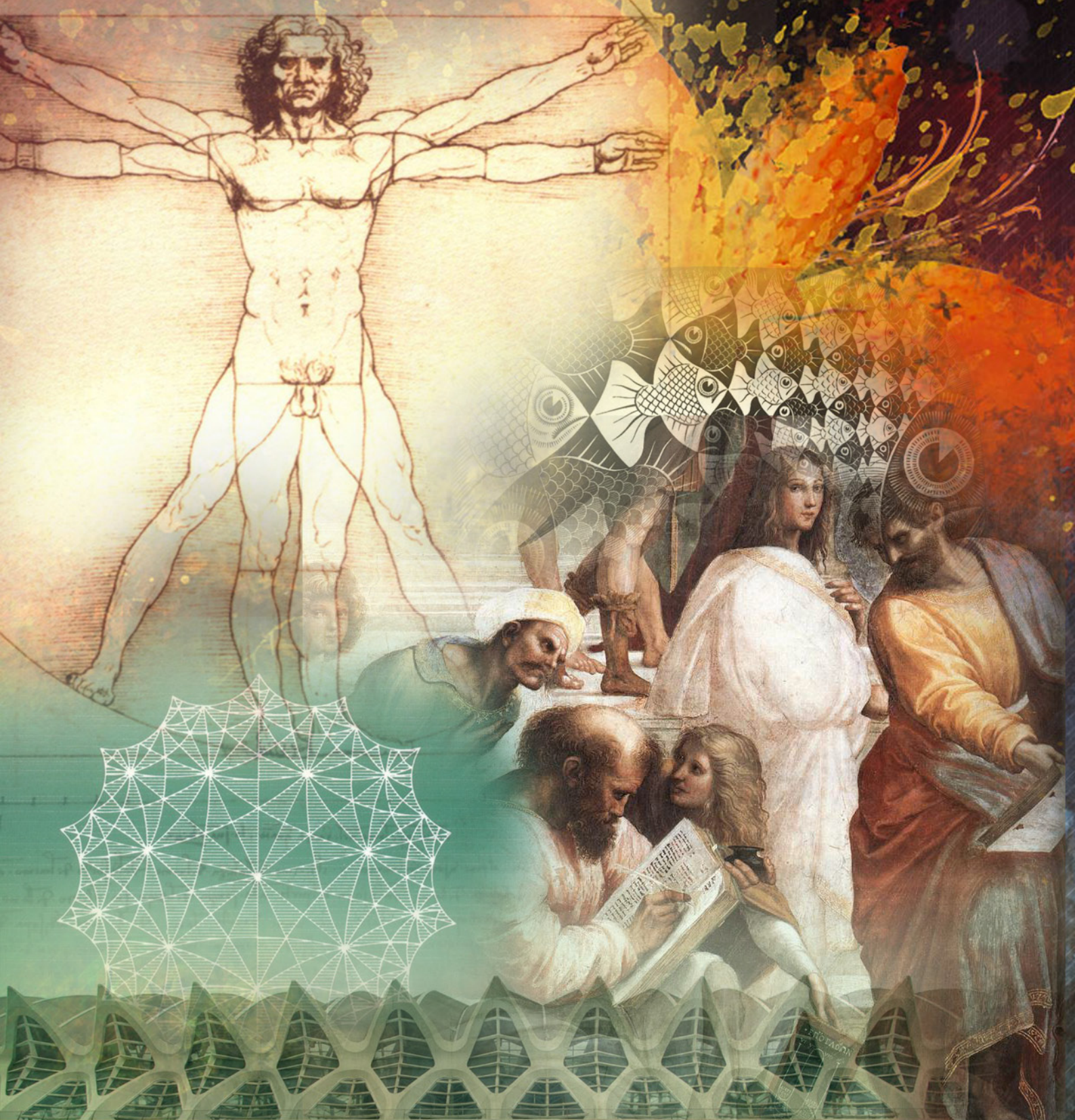




# Matemáticas

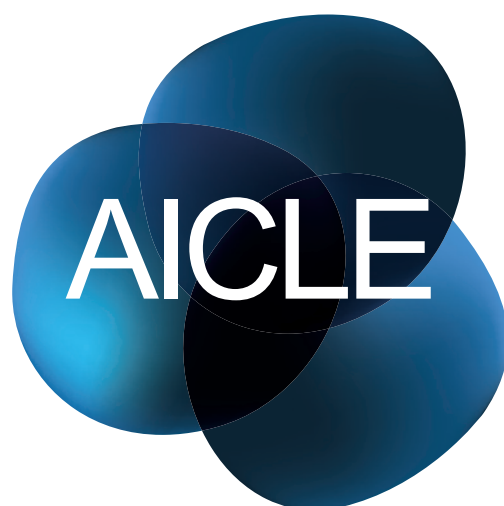
Secundaria



JUNTA DE ANDALUCÍA

Inglés





# Identificación del material AICLE

|                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>TÍTULO</b>                       | Functions I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>NIVEL LINGÜÍSTICO SEGÚN MCER</b> | A2+                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>IDIOMA</b>                       | Inglés                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>ÁREA / MATERIA</b>               | Matemáticas                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>NÚCLEO TEMÁTICO</b>              | Funciones                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>GUIÓN TEMÁTICO</b>               | <ul style="list-style-type: none"> <li>- Concepto de función</li> <li>- Crecimiento y continuidad de funciones. Máximos y mínimos</li> <li>- Dominio y recorrido</li> <li>- Funciones lineales</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>FORMATO</b>                      | Material didáctico en formato PDF                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>CORRESPONDENCIA CURRICULAR</b>   | 2º de Educación Secundaria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>AUTORÍA</b>                      | Cristina López Lupiáñez                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>TEMPORALIZACIÓN APROXIMADA</b>   | 6 sesiones                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>COMPETENCIAS BÁSICAS</b>         | <p>Competencia en comunicación lingüística</p> <ul style="list-style-type: none"> <li>- Conocer, adquirir, ampliar y aplicar el vocabulario del tema</li> <li>- Ejercitar una lectura comprensiva de textos relacionados con el núcleo temático</li> </ul> <p>Competencia Matemática</p> <ul style="list-style-type: none"> <li>- Conocer algunas nociones básicas sobre funciones. Estudiar intuitivamente el crecimiento y la continuidad de una función. Conocer las funciones lineales</li> <li>- Resolver situaciones utilizando las nociones matemáticas aprendidas</li> </ul> <p>Aprender a aprender</p> <ul style="list-style-type: none"> <li>- Aprender a relacionar los conceptos tratados</li> <li>- Organizar las nociones, ideas y argumentos de forma ordenada y constructiva.</li> </ul> <p>Autonomía e iniciativa personal</p> <ul style="list-style-type: none"> <li>- Ser autónomos para realizar las actividades individuales</li> <li>- Tener capacidad de juicio crítico ante opiniones ajenas</li> <li>- Expresar ideas propias de forma argumentada</li> </ul> |
| <b>OBSERVACIONES</b>                | <p>La unidad puede trabajarse en 2ºESO o en 3ºESO junto con la titulada "Functions II". La unidad podría ir acompañada de ejercicios adicionales para aumentar la práctica de los procedimientos trabajados. Las funciones comunicativas de las actividades indican el propósito de las mismas. Deberá haber frecuentes puestas en común. Los cuadros explicativos pueden usarse para actividades de listening.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

# Tabla de programación AICLE

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                  |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| <b>OBJETIVOS</b>                   | <ul style="list-style-type: none"> <li>- Reconocer y plantear situaciones susceptibles de ser formuladas en términos matemáticos, elaborar y utilizar diferentes estrategias para abordarlas y analizar los resultados</li> <li>- Actuar ante los problemas que se plantean en la vida cotidiana de acuerdo con modos propios de la actividad matemática, tales como la exploración sistemática de alternativas, la precisión en el lenguaje, la flexibilidad para modificar el punto de vista o la perseverancia en la búsqueda de soluciones</li> <li>- Elaborar estrategias personales para el análisis de situaciones concretas y la identificación y resolución de problemas, utilizando distintos recursos e instrumentos y valorando la conveniencia de las estrategias utilizadas en función del análisis de los resultados</li> </ul> |                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                  |
| <b>CONTENIDOS DE CURSO / CICLO</b> | <p>Aportaciones del estudio gráfico al análisis de una situación: crecimiento y decrecimiento. Continuidad y discontinuidad. Máximos y mínimos. Representación gráfica de una situación que viene dada a partir de una tabla de valores, de un enunciado o de una expresión algebraica sencilla. Interpretación de las gráficas como relación entre dos magnitudes.</p> <p>(Bloque 5, Funciones y gráficas, 1631/2006)</p>                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                  |
| <b>TEMA</b>                        | <ul style="list-style-type: none"> <li>- Definición de función</li> <li>- Expresión algebraica, tabla de valores y representación gráfica de una función</li> <li>- Funciones crecientes, decrecientes y constantes</li> <li>- Máximos y mínimos de una función</li> <li>- Continuidad de una función</li> <li>- Funciones lineales</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                  |
| <b>MODELOS DISCURSIVOS</b>         | <ul style="list-style-type: none"> <li>- Definir conceptos</li> <li>- Redactar argumentos y conclusiones</li> <li>- Argumentar respuestas</li> <li>- Exponer ejemplos, nociones e ideas</li> <li>- Expresar acuerdo o desacuerdo con las ideas de otros</li> <li>- Preguntar el por qué de ciertas afirmaciones</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                  |
| <b>TAREAS</b>                      | <ul style="list-style-type: none"> <li>- Actividades para adquirir el vocabulario específico</li> <li>- Actividades para la comprensión significativa y relacional de los conceptos tratados</li> <li>- Ejercicios para practicar los procedimientos tratados</li> </ul> <p>Proyectos:</p> <ul style="list-style-type: none"> <li>- Functions in the news</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                  |
| <b>CONTENIDOS LINGÜÍSTICOS</b>     | <p><b>FUNCIONES:</b></p> <ul style="list-style-type: none"> <li>- Percibir la utilidad de las funciones para el estudio de ciertos aspectos de la realidad</li> <li>- Representar una función usando adecuadamente varias herramientas</li> <li>- Analizar intuitivamente el crecimiento y la continuidad de una función.</li> <li>- Diferenciar las funciones lineales e interpretar su pendiente</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                  | <p><b>ESTRUCTURAS:</b></p> <p>It can/not be... because...<br/>         I you consider/look that... then...<br/>         If it were... then...<br/>         This is an example of... because...<br/>         We have to consider<br/>         How do you calculate/ estimate/ define... this?<br/>         Why do you think that is the right option?<br/>         (...)</p> | <p><b>LÉXICO:</b></p> <p>Function, algebraic expression (of a function), value table (of a function), graphic representation</p> |
| <b>CRITERIOS DE EVALUACIÓN</b>     | <p>Conocer la noción de función</p> <p>Realizar la representación gráfica y la tabla de valores de una función dada su expresión algebraica</p> <p>Reconocer intuitivamente funciones crecientes, decrecientes, constantes y continuas</p> <p>Reconocer cuando una función es lineal. Conocer la forma de la gráfica y el concepto de pendiente</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                  |

## YOUR FIRST "FUNCTION": REMEMBER

### How is your memory?

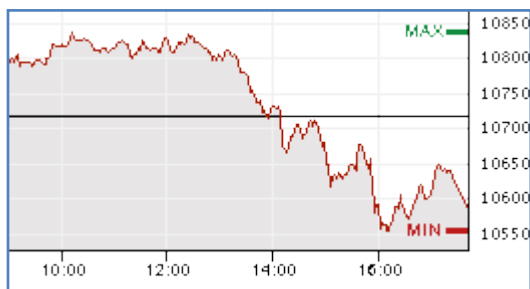
With some activities you will remember important things.



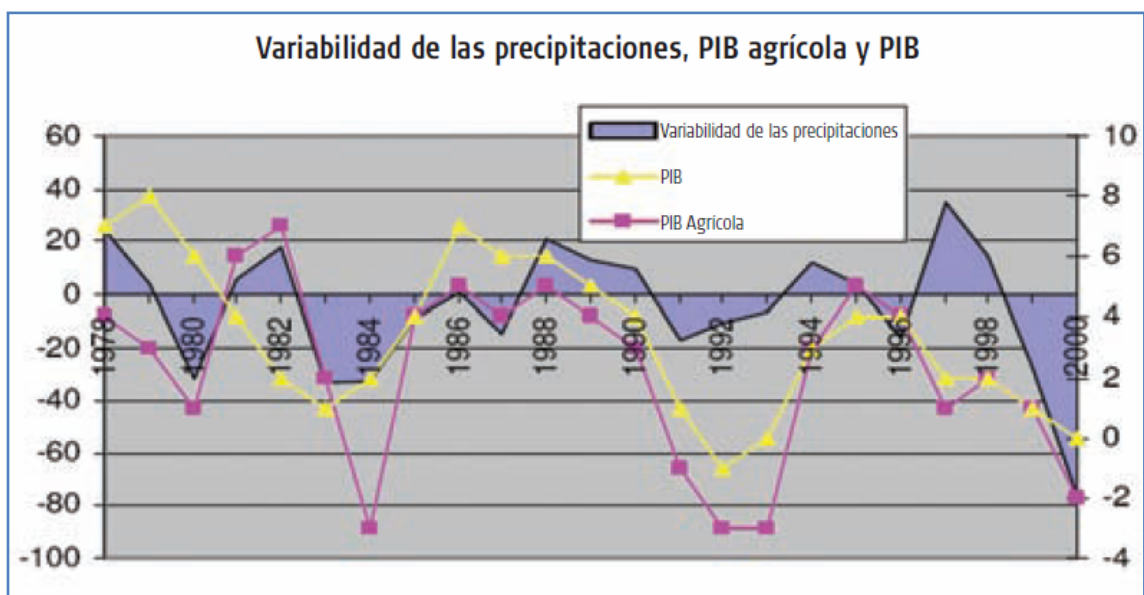
Work in group!



What do you see?



Graphic about economy, situation of the Stock Exchange in Spain (17/09/2010)



1. Diego Forlán (Uruguay) 65.77 puntos
2. Miroslav Klose (Alemania) 65.39 puntos
3. Thomas Müller (Alemania) 65.36 puntos
4. Andrés Iniesta (España) 65.09 puntos
5. Xavi Hernández (España) 64.63 puntos
6. David Villa (España) 64.59 puntos
7. Luis Suárez (Uruguay) 64.51 puntos
8. Arjen Robben (Holanda) 64.51 puntos
9. Bastian Schweinsteiger (Alemania) 64.35 puntos
10. Manuel Neuer (Alemania) 62.75 puntos

List of the best players of Football World Championship, 2010. It is according to Capello's opinion.



**Introduction:** What is and what is NOT a function?



Write a sentence answering the question:

**What is a function?**

You can write here:

Speaking help: I remember that... / An example is... / So a function is...



Now share your ideas with the rest of the class.



Let's see if you paid attention...



Discuss in group and write an example of function using name of your friends and numbers of sits at the theatre:



Blank area for writing an example of a function.



**After this previous introduction,** listen twice to you teacher. Complete the text. Work in group.



A function is a \_\_\_\_\_ between two sets by which we assign to each element of the first \_\_\_\_\_ the second.

For example:

Usually the sets are numerical (magnitudes) and their elements are values. The first one is the \_\_\_\_\_ variable (it's common to identify it with the letter   ) and the second one is the \_\_\_\_\_ variable (usually identified with the letter   ).

For example:

Vocabulary (take note): function, set, value, variable, magnitude.

1) A bit deeper:

a) Discuss in group.

Prepare a short explanation for your classmates.

Is  $y = \sqrt{x}$  a function? Why?



Discussion help: It cannot be a function because... / It is a function because... / If it were a function then...

b) Read the text and take note of the new vocabulary. But some words are wrong, find them!

The **algebrac expression** of a funtion is the expresion of the relationship between the variables using a formula.

It is usualy like this:  $y = f(x)$  Exmple:  $y = \sqrt{x}$





c) Complete the chart in group:

• Write one example of function: \_\_\_\_\_

• Write three values for x and calculate the corresponding values for y:

|              |  |  |  |
|--------------|--|--|--|
| Values for X |  |  |  |
| Values for Y |  |  |  |



2) Tables.

Complete in group the following charts.

Listen to your teacher and check your answers!

Function 1:

|                         |   |   |   |    |
|-------------------------|---|---|---|----|
| X=Nº of candies you buy | 1 | 2 | 3 |    |
| Y= Price you pay (€)    | 2 | 4 |   | 18 |

The algebraic expression of the function is  $y =$  \_\_\_\_\_

Function 2:

|   |   |   |    |    |
|---|---|---|----|----|
| x | 3 | 9 | 30 |    |
| y | 1 | 3 |    | 15 |

The algebraic expression of the function is  $y =$  \_\_\_\_\_

Function 3:

|   |    |    |    |    |
|---|----|----|----|----|
| x | 1  | 2  | 7  |    |
| y | 21 | 22 | 27 | 60 |

The algebraic expression of the function is  $y =$  \_\_\_\_\_

**Function 4:**

|   |   |   |    |   |
|---|---|---|----|---|
| x | 1 | 2 | 3  | 4 |
| y | 1 | 8 | 27 |   |

The algebraic expression of the function is  $y =$  \_\_\_\_\_

**Function 5:**

|   |   |   |    |    |
|---|---|---|----|----|
| x | 4 | 9 | 16 |    |
| y | 2 | 3 | 4  | 15 |

The algebraic expression of the function is  $y =$  \_\_\_\_\_

*Note: be careful with last function; remember what happens to a square root!*

New vocabulary: value table

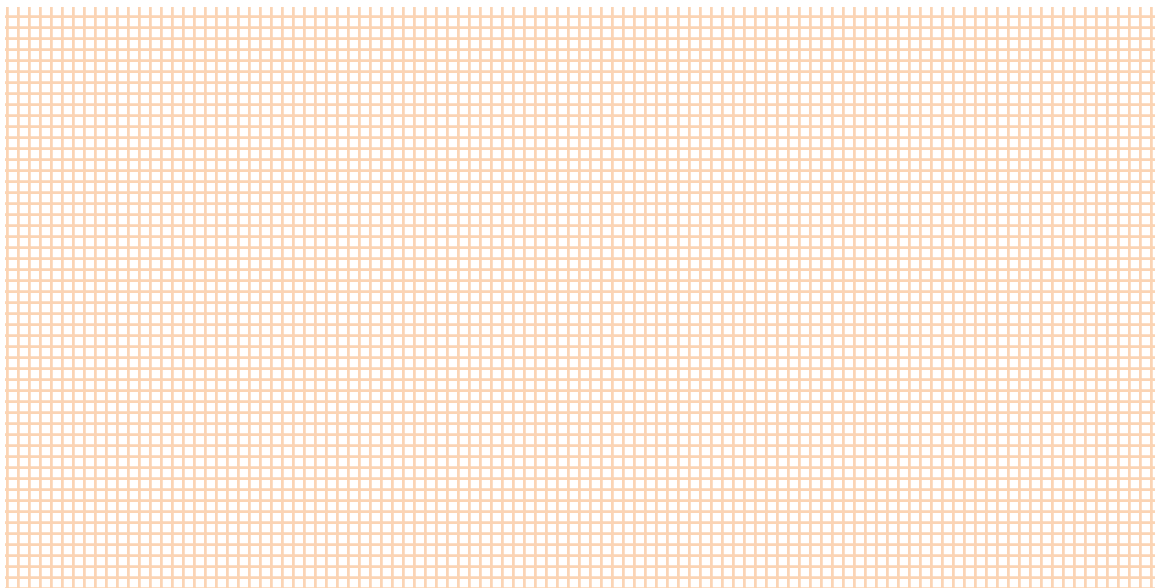
**3) Not mathematics... painting!!**

You are going to paint functions. Yes!  
Follow the instructions working in group.  
Use colors. Are you ready to be an artist?

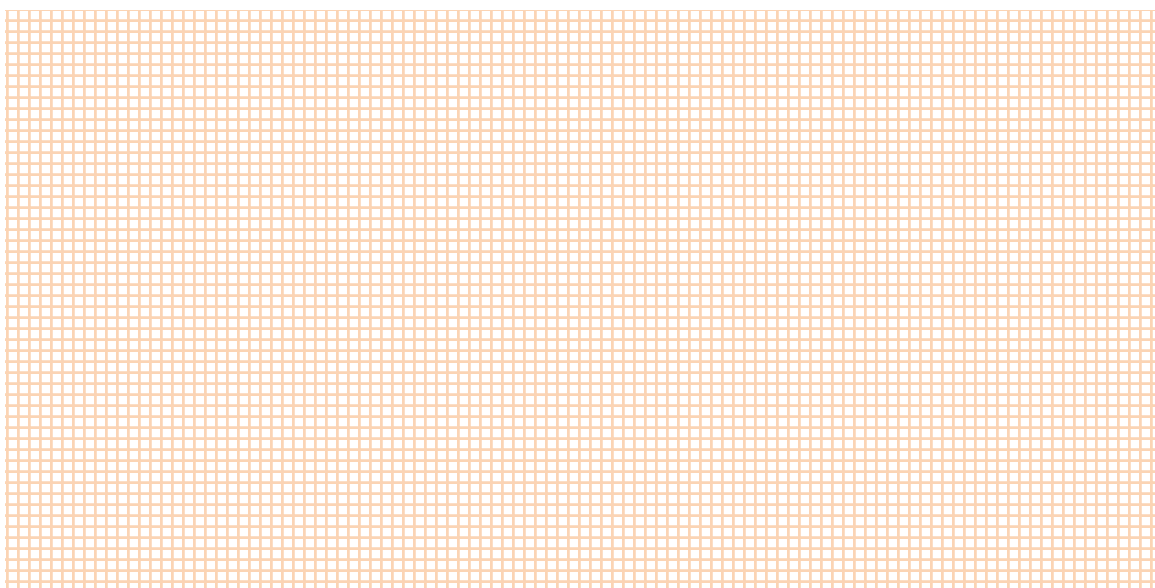
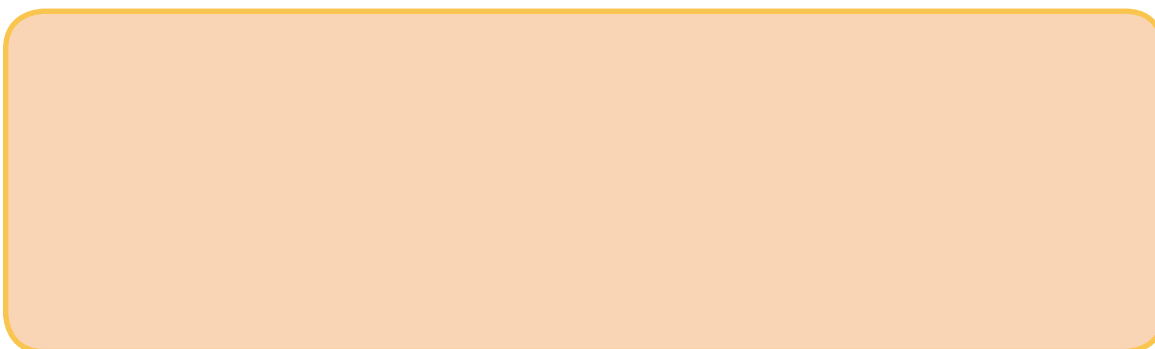
**a) See the table value for Function1 (about candies and prices).**

- **Write the coordinates of four points.** First coordinate is the number of candies you buy. Second coordinate is the price you pay for the candies.

- Draw the points on the Cartesian plane. Join the points by a straight line.



- b) Repeat last activity for Functions 2 and 3.







4) Order the words and rewrite the sentences. After that, select the right ones. Finally, listen twice to your teacher and check your answers.



magnitudes A relationship function is a between two.

algebraic of a formula function The shows the relationship by representation a.

function The graphic of a a graphic on the Cartesian representation plane to show the uses relationship.

To practice what you learnt, do the following work sheet.

## Work sheet

With these exercises you will see how well you ...



- ... remember the vocabulary you learnt today.
- ... know what a function is.
- ... recognize the algebraic expression of a fraction.
- ... create or complete the value table of a function.
- ... draw the graphic representation of a function.

### Vocabulary:

#### 1) Complete:

a) Ana thinks that a \_\_\_\_\_ is a relationship between two sets, but she forgets an important condition: for every element of the first \_\_\_\_\_ you assign \_\_\_\_\_ of the second.

b) When you write in two rows (or two columns) the values of the two magnitudes that are related by a function, you are creating a \_\_\_\_\_.



### Algebraic expression of a function:

$$y = mx + b$$

#### 4) Complete the chart:

| Value for the independent variable X | Value for the dependent variable Y | Algebraic expression of the function $Y=f(x)$ |
|--------------------------------------|------------------------------------|-----------------------------------------------|
| 3                                    | 6                                  |                                               |
| 4                                    | 16                                 |                                               |
| 6                                    |                                    | $Y=x/3$                                       |
|                                      | 5                                  | $Y=x-6$                                       |
| 100                                  | 10                                 |                                               |
| 150                                  | 1,5                                |                                               |
|                                      |                                    | $Y=3+x^5$                                     |
|                                      |                                    | $Y=3+\sqrt{x}$                                |

### Graphic representation of a function

Match the functions with the “handmade” graphic representations:

$Y = 3x + 2$

$Y = 2$

$Y = -x^2$

$Y = 3x^2 + 2$

Draw the graphic representation of these functions:

$$Y = \sqrt{x}$$
$$Y = -3x^2 + x - 1$$
$$Y = \frac{1}{x}$$

## DOMAIN OF A FUNCTION

**The domain will be yours.**



With some activities you will learn what the domain of a function is. Surely you don't know it yet but work in pairs and you'll be an expert!



1) Select the right option discussing with your partner:

a) Consider the function  $f(x) = 1/x$ . Can you calculate  $f(0)$ ? Why?

- Yes, all I have to calculate is  $f(0) = 1/0$ .
- No, the algebraic expression is not well written.
- No, it's not possible to divide by zero.

b) If  $f(x) = \dots$  can you calculate  $f(1)$ ? Why?

- Yes, all I have to calculate is  $f(1) = \sqrt{1-2}$ .
- No, the algebraic expression is not well written.
- No, to know the value of  $f(1)$  you need to calculate the square root of a negative number.

c) The value of the dependent variable...

- Can be always determined for every value of the independent variable.
- Is not defined in certain cases.





2) Pay attention to the situation. Think carefully and discuss with your partner. Answer the questions...

a) Consider the function whose value table is...

|                            |     |    |      |    |
|----------------------------|-----|----|------|----|
| <b>X=number of tickets</b> | 1   | 2  | 3    | 4  |
| <b>Y= price (€)</b>        | 5,5 | 11 | 16,5 | 22 |

Would you calculate the price of **4.27 tickets**? Why?

---

---

---

b) If the independent variable of a function  $y=f(x)$  refers to number of people, can you determine  **$f(5.8)$** ? Why?

---

---

---



3) Listen to your teacher and complete the text.  
Work in pair. The words you need are: function, set, domain, usually, values.



The \_\_\_\_\_ of a function  $y=f(x)$  is the \_\_\_\_\_ of \_\_\_\_\_ for which the \_\_\_\_\_ is defined, \_\_\_\_\_ denoted  $Domf(x)$ .

New vocabulary: **domain** (of a function).





#### 4) Important clues to study the domain...



a) Every function has its own particular domain, according to its own nature. **Read this text and write two more examples.** Work in pair.



*The domain of a function is usually determined by*

- The **algebraic expression** of the function ( $y=1/x$  is not defined for  $x=0$ ).

*Examples:*

---

---

- The **situation**: if the independent variable refers number of tickets, the function is not defined for  $x=1.24$ ).

*Examples:*

---

---

---



b) Explain one of your examples to the rest of the class!

Exposition help: The domain of the function ... is determined by... because...



Space to take note:

---

---

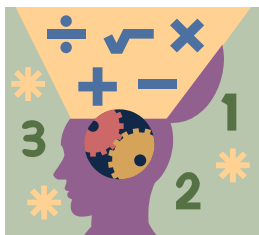
---

---

---

---

---



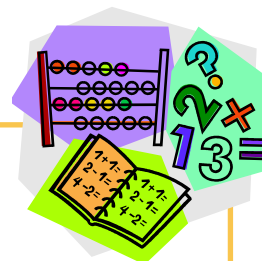
## Learning more things...

You know the domain of a function and now you will learn a new concept. Keep on working in pair.



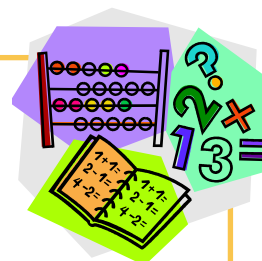
1) Consider the function  $y=x^2$  and answer:

- Calculate  $f(-4)$ ,  $f(-3)$ ,  $f(4)$  and  $f(3)$ .
- The obtained values are
  - Positive
  - Negative
  - All the same
- Every value of the variable  $Y$ ...
  - Is positive
  - Is negative
  - Positive or negative, depending on the value of  $X$ .



2) If  $x$ ="day of the week" and  $y$ ="number exercises of math you do" (according to the day of the week)...

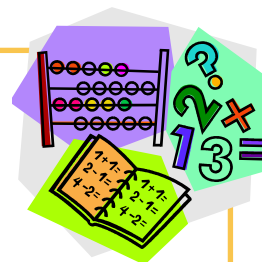
- The values of  $Y$  cannot be determined.
- The values of  $Y$  are always positive.
- The values of  $Y$  are always 0 or a whole number.



3) If the domain of a function is the set of values of  $X$  where the function is defined, the range of a function should be...

- The set of possible values for  $Y$  produced by the function.
- The set of impossible values for  $Y$ .
- The positive section of the graphic of the function.

Clue: The range of the first function is "the set of all the positive numbers, including 0".





#### 4) Write and hear.

a) What is the range of a function? Write in pair a short paragraph.



Empty box for writing a short paragraph.



b) Listen twice to your teacher and rewrite the text... with the words in order.



Text:

Empty box for rewriting the text.

*Text:*

*The of a function  $y=f(x)$  is the set of variable all values domain of the dependent range  $y$  produced by  $f$  from all the elements of the. denoted It's often  $Rf(x)$ .*

New vocabulary: **range** (of a function)



## INCREASING, DECREASING AND MORE

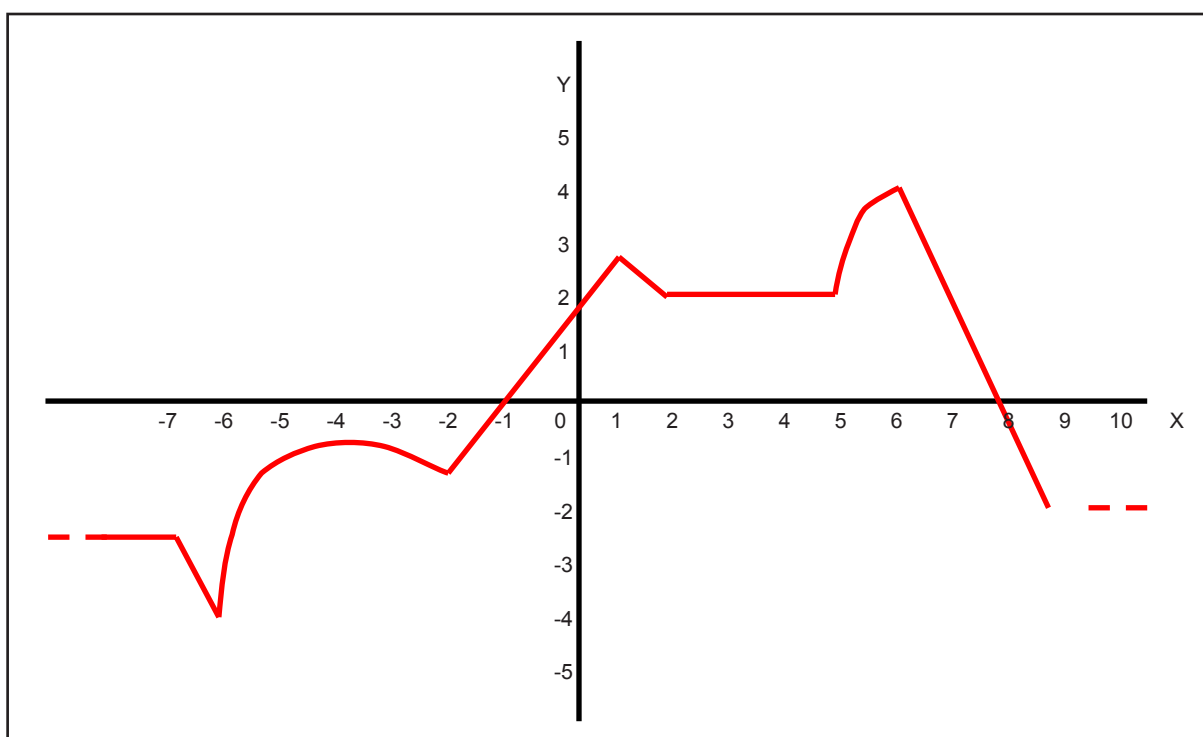
### Up and down...

Functions can go up and down, you'll see! Work in group.



1) Watch this graphic carefully (x=temperatures ( $^{\circ}\text{C}$ ) and y=number of animals of certain species).

What can you say about the function?



2) Now watch again and answer:



a) Do you think it is a **decreasing function**? And an **increasing one**?

b) The function **increases... where**?



c) The function **decreases... where?**

d) Where is the function **constant**?

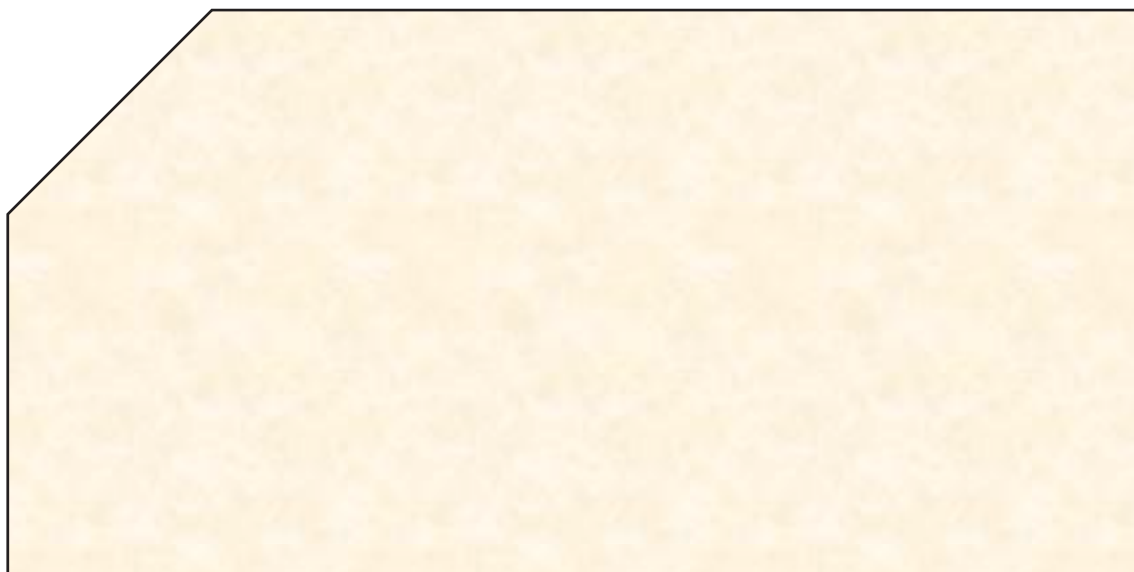


3) Your turn to draw: do the graphic of a function that...

a) Is increasing from  $x=-5$  to  $x=1$ .

b) Is decreasing from  $x=4$  to  $x=8$ .

c) Is constant in the rest of the domain.



4) Prepare an exposition to explain your graphic to the rest of the class.



Notes:





5) Look at the graphic at the beginning again: match every point of the graphic with the corresponding expression:

*Local minimum*  
*Global minimum*  
*Local maximum*  
*Global maximum*

$(-6, -3.9)$   
 $(6, 3.3)$   
 $(1, 2)$   
 $(-2, -1.5)$



6) Listen to your teacher and match the two halves of the sentences.



$Y = f(x)$  is a increasing function I f

global maximum or global minimum.

$Y = f(x)$  is a decreasing function if

the maximum of the function.

The largest value of the range of a function is

when  $a \leq b$  then  $f(a) \leq f(b)$  for every values  $a$  and  $b$  of  $\text{Dom}f(x)$ .

The smallest value is the minimum value of the function. If we consider the whole function these points are

when  $a \leq b$  then  $f(a) > f(b)$  for every values  $a$  and  $b$  of  $\text{Dom}f(x)$



**Note:** If a value is the largest one that a function can take in one interval of the domain, we have a local maximum. We can have also a local minimum.

New vocabulary: increasing, decreasing, constant (function), maximum, minimum (plural maxima, minima) of a function (absolute and relative ones).

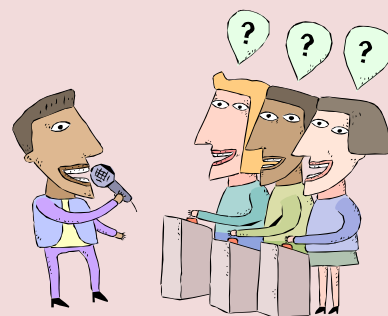




## 7) Ready to win??

Your teacher will ask your group for examples about the last words you learnt.

Do it well and get points!!



## CONTINUOUS FUNCTIONS

### Is it continuous?

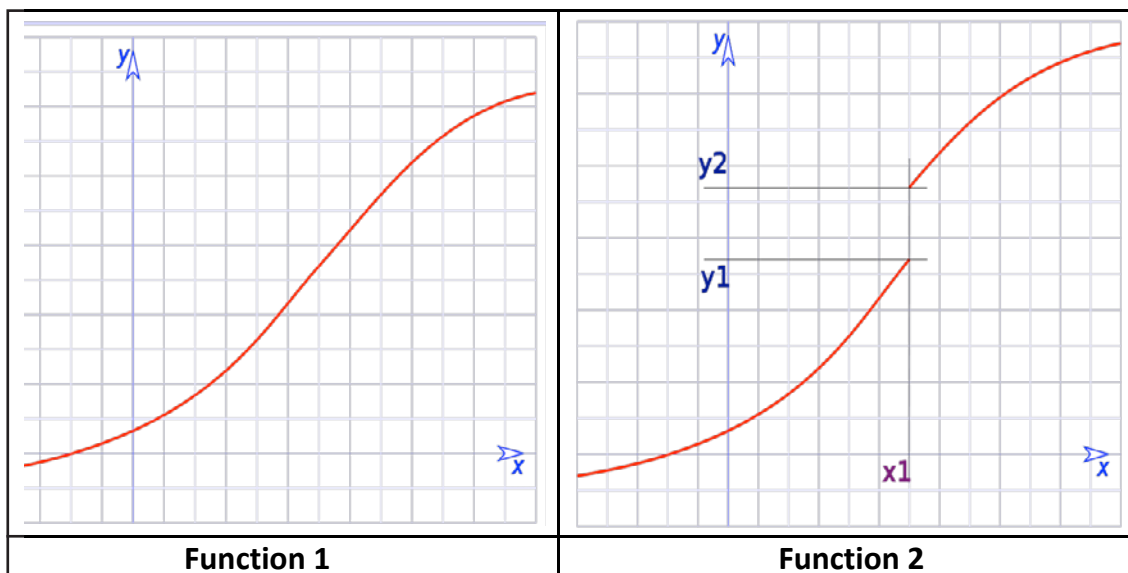
Your group will study when a function is continuous. All you need is have a look! It is really easy so... let's go!



### 1) What's the difference?



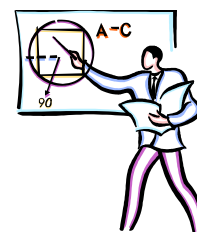
a) Write a short paragraph explaining the difference between these two functions:



Write here:

Discussion help: The first one... but the other... / As you can see on this part of the graph...

b) Share your ideas with the rest of the class!



2) Think and answer:



a) Which one is the **continuous function**? And which one **is NOT** continuous?

b) If you **really want to have the graph of a function...** How would you change the second picture? **Would you add anything??**

c) Try to complete:

**A continuous function is**

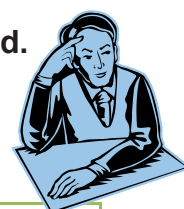
**If a function is NOT continuous, we can say it is a \_\_\_\_\_ function.**



3) Draw and think: it is a bit more difficult; ask your teacher if you need.



a) Do the graphic representation of these functions and say if they are continuous or not:



$$Y = \begin{cases} X & \text{if } x < 0 \\ 2x & \text{if } x > 0 \end{cases}$$

$$Y = \begin{cases} X & \text{if } x \leq 1 \\ 2x & \text{if } x > 1 \end{cases}$$

It is a \_\_\_\_\_ function because...

It is a \_\_\_\_\_ function because...

b) What happens if we change the first function like this?

$$Y = \begin{cases} X & \text{if } x \leq 0 \\ 2x & \text{if } x > 0 \end{cases}$$



4) Read the following text:



Some words are not correct. Be the first group to discover them!!

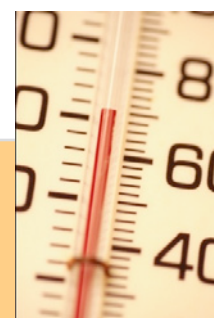


*A **continous function** is a function whose graf can be drawn without lifting the chalk from the blackboard.*

*In mathematics, a continuous function is a function for which, intuitively, smal changes in the valu of the independent variable X produce small changes in the other variable Y.*



Now write an example of continuous function. It has to be related to degrees of temperature!



New vocabulary: continuous/ discontinuous function.



## LINEAR FUNCTIONS

### Going throw the straight line.

Work with your partner, you will study a special kind of functions.  
What you know about proportionality can be useful.  
It will be easy so come on!!



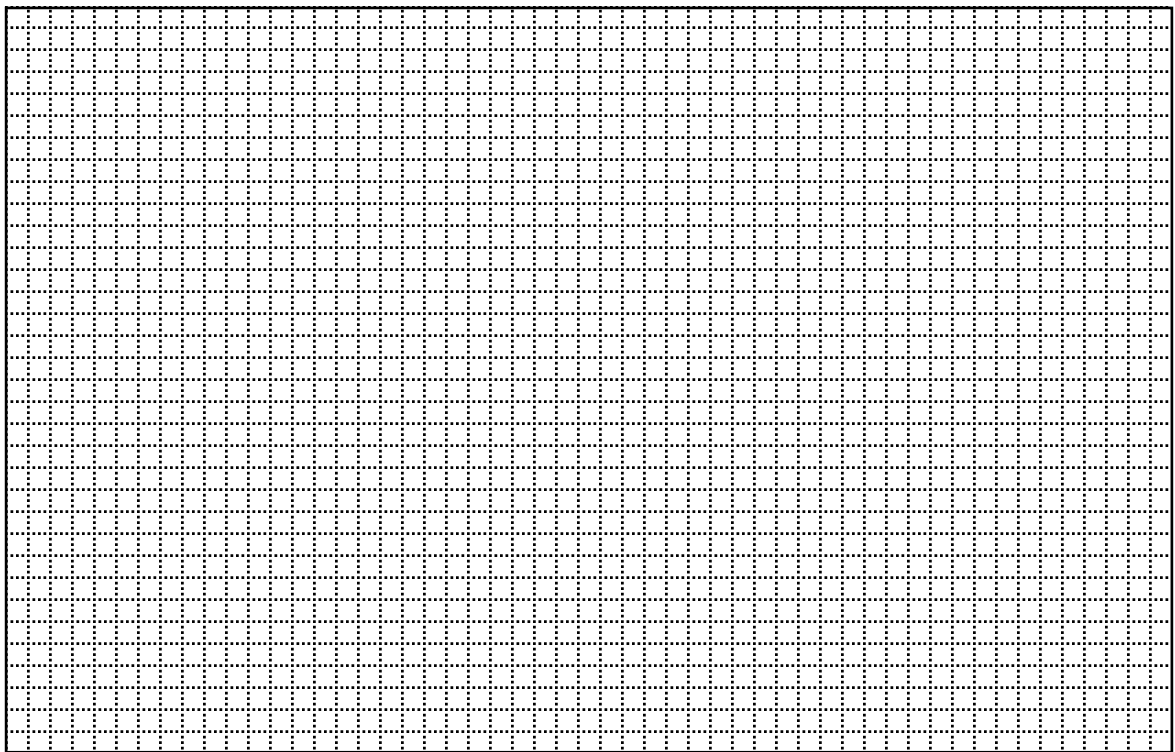
#### 1) Represent and think...

Do the value table and draw the graphic representation of these functions.



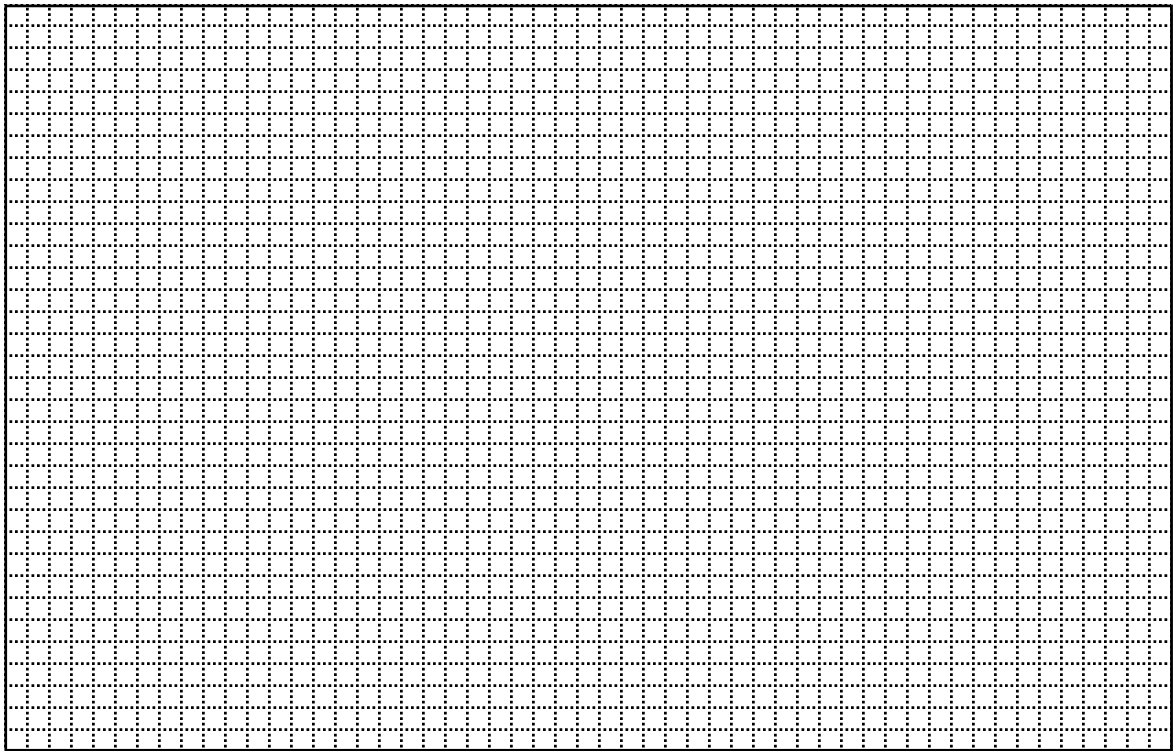
After that, compare them and write a short paragraph about the difference between them.

- $Y=3x$

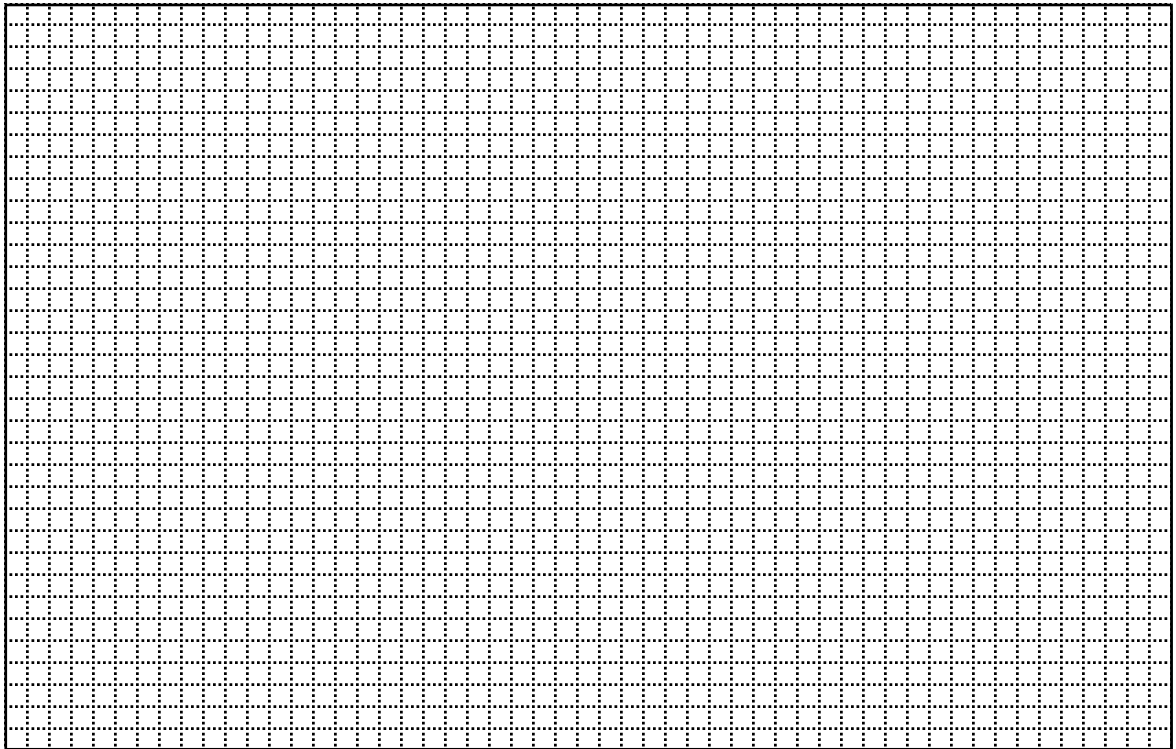




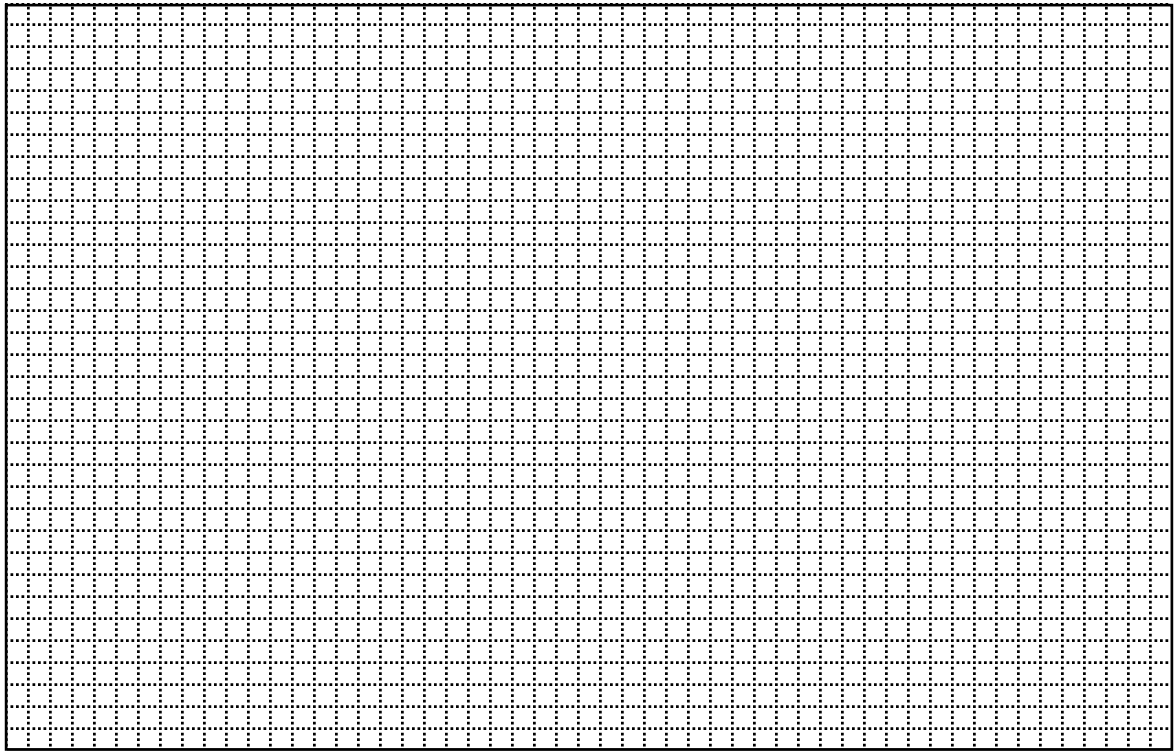
•  $Y=x^2-x$



•  $Y=-3x$



•  $Y = -x^2 + 5$



They are different/similar functions because:



2) Imagine the situation and think:



You are collaborating with a non governmental association. You have to give water to grow plants. Look at the table and answer:

|                                |   |    |    |    |
|--------------------------------|---|----|----|----|
| <b>Squared metres of field</b> | 4 | 6  | 7  | 8  |
| <b>Litres of water</b>         | 8 | 12 | 14 | 16 |

a) Are the variables directly proportional? Why? What is the constant of proportionality?

b) Try to invent a function for the situation. What's the independent variable? And the dependent one? Write the algebraic expression of the function and the domain.

c) Draw the graphic representation of the function.

d) Think and answer:

i) What's the shape of the graphic?

ii) Is the point (0,0) on the graphic?

iii) If you add one person... how many kilograms you have to add? Can you see that on the graphic?

Now read and learn!

*English: A linear **function** is a function with this algebraic expression:*

$$Y = mx \text{ (m is a number)}$$



## 2) Match the characteristics with the functions.

After that listen to your teacher and complete the text below. Use the given words.



| Sentence                                       | Function     |
|------------------------------------------------|--------------|
| Is a decreasing function                       | $Y = 6X$     |
| Is an increasing function                      | $Y = 0.5X$   |
| (0,0) is a point of the graphic                | $Y = -0.25X$ |
| Has every value of X on the domain             | $Y = -0$     |
| Is a constant function                         | $Y = -7x$    |
| If X increases one unit, Y increases six units | $X = 0$      |

The number  $m$  is called the \_\_\_\_\_ of the function, and it means the number of units that the dependent variable increases (or decreases) for every unit that the independent variable increases (or decreases).

The point \_\_\_\_\_ is always on the graphic of a \_\_\_\_\_ function.

If the slope is \_\_\_\_\_, the function is \_\_\_\_\_. If the \_\_\_\_\_ is \_\_\_\_\_, the function is \_\_\_\_\_. The function is constant if the slope equals \_\_\_\_\_.

In the situation of the association the domain of the function wasn't the set of all the numbers, but in general the domain of a linear function includes \_\_\_\_\_ numbers.

Words to complete the text: decreasing, slope ( $x^2$ ), positive, all, zero, linear, (0,0), increasing,

Read: slope gives you information:

- The number  $m$  is called the slope of the function.
- It means the number of units that the dependent variable increases (or decreases) for every unit that the independent variable increases (or decreases).
- If the slope is positive, the function is increasing.
- If the slope is negative, the function is decreasing.
- The function is constant if the slope equals zero.

New vocabulary: linear function, slope.



## VOCABULARY GAME: PLAY WITH YOUR TEAM!

Now it's time to check the vocabulary you learnt. Your teacher is going to write some words or expressions on the board but... some letters will be disordered or removed.



Every team will have to:

- Write the word or expression correctly (one point).
- If the correction is right, the team will have the chance to give an example of the word or expression (one extra point).

Prepare with your group a concept map about what you learnt. Explain it to the rest of the class.



## POST-TASK: FUNCTIONS IN THE NEWS

With this project you will realize that functions are everywhere. Use press and internet and get ready to get surprised.

**Search in some newspaper or magazine for three graphs that seems interesting to you. For example, in the sections about sport or economy you will find several graphics.**

- In those graphs search for a decreasing part and for an increasing part.
- Search for local and global maxima-minima.
- Take note of the range and the domain of the functions of the graphics.
- What did you find interesting or strange about the graphics?



### Using Internet...



- a) Find two graphics of functions like the ones you studied.
- b) Indicate the type of function and the most important elements.
- c) Write a possible value table for the functions.

**Prepare an exposition of the most important ideas of your investigation. Don't be shy... show your graphics!!**

### WHAT YOU HAVE LEARNT:

#### **With this activities you have learnt...**

What a function is.

How to express a function (algebraic representation, value table, graphic representation).

That there are different kinds of functions: increasing/decreasing ones, continuous functions...

What the domain/range of a function is.

What a linear function is. What the slope of a linear function is.





Time to estimate how well you learnt the topics.

|                                                                                                            | ALWAYS | SOME-TIMES | NEVER |
|------------------------------------------------------------------------------------------------------------|--------|------------|-------|
| <b>CONCEPTS</b>                                                                                            |        |            |       |
| I understand and remember the concepts about functions I studied.                                          |        |            |       |
| <b>PRACTICE</b>                                                                                            |        |            |       |
| I can represent a function using the value table, the algebraic expression and the graphic representation. |        |            |       |
| I can distinguish when a function is increasing, decreasing or constant. I can find minima and maxima.     |        |            |       |
| I can distinguish when a function is continuous.                                                           |        |            |       |
| I can check if a function is linear and distinguish the slope.                                             |        |            |       |
| <b>LISTENING</b>                                                                                           |        |            |       |
| I understand when someone talks about functions and main related concepts.                                 |        |            |       |
| <b>READING</b>                                                                                             |        |            |       |
| I can read texts about situations related to functions and understand the most important information.      |        |            |       |
| <b>SPEAKING</b>                                                                                            |        |            |       |
| I can speak about the main things related to functions and their applications.                             |        |            |       |
| <b>WRITING</b>                                                                                             |        |            |       |
| I can write describing situations where concepts related to functions are involved.                        |        |            |       |
| <b>VOCABULARY</b>                                                                                          |        |            |       |
| I recognize words and expressions related to functions.                                                    |        |            |       |

## CREDITS

The images used to create this document can be found on the following websites:

<http://www.libertaddigital.com/bolsa/ibex-35/>

<http://www.navegandoxlared.es/?p=924>

[http://www.unesco.org/water/wwap/wwdr/wwdr2/case\\_studies/pdf/kenya\\_es.pdf](http://www.unesco.org/water/wwap/wwdr/wwdr2/case_studies/pdf/kenya_es.pdf)

Predesigned images: <http://office.microsoft.com>