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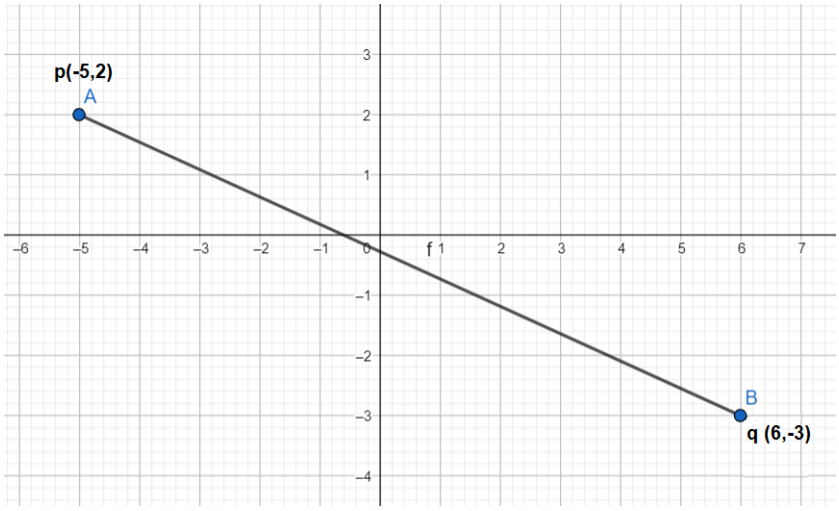
❑ ACTIVITY 1 – Point objects

We want to create objects that represent points, from them we need:

- Have 2 properties: **x** and **y**. They will serve to represent coordinates of the point.
- The construction of the points will use a constructor function to which 2 numbers are passed. If what you receive in each coordinate is not a number, it is set to zero.
- A method called **change** to which we pass 2 numbers and allows us to modify the coordinates of the number.
- A method called **copy** that returns a copy of the object
- An object called **equals** that receives a second point and tells us if both points are equal.
- A method called **addition** that receives a second point and returns a third point resulting from adding the coordinates of the previous 2
- A method called **getDistance** that also receives a second point and returns the distance between both points, for this operation, take into account:



To calculate the distance we apply the Pythagorean Theorem, the distance comes out of the formula:

$$\sqrt{distHorit^2 + distVert^2} = \sqrt{abs(6-(-5))^2 + abs(-3-2)^2} = \sqrt{11^2+5^2} = \sqrt{146} = 12{,}08$$

Finally the method called **toString** that returns a text with the coordinates of the point. For example. For example (**-5,2**)

❑ ACTIVITY 2 – Add arithmetic mean calculation method to arrays

- Array objects (in short, arrays) have numerous methods that are very useful
- We find it interesting to add a method to all arrays for calculating the arithmetic mean of their elements.
- Modify the prototype of the arrays to add this method.

Hint: Use the **reduce** method of Arrays

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❑ ACTIVITY 3 – Modifying Map Objects

- We saw that Map objects associate keys with values. Keys cannot be repeated, but values can.
- Creates, for this type of object, a method called invertMap that returns a new map object where the keys are the values of the original map. The values of the new map will be arrays containing the keys where that value was repeated.
- For example, if we had a map with these keys:
  - Key 1: Value: "Optimal"
  - Key 2: Value: "Noteworthy"
  - Key 3: Value: "Noteworthy"
  - Key 4: Value: "Excellent"
  - Key 5: Value: "Improvable"
  - Key 6: Value: "Excellent"
  - Key 7: Value: "Noteworthy"

The method will be able to obtain this other map:

  - Key: "Optimal", Value:[1]
  - Code: "Remarkable", Value[2,3,7]
  - Key:"Improvable", Value[5]
  - Key:"Excellent", Value[4,6]

❑ ACTIVITY 4 – Inheritance

- Create an object type to represent shapes
- Its properties are:
  - Markup, a text
  - Model, a text
  - RAM memory, a number indicating GB of capacity
  - Hard disk capacity, a number indicating GB of capacity
  - Screen inches, a number that indicates Inches
- Computer methods
  - toString, serves to obetner in text form the details of the computer
- When creating a computer you can indicate all the values, but by default (without being forced to indicate them) 17 inches, 512 GB of hard disk and 4 GB of RAM are taken as values. The make and model are necessary.
- Create another type of object that represents laptops, which inherit everything from computers but add a property called autonomy, which is a number that expresses hours. This object is built just like computers, but you can add autonomy (by default, 4 hours). By default, in laptops the inches are 12 and the hard disk 256 GB.

❑ ACTIVITY 5 – Difference between dates

- Make a page that asks for a date using the notation, day/month/year.
- If there is a failure on the date it is requested again. The correctness of the date will not be checked, but it will have 2 digits for the day, 2 for the month and 2 for the year.

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- A second date will be requested and validated as well.
- Finally, 2 dates of type Date will be created and the difference in days between it will be shown.

❑ ACTIVITY 6 – Validate URLs

- Create a web application to validate URLs
- Remember that a URL is formed by:
  - ✓ Protocol, followed by 2 points and, depending on the protocol, by up to 3 forward bars (/), but there may even be none.
  - ✓ There may be a username (not required) that will consist only of texts, number and/or hyphens. In addition, you can separate several words with periods, type gema.morant for example)
  - ✓ After the username (li ho hay) there can be 2 dots followed by the password. In the password any series of characters is valid. It should be noted that if there is a password there must be a username followed by 2 dots, but there may be a username and there must be no password (the 2 points would not be put either).
  - ✓ If there is a username, an at symbol is placed at the end of the password. If there is no password it is placed behind the username.
  - ✓ Then the name of the machine, whose characters are the same as for the user name. At least one machine name consists of 2 words separated by a period, but there can be more words.
  - ✓ Optionally, you can put 2 dots followed by a port number. The port number is a series of numerical digits.
  - ✓ Also optionally there may be at the end a route, which would begin with the symbol of divide (/) and then words and symbols of divide. Those words may have points in between.
- Although there may be a search string at the end of all of the above, we will not complicate validation further. But at least, it will be allowed (without being mandatory) that at the end there is any series of characters if they are preceded by the literal symbol of closing the question mark (?).

❑ ACTIVITY 7 – Validate the NIF

- Create a web application that serves to validate NIFs indicating if it is correct or not.
- A NIF consists of a possible first letter that can be X, Y or Z. There may be no letter and then there will be a number.
- Then there will be 7 more issues.
- Finally there will be a letter that fulfills a formula.
- The formula of the letter consists of dividing the numbers of the NIF by 23 and taking the rest. When the first digit is an X, it is changed to the number 0 to make this calculation. The Y is changed to the number 1 and the Z to 2. The rest obtained is checked in this series:

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
T	R	W	A	G	M	Y	F	P	D	X	B	N	J	Z	S	Q	V	H	L	C	K	E

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- ❑ **ACTIVITY 8 – Access prohibited**
  - Create a web page that displays the text "Welcome" but if the time is from 9:00 to 14:00 and it is a day that is neither Saturday nor Sunday.
  - If that premise is not met, then the text "Page closed" will be displayed.
- ❑ **ACTIVITY 9 – Minesweeper with objects (OPTIONAL)**
  - Create a page that serves to display the Minesweeper game map, according to the guidelines given in the previous topic activity.
  - Solve the problem by using an object (or a type of objects), which admit a constructor to which we indicate the number of rows and columns and the number of mines to draw.
  - In the construction it will be possible to place the numbers of mines in the boxes without mine.
  - In addition, there will be a method called drawing that will be responsible for drawing the board.
  - Another method called recalculate will be able to recalculate the board again. If this method is not passed parameters, it recalculates the parameters of rows, columns, and mines that will be indicated to you previously. But the method allows these parameters to be changed.

- ❑ **ACTIVITY 10 – Card deck (OPTIONAL)**
  - Create a type of objects that serve to represent **Cards**. These objects will have the properties:
    - **suit**. Which will be a number from 1 to 4 (where 1 means Coins, 2 Swords, 3 Clubs and 4 Cups)
    - **value**. A number from 1 to 10. (8=Jack 9=Horse, 10=King)
  - Objects of this type are constructed indicating the suit and value. If there are data failures, a null object is returned in the creation.
  - The cards will have these methods:
    - **giveValue**. That receives a suit number and a value for the card, to, with them, modify the card. In the face of incorrect data, nothing changes in the letter.
    - **toString**. Common (and standard) method to return in understandable text form the value of the letter. For example: **Ace of Coins**
  - In addition, there will be another type of object: **CardsDeck**. The idea is that it represents a deck of Spanish cards. It will have the following details:
    - The deck consists of 40 cards. For this you will have the **cards** property that will be an array of 40 cards.
    - When building the deck, the cards are filled in the following order: by suits and each suit with the cards from 1 to 10. The array will not be directly accessible outside the constructor function.
    - The **shuffling** method allows you to shuffle the cards. That is, mess them up randomly.
    - The **toString** method allows you to get the deck in text form to know how the cards are ordered.