Practice questions on JavaScript

Section 1: JavaScript Fundamentals

a) Define JavaScript and explain its importance as a web programming language.
b) Describe where JavaScript code can be placed within an HTML document.
c) Differentiate between inline, internal, and external JavaScript scripts.
d) Explain various methods of displaying data in JavaScript (e.g., innerHTML, document.write, alert, console.log).
e) Define and explain the use of comments in JavaScript.

Section 2: Variables, Constants, and Data Types

a) Define a variable in JavaScript. Differentiate among var, let, and const with examples.
b) Explain JavaScript data types and their usage with suitable examples.
c) Describe the behavior of arrays and objects declared with const.
d) Explain the difference between constant binding and constant value in JavaScript.
e) Discuss the concept of constant reference and why the contents of const arrays and objects can be modified.

Section 3: Operators and Control Statements

a) Define conditional statements in JavaScript and list their types.
b) Differentiate among if, else if, and else statements with examples.
c) Write a short note on the ternary (?:) operator and state when it is preferred over if-else blocks.

Section 4: Loops and Iteration Control

a) Define loops in JavaScript and explain their importance in programming.
b) Describe the syntax and working process of a for loop with an example.
c) Differentiate between while and do...while loops with examples.
d) Explain the use of break and continue statements in loops.
e) Discuss the use of labels in nested loops with examples.

Section 5: Functions

a) Define a function in JavaScript and list its advantages.
b) Differentiate between function declaration and function expression.
c) Explain the concept of arrow functions and their advantages over traditional functions.
d) Describe how parameters and arguments work in JavaScript functions.
e) Explain default and rest parameters with examples.
f) Differentiate between arguments passed by value and by reference.

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Section 6: Strings and Template Literals

a) Define a string and describe its properties in JavaScript.
b) Explain the advantages of template literals over traditional string concatenation.
c) Describe variable interpolation and expression evaluation using template literals.
d) Illustrate how template literals support multiline strings and embedded expressions.

Section 7: Arrays and Objects

a) Define an array and describe its role in storing sequential data.
b) Explain how to iterate through an array using various types of loops.
c) Define an object and explain how data is stored as key–value pairs.
d) Compare arrays and objects in terms of structure and usage.

Section 8: Document Object Model (DOM)

a) Define the Document Object Model (DOM) and explain how it represents an HTML document.
b) Describe how JavaScript can dynamically modify HTML elements using the DOM.
c) Compare innerHTML, innerText, and textContent in terms of rendering and security.
d) List and explain different DOM element selection methods with examples.
e) Discuss document.body, document.head, and document.forms properties.
f) Explain how JavaScript can dynamically change element attributes and CSS styles.

Section 9: Events and Event Handling

a) Define an event in JavaScript and explain event-driven programming.
b) List common types of JavaScript events used in interactive web applications.
c) Differentiate between inline event handling and addEventListener() method.
d) Describe the syntax and benefits of addEventListener().
e) Compare onclick, ondblclick, onmouseover, and onmouseout events with examples.
f) Explain the onsubmit event and the use of event.preventDefault() in form validation.
g) Describe the differences among onfocus, onblur, onchange, and oninput events.

Section 10: Short Notes

a) innerHTML
b) textContent
c) addEventListener()
d) Pass-by-reference
e) Template strings
f) Default parameters
g) Rest parameter (...)
h) DOM selection methods

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Section 11: Output Based questions.

Variables, Data Types, and Operators

```
a. let x = '5' + 2 + 3; console.log(x);
b. let x = 2 + 3 + '5'; console.log(x);
c. let y; console.log(y);
d. let z = null; console.log(typeof z);
e. console.log('5' == 5); console.log('5' === 5);
f. let a = 'Hello'; a[0] = 'Y'; console.log(a);
g. let text = 'JavaScript';
    console.log(text.slice(4, 1));
h. let s = 'ABCD'; console.log(s.charAt(10));
i. let n = '  JS  '; console.log(n.length);
```

Loops and Iteration Control

```
a) for (let i = 0; i < 3; i++)
   { console.log(i); }
```

```
b) let i = 5;
   for (let i = 0; i < 2; i++) {}
   console.log(i);
```

```
c) let text = '';
   for (let i = 1; i <= 5; i++)
   { if (i === 3) continue; text += i; }
   console.log(text);
```

```
d) let text = '';
   for (let i = 1; i <= 5; i++)
   { if (i === 3) break; text += i; }
   console.log(text);
```

```
e) let i = 10;
   do { i++; }
   while (i < 10);
   console.log(i);
```

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f)
```js
let i = 0;
while (i < 3)
{ i++; }
console.log(i);
```

g)
```js
let i = 0;
do { i++; }
while (i < 0);
console.log(i);
```

h)
```js
let a = 10;
for (var a = 0; a < 3; a++) {}
console.log(a);
```

i)
```js
outer: for (let i=1;i<=3;i++)
{ inner: for(let j=1;j<=3;j++)
{ if(j===2) break outer; console.log(i,j); }
}
```

j)
```js
outer: for (let i=1;i<=3;i++)
{ inner: for(let j=1;j<=3;j++)
{ if(j===2) continue outer;
console.log(i,j); }
}
```

k)
```js
let res = '';
for(let i=0; i<5; i++)
{ if(i==2) continue;
res += i; }
console.log(res);
```

l)
```js
let res = '';
for(let i=0; i<5; i++)
{ if(i==2) break; res += i; }
console.log(res);
```

Functions and Parameters

a)
```js
function multiply(x, y = x)
{ return x * y; }
console.log(multiply(5));
```

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b)
```
function f(...args)
{ return args.length; }
console.log(f(1,2,3,4));
```

c)
```
let x = 5;
function change(x){ x = 999; }
change(x);
console.log(x);
```

d)
```
function sum(a = 5, b = a * 2)
{ return b; }
console.log(sum());
```

e)
```
function f(a,b=5)
{ return a + b; }
console.log(f(10,undefined));
```

f)
```
function f(a,b=5)
{ return a + b; }
console.log(f(10,null));
```

g)
```
function total(...n)
{ return n[0] + n[2]; }
console.log(total(2,4,6));
```

h)
```
function total(...n)
{ return n.length; }
console.log(total());
```

i)
```
function show(x = 5)
{ x = 99; return x; }
console.log(show());
```

j)
```
function show(x = 5)
{ return x; }
console.log(show(undefined));
```

k)
```
function show(x = 5)
{ return x; }
console.log(show(null));
```

```
l) function f(a,b=a*2)
   { return b; }
   console.log(f(3));
```

Section 4: Arrays and Objects

```
a) const arr = ['a','b','c'];
   arr[0] = 'x';
   console.log(arr);
b) let arr = [1,2,3];
   arr.length = 1;
   console.log(arr);
c) const obj = { a:1 };
   function modify(o)
   { o = { a:999 }; }
   modify(obj);
   console.log(obj.a);
d) const obj = { a:1 };
   function modify(o)
   { o.a = 999; }
   modify(obj);
   console.log(obj.a);
e) let obj = {x:1};
   let ref = obj;
   ref.x = 9;
   console.log(obj.x);
f) let obj = {x:1};
   let ref = obj;
   ref = {x:9};
   console.log(obj.x);
g) let o = {n:1};
   function f(obj)
   { obj.n = obj.n + 5; }
   f(o);
   console.log(o.n);
h) const student = { name: 'Rafi', marks: [80, 75, 90] };
   student.marks.push(85);
   student.name = 'Nafis';
   let total = 0;
   for (let i = 0; i < student.marks.length; i++)
```

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```
{ total += student.marks[i]; }
console.log(`${student.name}'s Average: ${total /
student.marks.length}`);
```

DOM Manipulation

a)
```
<p id="p1">Hello</p>
<script>
let p = document.getElementById("p1");
p.innerText = "<b>World</b>";
console.log(p.innerHTML);
</script>
```

b)
```
<p id="p1">Hello</p>
<script>
let p = document.getElementById("p1");
p.innerHTML = "<b>World</b>";
console.log(p.innerText);
</script>
```

c)
```
<p id="p1"><span>Hi</span></p>
<script>
let p = document.getElementById("p1");
console.log(p.textContent);</script>
```

d)
```
<p id="p1">Hello <span
style="display:none">Hidden</span></p>
<script>
let p = document.getElementById("p1");
console.log(p.innerText);
</script>
```

e)
```
<p id="p1">Hello <span
style="display:none">Hidden</span></p>
<script>
let p = document.getElementById("p1");
console.log(p.textContent);
</script>
```

f)
```
<div id="box">Hi</div>
<script>
```

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```
document.getElementById("box").style.display = "none";
console.log(document.getElementById("box").innerText);
</script>
```

g)
```
<p class="a">One</p>
<p class="a">Two</p>
<script>
let els = document.getElementsByClassName("a");
console.log(els[1].innerText);
</script>
```

h)
```
<p class="a">One</p>
<p class="a">Two</p>
<script>
let els = document.querySelector(".a");
console.log(els.length);
</script>
```

i)
```
<p id="p1">ABC</p>
<script>
let p = document.getElementById("p1");
p.innerHTML = p.innerHTML + "<b>XYZ</b>";
console.log(p.innerText);
</script>
```

j)
```
<p id="p1">ABC</p>
<script>
let p = document.getElementById("p1");
p.innerText = p.innerText + "<b>XYZ</b>";
console.log(p.innerHTML);
</script>
```

k)
```
<p id="p1">Hello <b>JS</b></p>
<script>
let p = document.getElementById("p1");
console.log(p.textContent);
</script>
```

l)
```
<p id="p1">Hello <b style="display:none">JS</b></p>
<script>
```

```
let p = document.getElementById("p1");
console.log(p.innerText);
</script>
```

m)
```
<p id="p1">Hello <b style="display:none">JS</b></p>
<script>
let p = document.getElementById("p1");
console.log(p.textContent);
</script>
```

n)
```
let list = document.querySelectorAll("p");
console.log(list[0].innerText);
let list = document.querySelector("p");
console.log(list.length);
```
(Assume there are 3 <p> tags in DOM, first contains text "ABC")

Events and Event Handling

a)
```
<button id="b">Click</button>
<script>
let c = 0;
document.getElementById("b").addEventListener("click",
function(){ c++; });
document.getElementById("b").addEventListener("click",
function(){ console.log(c); });
</script>
```

b)
```
<button id="b">Click</button>
<script>
document.getElementById("b").onclick =
()=>console.log("X");
document.getElementById("b").addEventListener("click",
()=>console.log("Y"));</script>
```

c)
```
<button id="b">Click</button>
<script>
document.getElementById("b").addEventListener("click",
()=>console.log("X"));
document.getElementById("b").onclick =
()=>console.log("Y");
```

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```
        </script>

d)  <button id="b">Click</button>
    <script>
    document.getElementById("b").onclick =
    ()=>console.log("A");
    document.getElementById("b").onclick =
    ()=>console.log("B");
    document.getElementById("b").addEventListener("click",
    ()=>console.log("C"));
    </script>
e)  <button
    id="b">Click</button><script>document.getElementById("
    b").addEventListener("click", ()=>console.log("A"));
    document.getElementById("b").addEventListener("click",
    ()=>console.log("B"));
    document.getElementById("b").onclick =
    ()=>console.log("C");
    </script>
```

Section 12: Programming Based

a) Write a JavaScript program to display all elements of an array within a paragraph tag.
b) Develop a script that computes and displays the sum of all numeric values in an array.
c) Use a for loop to display each element of an array inside individual div tags.
d) Create an array of car brands and display each brand in bold within separate paragraph tags.
e) Write a script that counts and displays how many numbers in an array are greater than 50.
f) Define an object named student with properties name, id, and department, and display each property in separate paragraph tags.
g) Create an object representing a car and display its brand and color using innerText.
h) Create an array of student objects and display those with an average mark above 70.
i) Design a web page where the user enters their age and the program displays voting eligibility.
j) Use the ternary operator to display 'Pass' or 'Fail' based on marks entered in an input box.
k) Write a for loop to print numbers from 1 to 10 on a webpage.
l) Implement a while loop to display the first five multiples of 5 inside div elements.
m) Use a do...while loop to print numbers from 10 down to 1 within a paragraph tag.
n) Write a loop that terminates using break when a specific number is reached, displaying the last printed value.

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o) Use continue in a loop to skip even numbers and display only odd numbers from 1 to 10.
p) Calculate and display the sum of numbers from 1 to 100 using a for loop.
q) Create a function that takes two numbers and displays their sum in a paragraph tag.
r) Develop a function that accepts an array and displays its length inside a div.
s) Write a function that checks whether a given number exists within an array.
t) Build a webpage where a function dynamically appends student details (from an object) as paragraph tags inside a div using DOM manipulation.
u) Use a for loop to display country names ['Bangladesh', 'India', 'Nepal', 'Bhutan', 'Pakistan'] within separate paragraph tags.
v) Write a program that stores numbers [10, 20, 30, 40, 50] in an array and displays their total sum inside a div.
w) Create a student object with properties name, id, and department, and display them using paragraph tags.
x) Use nested loops to display each fruit name from ['Apple', 'Mango', 'Banana'] three times in paragraph tags.
y) Define a function checkGrade(marks) that displays grades (A+, A, B, Fail) based on marks and call it for three students.
z) Create an array of product objects and display all names and prices within an HTML table using a loop.
aa) Design a webpage with a button that, when clicked, displays names from an array inside paragraph tags.
bb) Write a function to find and display the largest number from [25, 68, 42, 89, 55] in a heading tag.
cc) Define a car object with properties brand and speed, then use an if statement to display 'Fast Car' or 'Normal Car' based on speed.
dd) Write a function that accepts an array and returns its length, displaying the result on a webpage.
ee) Create a function findAverage() to compute the average of [70, 80, 90, 60, 85] and display it on button click.
ff) Create an object {name: 'Hasan', age: 20} and a function that increases the age by 5, displaying the updated object.
gg) Write a function that uses template literals to display student names and marks dynamically in paragraph tags.
hh) Define a function averageSalary() that computes the average salary from an array of employee objects and logs it to the console.
ii) Write a function that returns a new array containing only marks greater than or equal to 40.
jj) Create an array of product objects with name, price, and quantity, and compute the total cost using a loop.
kk) Develop a function applyBonus(employees) that increases salaries based on conditions and returns the updated array.
ll) Write a function that converts an array of Celsius temperatures to Fahrenheit using the formula $F = (C * 9/5) + 32$.
mm) Create a function that increases marks by 5 for students scoring below 60, returning the updated array.

nn) Write a function that identifies and returns duplicate values from an array [2, 4, 6, 4, 8, 2, 10].