## **OVERALL**

1. What are arrays in JavaScript and why are they useful?

Array là 1 kiểu dữ liệu dùng để lưu trữ thông tin, thông tin được lưu trữ trong array được sắp xếp vào các ô nhớ index, từ 0 đến n.

1. What are objects in JavaScript and why are they useful?

Object là kiểu dữ liệu dùng để lưu trữ nhiều trường dữ liệu, mỗi trường dữ liệu được gán 1 property và value của dữ liệu

1. What are a couple of key differences between objects and arrays? (And can you find any good examples or metaphors that illustrate the difference?)

Object có ưu điểm những property thuộc kiểu string, do đó có thể tùy biến được property name.

Array lưu trữ value được sắp xếp theo thứ tự số index, nên việc truy cập dễ dáng nếu biết đc vị trí index của giá trị

1. What is the index of an array? What is it used for?

Index là số ô nhớ, dùng để đánh dấu vị trí của những value đc lưu trữ trên array.

1. What is a property?

Property là tên ô nhớ của 1 giá trị nào đó được lưu trữ trong object

1. What is a method?

Method là function gắn với 1 object nhất định nào đó.

## **Review of arrays**

1. Create an array named colors that contains five different names of colors as strings.

let colors = ["red", "white", "blue", "green", "yellow"];

1. Access the first color in the array and print it to the console using console.log()

console.log(colors[0]);

1. Now do the same with the *third* color in the list. (Remember that array indexes start at 0, not at 1!)

console.log(colors[2]);

1. Write one line of code that changes the value of the last color in the list to "ultraviolet" (overwriting the previous value).

colors.splice(4, 1, "ultraviolet");

1. Create a new variable called fourthColor and set it equal to the fourth color in the list.

let fourthColor = colors[4];

console.log(fourthColor);

1. Add another color to the end of the list.

colors.push("black");

1. Add another color to the *beginning* of the list.

colors.unshift("pink");

1. Print the length of the array to the console with console.log()

console.log(colors.length);

1. Remove the last color from the end of list, and then print the length of the array to the console one more time.

colors.pop();

console.log(colors.length);

1. Write a *for loop* to iterate through every color in the array and print each color's value to the console.

*for* (let i = colors.length; i <= colors.length ; i++) {

    console.log(colors[i]);

}

1. Copying from that loop you just wrote, modify it to print every color's value *and* every color's index in this format: 3, purple or 0, blue etc.

*for* (let i = 0; i < colors.length; i++) {

    console.log((i) + ": " + colors[i]);

}

1. Create a variable named lastColor that will always point to the *last* element of the colors array, no matter how many colors are in the list. (Hint: make use of the array's length property for this!)

let lastColor = (colors.length);

console.log(colors);

console.log(lastColor);

## **Review of objects**

**For extra review: read** [**MDN's intro to JavaScript objects**](https://developer.mozilla.org/en-US/docs/Learn/JavaScript/Objects/Basics)

1. Create an object named Person with properties that represent the information of that person like: first name, age, last name, address, ..

let Person = {

    firstName: "Dat",

    age: 27,

    lastName: "Nguyen",

    address: "Le Van Luong",

}

1. Use console.log() to print the penguin's name to the console as part of a welcome message, like "Hello, my name is [FIRST NAME] [LAST NAME]!"

console.log(`Hello, My name is ${Person.firstName} ${Person.lastName}`);

1. Write another line of code that adds a new property to that person called IQ and set it to a random number from 120 -> 200. (Note: Don't modify your person-creation code that you wrote above! Do this step in a separate line of code.)

function getMyIQ(min, max) {

*return* Math.floor(Math.random() \* (max - min)) + min;

}

Person.IQ = getMyIQ(120, 200);

1. Add a method to your person called greeting that prints to the console: "Hello! It nice to meet you!" (Note: Again, don't modify your previous code! Do this step by writing a new line of code.)

Person.greeting = function () {

    console.log("Hello! It's nice to meet you");

}

Person.greeting();

1. Add another method to your person called sayHello that prints to the console the same message from step 2 above. But this time, be sure to use the mystical, magical, all-powerful this keyword to access your person’s first and last name, so that way the sayHello method could potentially work for *any* person that has a name!

Person.sayHello = function () {

    console.log(`Hello! It's nice to meet you, My name is ${this.firstName} ${this.lastName}`);

}

Person.sayHello();

1. Next, call your person’s sayHello() method and make sure that it works! (Hint: if you need an example of what it looks like when you call a method of an object, look at console.log() -- that's how you call the log() method of the console object!)

Person.sayHello();

1. Without modifying any of your previous code, change the person’s name to "Bill Gate" and then call your person’s sayHello() function one more time to make sure it still works.

Person.firstName = "Bill"

Person.lastName = "Gates"

Person.sayHello();

1. Write another method called testIQ, and inside that method, use an if / else statement to print "I’m smart!" to the console if your person IQ have > 150 IQ , or "No, i’m not good enough!" if its IQ <= 150

Person.testIQ = function () {

*if* (this.IQ > 150) {

        console.log("You are smart");

    } *else* {

        console.log("No, I'm not good enough");

    }

}

Person.testIQ();

1. Hint: Remember to use the very handy this keyword to access the object that your new method is currently attached to!
2. Call your person’s testIQ() method and make sure it works!
3. Change the IQ property to a random number-- again, without modifying any of your previous code!

Person.IQ = getMyIQ(120, 200);

1. Now call your person’s testIQ() method again and make sure it works as expected!

console.log(Person);

Person.testIQ();

1. Read about Object Oriented: <https://developer.mozilla.org/en-US/docs/Learn/JavaScript/Objects/Object-oriented_JS>
2. Create more 5 person with different name, call sayHello() and tell the differences.

function createPerson (first, last, age, address) {

    this.firstName = first;

    this.lastName = last;

    this.age = age;

    this.address = address;

    }

let myFather = new createPerson("John", "Wick", 50, "Hoang Dao Thuy");

console.log(myFather);

let myMother = new createPerson("Agelina", "Jolie", 45, "Earth");

console.log(myMother);

let myFriend = new createPerson("Brad", "Pitt", 50, "Mars");

console.log(myFriend);

let myFoe = new createPerson("Thor", "Wick", 40, "Asgadian");

console.log(myFoe);

let myGirl = new createPerson("Scarlet", "Witch", 30, "Earth");

console.log(myGirl);

## **FUNCTION WITH ARRAY:**

**1.** Write a JavaScript function to check whether an `input` is an array or not.

*Test Data* :

console.log(is\_array('w3resource'));

console.log(is\_array([1, 2, 4, 0]));

false

True

let is\_array = function(input) {

*if* (toString.call(input) === "[object Array]")

*return* true;

*return* false;

    };

console.log(is\_array('w3resource'));

console.log(is\_array([1, 2, 4, 0]));

**2.** Write a JavaScript function to clone an array.

*Test Data* :

console.log(array\_Clone([1, 2, 4, 0]));

console.log(array\_Clone([1, 2, [4, 0]]));

[1, 2, 4, 0]

[1, 2, [4, 0]]

let array\_Clone = function(arra1) {

*return* arra1.slice(0);

    };

console.log(array\_Clone([1, 2, 4, 0]));

console.log(array\_Clone([1, 2, [4, 0]]));

**3.** Write a JavaScript function to get the first element of an array. Passing a parameter 'n' will return the first 'n' elements of the array.

*Test Data* :

console.log(first([7, 9, 0, -2]));

console.log(first([],3));

console.log(first([7, 9, 0, -2],3));

console.log(first([7, 9, 0, -2],6));

console.log(first([7, 9, 0, -2],-3));

*Expected Output* :

7

[]

[7, 9, 0]

[7, 9, 0, -2]

[]

let first = function (array, n) {

*if* (array == null)

*return* void 0;

*if* (n == null)

*return* array[0];

*if* (n < 0)

*return* [];

*return* array.slice(0, n);

};

console.log(first([7, 9, 0, -2]));

console.log(first([],3));

console.log(first([7, 9, 0, -2],3));

console.log(first([7, 9, 0, -2],6));

console.log(first([7, 9, 0, -2],-3));

**4.** Write a JavaScript function to get the last element of an array. Passing a parameter 'n' will return the last 'n' elements of the array.

*Test Data* :

console.log(last([7, 9, 0, -2]));

console.log(last([7, 9, 0, -2],3));

console.log(last([7, 9, 0, -2],6));

*Expected Output* :

-2

[9, 0, -2]

[7, 9, 0, -2]

let last = function (array, n) {

*if* (array == null)

*return* void 0;

*if* (n == null)

*return* array[array.length - 1];

*return* array.slice(Math.max(array.length - n, 0));

};

console.log(last([7, 9, 0, -2]));

console.log(last([7, 9, 0, -2], 3));

console.log(last([7, 9, 0, -2], 6));

**5.** Write a simple JavaScript program to join all elements of the following array into a string.

*Sample array* : myColor = ["Red", "Green", "White", "Black"];

*Expected Output* :

"Red,Green,White,Black"

"Red,Green,White,Black"

"Red+Green+White+Black"

myColor = ["Red", "Green", "White", "Black"];

console.log(myColor.toString());

console.log(myColor.join());

console.log(myColor.join('+'));

**6.** Write a JavaScript program which accept a number as input and insert dashes (-) between each two even numbers. For example if you accept 025468 the output should be 0-254-6-8.

let userInput = prompt("Insert String");

let userString = userInput.toString();

let result = [userString[0]];

*for* (let i = 1; i < userString.length; i++) {

*if* (userString[i - 1] % 2 === 0 && userString[i] % 2 === 0) {

        result.push('-', userString[i]);

    } *else* {

        result.push(userString[i]);

    }

}

console.log(result.join(''));

**7.** Write a JavaScript program which accept a string as input and swap the case of each character. For example if you input 'The Quick Brown Fox' the output should be 'tHE qUICK bROWN fOX'.

let string1 = prompt("Insert another String");

const UPPER = 'ABCDEFGHIJKLMNOPQRSTUVWXYZ';

const LOWER = 'abcdefghijklmnopqrstuvwxyz';

const result1 = [];

*for* (let i = 0; i < string1.length; i++) {

*if* (UPPER.includes(string1[i])) {

        result1.push(string1[i].toLowerCase());

    } *else* *if* (LOWER.includes(string1[i])) {

        result1.push(string1[i].toUpperCase());

    } *else* {

        result1.push(string1[i]);

    }

}

console.log(result1.join(''));

**8.** Write a JavaScript program to compute the sum and product of an array of integers.

let userArray = [1, 2, 3, 4, 5, 6],

    userSum = 0,

    userProduct = 1;

*for* (let i = 0; i < userArray.length; i++) {

    userSum += userArray[i];

    userProduct \*= userArray[i];

}

console.log(`Sum : ${userSum} and Product: ${userProduct}`);

## **FUNCTION WITH OBJECT:**

**1.** Write a JavaScript program to list the properties of a JavaScript object.

*Sample object*:

var student = {

name : "David Rayy",

sclass : "VI",

rollno : 12 };

*Sample Output*: name,sclass,rollno

let student = {

    name: "David Rayy",

    sclass: "VI",

    rollno: 12

};

console.log(Object.keys(student));

**2.** Write a JavaScript program to delete the rollno property from the following object. Also print the object before or after deleting the property.

*Sample object*:

var student = {

name : "David Rayy",

sclass : "VI",

rollno : 12 };

delete student.rollno;

console.log(student);

**3.** Write a JavaScript program to get the length of a JavaScript object.

*Sample object* :

var student = {

name : "David Rayy",

sclass : "VI",

rollno : 12 };

objectLength = Object.keys(student).length;

console.log(objectLength);

**4.** Write a JavaScript program to display the reading status (i.e. display book name, author name and reading status) of the following books.

var library = [

{

author: 'Bill Gates',

title: 'The Road Ahead',

readingStatus: true

},

{

author: 'Steve Jobs',

title: 'Walter Isaacson',

readingStatus: true

},

{

author: 'Suzanne Collins',

title: 'Mockingjay: The Final Book of The Hunger Games',

readingStatus: false

}];

*for* (let i = 0; i < library.length; i++) {

*if* (library[i].readingStatus == true) {

        console.log(`Already read ${library[i].title} by ${library[i].title}`);

    } *else* {

        console.log(`Haven't read ${library[i].title} by ${library[i].title}`);

    }

}

**5.** Write a JavaScript program to create a Clock

Note: The output will come every second.

*Expected Console Output :*

"14:37:42"

"14:37:43"

"14:37:44"

"14:37:45"

"14:37:46"

"14:37:47"