RQF LEVEL 3

SWDJF301

SOFTWARE DEVELOPMENT

JavaScript Fundamentals

TRAINER MANUAL

October, 2024

JAVASCRIPT FUNDAMENTALS

KOICA Korea International Cooperation Agency

TQUM TVET Quality Management Project

2024

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ACRONYMS

API: Application Programming Interface

CND: Content Delivery Network

CSS: Cascading Style Sheet

DOM: Document Object Model

HTML: Hypertext Markup Language

IDE: Integrated Development Environment

JS: JavaScript

MVC: Model-View-Controller

OS: Operating System

RTB: Rwanda TVET Board

SPAs: Single-Page Applications

SRC: Source

TQUM Project: TVET Quality Management Project

URI: Uniform Resource Identifier

URL: Uniform Resource Locator

VS Code: Visual Studio Code

INTRODUCTION

This trainer's manual includes all the methodologies required to effectively deliver the module titled **" SWDJF301: JavaScript Fundamentals."** Trainees enrolled in this module will engage in practical activities designed to develop and enhance their competencies.

The development of this training manual followed the Competency-Based Training and Assessment (CBT/A) approach, offering ample practical opportunities that mirror real-life situations.

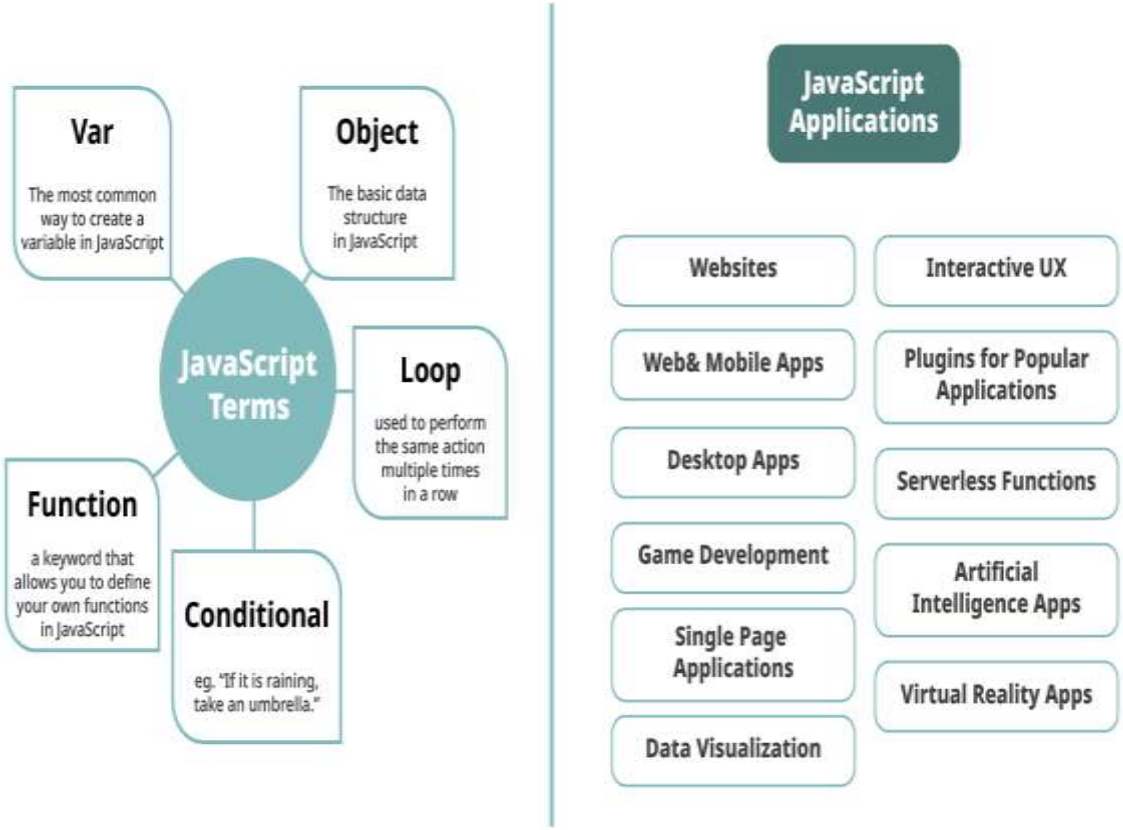
The trainer's manual is organized into Learning Outcomes, which is broken down into indicative content that includes both theoretical and practical activities. It provides detailed information on the key competencies required for each learning outcome, along with the objectives to be achieved.

As a trainer, you will begin by asking questions related to the activities to encourage critical thinking and guide trainees toward real-world applications in the labor market. The manual also outlines essential information such as learning hours, didactic materials, and suggested methodologies.

This manual outlines the procedures and methodologies for guiding trainees through various activities as detailed in their respective trainee manuals. The activities included in this training manual are designed to offer students opportunities for both individual and group work. Upon completing all activities, you will assist trainees in conducting a formative assessment known as the end learning outcome assessment. Ensure that students review the key reading and the points to remember section.

MODULE CODE AND TITLE: SWDJF301 JAVASCRIPT FUNDAMENTALS

Learning Outcome 1: Apply JavaScript Basic Concepts
Learning Outcome 2: Manipulate Data with JavaScript
Learning Outcome 3: Apply JavaScript in Project


JavaScript Terms
Var
The most common way to create a variable in JavaScript
Object
The basic data structure in JavaScript
Loop
used to perform the same action multiple times in a row
Function
a keyword that allows you to define your own functions in JavaScript
Conditional
eg. "If it is raining, take an umbrella."
JavaScript Applications
Websites
Interactive UX
Web& Mobile Apps
Plugins for Popular Applications
Desktop Apps
Serverless Functions
Game Development
Artificial Intelligence Apps
Single Page Applications
Virtual Reality Apps
Data Visualization

Indicative contents
1.1 Introduction to JavaScript
1.2 Integration of JavaScript to HTML
1.3 Use of variables in JavaScript
1.4 Use of data types in JavaScript
1.5 Use of operators in JavaScript

Key Competencies for Learning Outcome 1: Apply JavaScript Basic Concepts

Knowledge	Skills	Attitudes
• Description of JavaScript • Explanation of Variable and their scope • Description of JavaScript Data Types • Description of JavaScript Operators	• Installing vs code and node js. • Integrating JavaScript in HTML • Declaring and initializing variables in JavaScript • Using comments in JavaScript program • Using data types in JavaScript program • Applying operators in JavaScript	• Being Problem solver • Being Team worker • Being a critical thinker • Being Innovative • Having Creativity • Being confident

Duration: 30 hrs

Learning outcome 1 objectives:

By the end of the learning outcome, the trainees will be able to:

1. Describe correctly JavaScript key concepts as used in programming.
2. Explain properly JavaScript variables and their scope based on task.
3. Use correctly JavaScript data types based on variables.
4. Integrate properly JavaScript in HTML based on project structure.
5. Install effectively vs code and node js in accordance with JavaScript standard.
6. Use properly operators in JavaScript program.

 **Resources**

Equipment	Tools	Materials
• Computer • Projector • White board	• Text editor • Node js • Browser	• Internet

 **Advance Preparation:**

Before delivering this learning outcome, you are recommended to:

- Avail computers with text editor and web browser installed.
- Prepare video(s) to be used as didactic material.

Indicative content 1.1: Introduction to JavaScript

Duration: 8 hrs

Theoretical Activity 1.1.1: Description of JavaScript overview

Notes to the trainer:

- Trainer may use small groups for describing JavaScript key concepts.
- The use of JavaScript icon, images or video as didactic materials is required.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the activity and ask trainees to answer to the following questions:

i. What do you understand about the following JavaScript key concepts?
   A. Variable
   B. Data Types
   C. Values
   D. Operators
   E. Expressions
   F. Keywords
   G. Comments
ii. What are some applications of JavaScript?
iii. Outline most known JavaScript libraries.
iv. What are some JavaScript frameworks used for web development?

Step 2: Ask trainees to write provided answers on paper.

Step 3: Ask trainees to presents their findings/Answers

Step 4: Provide the expert view and address any questions or concerns.

Step 5: Ask trainees to read the key reading 1.1.1 in the trainee manual.

Points to Remember

- **JavaScript** is a dynamic programming language that's used for web development, in web applications, for game development, and lots more.
- A **JavaScript variable** is simply a name of a storage location, each variable needs a data type to describe the kind of data to be stored in a variable. These data types may be categorised as **Primitive data type** and **Non-primitive data type.** While performing operations on operands (values and variables) we need a special symbol called an operator.

Practical Activity 1.1.2: Installation of node.js and VS Code

Notes to the trainer

- Having VS Code and node js setups
- Trainer may let each trainee install VS code and Node.js individually.
- The use of video as didactic material is required.

Key steps:

While delivering this activity, pass through the following steps:

Step 1: Introduce the topic and ask trainees to perform the task described below:

As a software developer, you are asked to install node.js and Vs Code in the computer.

Step 2: Explain the task and provide clear work instructions.

Step 3: Demonstrate how you can install the node.js and Vs Code while demonstrating, explain steps to be followed.

Step 4: Ask trainees to install node.js, Vs Code and monitor the procedures.

Step 5: Verify whether node.js and Vs Code are properly installed.

Step 6: Ask trainees to read the key reading 1.1.2. in trainee manual

Points to Remember

- Installing Node.js is a straightforward process that allows developers to leverage the power of JavaScript on the server-side.

Here are some key steps about installing Node.js:

1. Locate node.js setup file
2. Run setup file
3. Complete the Node.js Setup Wizard

- Installing Visual Studio Code (VS Code) is a simple process that allows developers to have a powerful and versatile code editor for their programming needs

  Here are some key steps about installing VS Code:

  1. Locate VS code setup file
  2. Run the setup file
  3. Finally, after installation completes, click on the finish button.

Application of learning 1.1.

BGS Ltd, is a young software development company that develops web applications. You are tasked by BGS Ltd to help them to install Microsoft Visual Studio Code and Node.JS so that their developers will be able to code easily and run JavaScript Applications.

Checklist:

Elements	**Indicators**	**Observation**	
		Yes	**No**
1. VS Code is well installed	1.1 Vs Code is installed		
	1.2 Vs code is located		
2.Node Js Modules and packages are well installed	2.1 Node js is installed		
	2.2. Node js version is verified		
Decision			

Indicative content 1.2: Integration of JavaScript to HTML

Duration: 5 hrs

Theoretical Activity 1.2.1: Description of JavaScript integration to HTML

Notes to the trainer:

- Trainer may use small group for describing the integration of JavaScript to HTML.
- The use of video to demonstrate how to integrate JavaScript to HTML as didactic material is required.

Key steps:

While delivering this activity, pass through the following steps:

Step1: Help trainees in forming groups and introduce the activity by asking trainees to answer to the following questions:

i. What do you understand about the term “script tag as “used in JavaScript:

ii. Shortly, explain the following ways of integrating JavaScript to HTML.

a. Referencing HTML

b. External JavaScript reference (CDN)

c. External java script

Step 2: Ask trainees to write provided answers on paper.

Step 3: Engage trainees in presenting their findings / answers

Step 4: Provide expert view and address any questions or concerns.

Step 5: Ask trainees to read the key reading 1.2.1 in the trainee manual.

Points to Remember

- Integrating JavaScript with HTML allows developers to enhance the interactivity and functionality of web pages. When working with files for the web, JavaScript needs to be loaded and run alongside HTML markup. Some ways of integrating JavaScript to HTML are: Using script tag, referencing HTML, external JavaScript reference (CDN) and external JavaScript.

Practical Activity 1.2.2: Integration of JavaScript to HTML

Notes to the trainer

- The trainer conducts this activity in a Computer Lab where trainees integrate JavaScript to HTML by using different ways and generating JavaScript output.
- Trainer may have sample JavaScript program where JavaScript integrated in HTML.
- While delivering this content, you are required to use a video for JavaScript integration to HTML as didactic material.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Introduce the topic and ask trainees to do the task described below: .
As a Backend developer, ask trainees to go to the computer lab to Integrate JavaScript to HTML.

Step 2. Explain the task, provide clear work instructions, demonstrate how to integrate JavaScript to HTML and the ways of generating output.

Step 3. Ask trainees to Integrate JavaScript to HTML, generate JavaScript output and monitor the procedures.

Step 4. Verify whether the Integration of JavaScript to HTML using script, referencing HTML, external JavaScript reference (CDN) and external JavaScript is performed.

Step 5. Ask trainees to read the key readings 1.2.1 in trainee manual

Points to Remember

- To integrate JavaScript into HTML you have to identify the HTML element(s) and write JavaScript codes to perform desired operations
- Generating JavaScript output allows developers to display information, results, or interact with users in various ways.

  To generate JavaScript output, you can follow these steps:

  1. After defining the desired output
  2. Use one of JavaScript's built-in functions to display output.
  3. Save your JavaScript file with a `.html` extension
  4. Open your HTML file in a web browser

Application of learning 1.2.

You are a web developer working on a project for a local event registration website. The client wants a simple registration form that includes basic validation using JavaScript. Your task is to implement the form and make it interactive.

Checklist

Elements	Indicators	Observation	
		Yes	No
1.<Script> tag is used	1.1 Script tag is defined and opened		
	1.2 Script tag is closed		
	1.3 Script tag is placed in appropriate place (in head, body or both)		
	1.4 Script codes are embedded inside script tag		
2. External JavaScript is well integrated	2.1 JavaScript file is created		
	2.2 HTML file is created		
	2.3 JavaScript file is linked to HTML file		
3. JavaScript output is generated	3.1 Form is created		
	3.2 Submit/cancel buttons are available		
	3.3 Form is interactive		
Decision			

Indicative content 1.3: Use of variables in JavaScript

Duration: 5 hrs

Theoretical Activity 1.3.1: Description of variables in JAVASCRIPT

Notes to the trainer:

- Trainer may form small groups for describing the variables in JAVASCRIPT
- Use a video to explain variables in JavaScript as didactic material.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. engage trainees in group formulation.

Step 2. Introduce the activity and ask trainees to answer to the following questions:

i. Differentiate declaration and re-declaration of variables.

ii. Explain the ways used while declaring a variable.

iii. Outline any four rules to be followed while naming variables in JavaScript

iv**.** What do you understand about variable initialization?

Step 3. Ask trainees to write answers provided on paper.

Step 4. Provide expert view and clarify ideas by using didactic materials.

Step 5. Address any questions or concerns.

Step 6. Ask trainees to read the key reading 1.3.1 in the trainee manual.

Points to Remember

Creating a variable in JavaScript is called "declaring" a variable. Once a variable is created and get assigns with a value this action is known as variable initialization. Variables declared with the **const** keyword are constants and cannot be reassigned after initialization. Variable re-declaration means to declare an already declared variable.

Practical Activity 1.3.2: Use variables in JAVASCRIPT

Notes to the trainer

- The trainer may conduct this activity in a Computer Lab where trainees develop sample JavaScript program while declaring and initialising variables.
- Trainer may have sample JavaScript program with declared and initialised variables.
- While delivering this content, you are required to use a video for JavaScript variables.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Introduce the topic and ask trainees to do the task described below:

As a Software developer, you are asked to open the computer, then the IDE and declare variables, initialize them with values and generate the output by using JavaScript.

Step 2. Explain the task and provide clear work instruction.

Step 3. Demonstrate how to initialize a variable and declare variable by explaining steps involving.

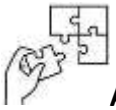
Step 4. Asks trainees to declare, initialize variables, generate output and monitor the procedures.

Step 5. Verify whether variable declaration and variable initialization are clearly used in JavaScript program.

Step 6. Ask trainees to read the key readings 1.3.2 in trainee manual

Points to Remember

- There are four Ways to Declare a JavaScript Variable: Using var, Using let, using const and, using nothing.
- For example: let name;
- To initialize a variable, we use the assignment operator (=) followed by value.
- For example: var salary =12000;



Application of learning 1.3.

You are building a temperature converter application. Users can input a temperature in either Celsius or Fahrenheit, and the application will convert it to the other unit. JavaScript variables will be used to store and manipulate the temperature values. Write a JavaScript program that simulates a simple temperature converter. The program should prompt the user for a temperature in Celsius, convert it to Fahrenheit, and display the converted temperature.

Checklist

Elements	Indicators	Observation	
		Yes	No
1 Variables are well declared	1.1 Variable name is valid		
	1.2 Variables are initialised		
	1.3 The entered data is converted		
	1.4 Output is generated		
Decision			

Indicative content 1.4: Use of data types in JavaScript

Duration: 5 hrs

Theoretical Activity 1.4.1: Description of data types in JavaScript

Notes to the trainer:

- Trainer may form small groups for describing the data types in JavaScript.
- Trainer may use a video as didactic material for explaining data types.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Engage trainees in forming small groups.

Step 2. Introduce the activity and trainees to answer to the following questions in their respective groups:

i. What do you understand about Data Type?

ii. Describe the different types of Data Type available in JavaScript.

iii. Explain the types of casting.

Step 3. Ask trainees to write provided answers on paper.

Step 4. Ask trainees to present their findings to the trainer and the whole class.

Step 5. Provide an expert view and clarify ideas by using didactic materials.

Step 6. Address any questions or concerns.

Step 7. Ask trainees to read key reading 1.4.1 in the trainee manual.

Points to Remember

- Data types describe the different types or kinds of data that we're going to be working with and storing in variables, in JavaScript, there are only two types of data types: Primitive data type and non-primitive (reference) data type. converting one data type to another data type is known as casting, there are two types of type casting in JavaScript and these are: Implicit Conversion and Explicit Conversion.

Practical Activity 1.4.2: Use data types in JAVASCRIPT

Notes to the trainer

- As this activity should take place in a Computer Lab, the trainer may facilitate trainees to use different data types while declaring variables.
- The use video as didactic material is required while demonstrating how to use different data types.
- Trainer may have sample JavaScript program demonstrating the use of data types.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Introduce the topic and ask trainees to do the following task:

As a software developer, you are asked to open the computers, then the IDE: use the data types as used in JavaScript.

Step 2. Explain the task and provide clear work instruction.

Step 3. Demonstrate how you can use different data types while declaring variables.

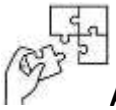
Step 4. Ask trainees to use data types in sample JavaScript program and monitor the activity.

Step 5. Verify whether data types are clearly used.

Step 6. Ask trainees to read the key readings 1.4.2 in the trainee manual.

Points to Remember

- To convert numeric strings and boolean values to numbers, you can use Number() and to convert other data types to strings, you can use either String() or toString(). When converting other data types to a boolean, you can use Boolean(). In JavaScript, undefined, null, 0, NaN, '' converts to false.



Application of learning 1.4.

You are developing a web application to track and manage student grades for a school. you'll encounter various data types in JavaScript to handle student information, course grades, and overall statistics.

Elements	Indicators	Observation	
		Yes	No
1.Data types are well defined and used	1.1 Different data types are used based on types of data to be stored.		
Decision			

Indicative content 1.5: Use of operators in JavaScript

Duration: 7 hrs.

Theoretical Activity 1.5.1: Description of the operators in JavaScript

Notes to the trainer:

- Trainer may form small groups for describing operators in JavaScript.
- Trainer may use a video as didactic material for describing and explaining operators in JavaScript.
- Trainer may use calculator to show the result of arithmetic operators in order to compare it with the result produced by JavaScript program with operators.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Engage trainees in forming small groups.
Step 2. Introduce the activity and ask trainees to answer to the following questions:

i. What do you understand about operator?
ii. Explain different types of operators

Step 3. Ask trainees to write answers provided on paper.
Step 4. Engage trainees to present their findings to the trainer and the whole class.
Step 5. Provide expert view and clarifies ideas by using didactic materials.
Step 6. Address any questions or concerns.
Step 7. Ask trainees to read the key reading 1.5.1 in the trainee manual.

Points to Remember

- Operators in JavaScript are symbols or keywords that perform operations on operands (values or variables). There are different types of operators and these are assignment operators, arithmetic operators, string operators, comparison operators, logical operators, bitwise operators and conditional operator.

Practical Activity 1.5.2: Use the operators in JavaScript

Notes to the trainer

- As this activity should take place in a Computer Lab, the trainer may facilitate trainees to use different operators in JavaScript program.
- Trainer may have sample JavaScript program to demonstrate the use of operators.
- The use of video as didactic material is required while demonstrating how to use different operators.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Introduce the topic and ask trainees to do the task described below:

As a software developer, you are asked use operators used in JavaScript program.

Step 2. Explain the task and provide clear work instruction.

Step 3. Demonstrate how to use operators and explain the use of them in JavaScript program.

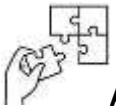
Step 4. Ask trainees to use operators and monitor the procedures.

Step 5. Verify whether operators are clearly used in JavaScript program.

Step 6. Ask trainees to read the key readings 1.5.2 in trainee manual.

Points to Remember

- Operators allow you to perform arithmetic calculations, compare values, assign values, and more.



Application of learning 1.5.

You are tasked with developing an inventory management system for a retail store using JavaScript. You will utilize different operators to handle stock levels, track sales, and manage product availability.

Checklist

Elements	Indicators	Observation	
		Yes	No
1. Operators in JavaScript are well used.	1.1 Variables are selected		
	1.2 Variables are well declared		
	1.3 The correct operator is selected		
	1.4 Operator is properly used		
	1.5 Output produced is correct		
Decision			

Learning outcome 1 end assessment

Written assessment

1. Choose the correct answer

i)JavaScript is a _____ language.

a) Object-Oriented
b) High-level
c) Assembly-language
d) Object-Based

The answer is d

ii) Initialization of variables can be done by writing—---------- operator in between variable name and operand value.

a) EQUALS

b) =

c) VALUE

d) ==

The answer is b

iii) Which of the following keywords is used to define a variable in JavaScript?

a) var

b) let

c)Both A and B

d)None of the above

The answer is c

4. Enumerate five JavaScript Data Types

The answer is:

a) Number
b) String
c) Boolean
d) Object
e) Undefined

3. Based on knowledge acquired in JavaScript variables, you are asked to read the following statement and state whether they are true or false.

i. Variable Scope determines the accessibility (visibility) of variables.
ii. A variable stores the data value that can be changed later.
iii. Any variable declared inside a block such as a function can be accessed anywhere in a program.

Answer:

i. True
ii. True
iii. False

4. Match the following items of A column which corresponding to B column.

A	**B**
1. Variable scope	A. is a JavaScript framework for building user interfaces.
2. vue	B. can be accessed from anywhere in a JavaScript program.
3. Global variables	C. is literally just where your application is running in.
4. Runtime environment	D. determines the accessibility (visibility) of variable.

Answer

1……..D
2……..A
3……..B
4……..C

5. Complete the following statement with the correct word(s)

"In JavaScript, an…….. is a sign or a special symbol used to perform operations on operands.

Answer

In JavaScript, an **operator** is a sign or a special symbol used to perform operations on operands.

6. Give the output of the following JavaScript statements:

a) result = '4' - 2;
console.log (result);
Output:
2

b) result = 'hello' - 'world';
console.log(result);
Output:
NaN

c) result = 4 + true;
console.log(result);

Output:

5

d) result = 4 - undefined;
console.log(result);
Output:
NaN

e) result = Number('324');
console.log(result);

Output:

324

f) let text = "Hello";

text += " World";

document.write("MY TEXT is " +text);

Output:

MY TEXT is Hello World

g) let x = 10;

x += 5;

document.getElementById("demo").innerHTML = "Value of x is: " + x;

Output:

Value of x is: 15

h) let x = 5;
console.log('--x = ', --x);

Output:

--x = 4

i) let x = 5;
document.getElementById("demo").innerHTML = (x !== 5);

Output:

false
j) let a = 6;
let b = 14;
result = a & b;

```
window.alert(result);
```

Output:
6

Practical assessment

The calculator should allow users to perform basic arithmetic operations like addition, subtraction, multiplication, and division. Your goal is to integrate JavaScript within an HTML document, use JavaScript variables, data types, and operator concepts to implement the calculator functionality. You are tasked with creating a simple calculator using HTML and JavaScript.

Checklist

Elements	Indicators	Observation	
		Yes	No
JavaScript is properly integrated in HTML based on project structure	HTML structure are created		
	Convert button is created		
	Input Text are formatted		
	HTML event listener are applied (onclick)		
	JavaScript form is validated		
Variables are correctly used based on task	Variables are declared		
	Variable initialisation is applied		
Datatype are correctly used based on variables	Datatypes are applied		
	Type casting is applied		
Operators are correctly used based on task	Assignment operators are used		
	Arithmetic operators are used		
Conditional statements are properly implemented according to the control flow	If else / Switch case statement is used		
Functions are appropriately used based on the task	Built-in functions are used		
	Function call is respected		
Decision			

Further information to the trainer

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1 <html>
2 <body>
3 <script type="text/javascript">
4 alert("Hello World");
5 </script>
6 </body>
7 </html>
8
9
10

Indicative contents
2.1 Using string in JavaScript **2.2 Using conditional statement** **2.3 Using Loop functions in JavaScript** **2.4. Using Functions in JavaScript** **2.5 Using objects in JavaScript** **2.6. Using arrays in JavaScript** **2.7 Using JavaScript in HTML** **2.8 Applying regular expression** **2.9 Error handling**

Key Competencies for Learning Outcome 2: Manipulate data with JavaScript

Knowledge	Skills	Attitudes
• Description of JavaScript strings • Description of conditional statements • Description of Loops in JavaScript • Description of Functions in JavaScript • Description of JavaScript objects. • Description of arrays in JavaScript • Description of regular expressions • Description of errors in JavaScript	• Applying string in JavaScript. • Using conditional statements in JavaScript • Using loop statements in JavaScript • Applying functions in JavaScript • Using JavaScript objects • Using arrays in JavaScript • Applying JavaScript in HTML. • Using Regular expressions in JavaScript. • Handling errors in JavaScript program	• Being Problem solver • Being Attentive • Being confident • Being a critical thinker • Being analytical and details oriented • Being Team worker

Duration: 70 hrs

Learning outcome 2 objectives:

By the end of the learning outcome, the trainees will be able to:

1. Describe properly JavaScript strings based on the task to be done
2. Apply effectively conditional statements in JavaScript based on control flow
3. Use effectively loops in JavaScript program based on the given task
4. Apply correctly functions in JavaScript program.
5. Use correctly objects in JavaScript.
6. Use correctly arrays in JavaScript program based on given task
7. Apply effectively regular expressions in JavaScript program
8. Handle correctly JavaScript errors based on JavaScript error handling mechanism
9. Apply effectively JavaScript in HTML based on events occurring.

Resources

Equipment	Tools	Materials
• Computer • Projector • White board	• Text editor • Nodejs • Browser	• Internet

Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail computers with text editor and web browser installed.
- Prepare video(s) to be used as didactic material.

Indicative content 2.1: Using string in JavaScript

Duration: 6 hrs

Theoretical Activity 2.1.1: Description of string in JavaScript

Notes to the trainer:

- Trainer may use small groups for describing strings in JavaScript.
- The use of video as didactic material is required while demonstrating the use of strings.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Engage trainees in group formulation.
Step 2. Introduce the activity and ask trainees to answer to the following questions:

i. What do you understand about the term “string”

ii. What is meant by string concatenation?

iii. Outline methods or ways by which we can concatenate strings in JavaScript**.**

Step 3. Ask trainees to write answers provided on flipchart/paper.
Step 4. Engage trainees in presenting their findings to the whole class.
Step 5. Provides expert view and clarifies ideas by using didactic materials.
Step 6. Address any questions or concerns.
Step 7. Ask trainees to read the key reading 2.1.1 in the trainee manual.

Points to Remember

- A string is a data type used to represent textual data. It is a sequence of characters enclosed within single quotes (''), double quotes ("") or backticks (``) and the Strings can contain letters, numbers, symbols, and special characters. String concatenation means to append one or more strings to the end of another string. To concatenate strings we can use the concat() method, the '+' operator, the array join() method or template literals.

Practical Activity 2.1.2: Use string in JavaScript

Notes to the trainer

- The trainer may conduct this activity in computer Lab where trainees use manipulate strings in JavaScript.
- Prepare sample JavaScript codes using strings.
- Avail Video for using string in JavaScript as didactic material.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Introduce the topic and ask trainees to do the task described below:
As a software developer, you are asked to open the computers, then the IDE and use String in different ways as used in JavaScript data manipulation.

Step 2. Demonstrate how to use string in JavaScript, while demonstrating explain the procedures to use string in JavaScript.

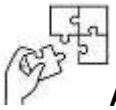
Step 3. Ask trainees to use string in their own JavaScript program.

Step 4. Verify whether strings are clearly used in JavaScript.

Step 5. Ask trainees to read the key readings 2.1.2 in trainee manual.

Points to Remember

- To manipulate and work with the string use various string methods and operations This includes concatenation, slicing, replacing, converting case, and more.



Application of learning 2.1.

you are tasked to work on a web application that allows users to perform basic string manipulation operations. Users can input a string, and the application provides them with options to perform operations like reversing the string, converting it to uppercase or lowercase, and counting the number of characters.

Checklist

Elements	Indicators	Observation	
		Yes	No
1. Strings are correctly used in JavaScript	1.1 Strings are declared		
	1.2 Escape characters are used		
	1.3 Strings are concatenated		
	1.4 String methods are applied		
	1.5 Output is produced		
Decision			

Indicative content 2.2: Using conditional statements

Duration: 6 hrs

Theoretical Activity 2.2.1: Description of conditional statement

Notes to the trainer:

- Trainer may form small groups to be used for describing conditional statements.
- Prepare didactic material like video to describe conditional statement.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Engage trainees in group formulation

Step 2. Introduce the activity and ask trainees to answer to the following questions:

i. What do you understand about the term “conditional statements”
ii. What are different types the conditional statements.
iii. Give the syntax of the switch statement.

Step 3. Ask trainees to write answers provided on flipchart/paper in their respective groups.

Step 4. Engage trainees in presentation of their findings.

Step 5. Provides expert view and clarify ideas by using didactic materials.

Step 6. Address any questions or concerns.

Step 7. Ask trainees to read the key readings 2.2.1 in trainee manual

Points to Remember

- Conditional statements in JavaScript are programming constructs that allow you to control the flow of your code based on specific conditions. They help you to create logic that responds to user input, handles different scenarios, and performs actions based on specific conditions. There are different types of conditional statements and these are: If statement, If-else statement, If-else-if statement and Switch case statement.

Practical Activity 2.2.2: Use conditional statements

Notes to the trainer

- The trainer may deliver this content in a Computer Lab.
- While delivering this content, avail a Video for using conditional statements in JavaScript as didactic material.
- Trainer may have sample JavaScript program where conditional statements used.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Introduce the topic and ask trainees do the task described below:
As a software developer, you are requested to open the computers, then the IDE and use different types of conditional statements in the JavaScript program.

Step 2. Explain the task and provide clear work instruction.

Step 3. Demonstrate how to use different types of Conditional statements. while demonstrating, explain the steps to use conditional statements in a JavaScript program.

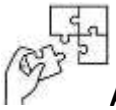
Step 4. Asks trainees to use different types of conditional statements in JavaScript program.

Step 5. Verify whether the different types of conditional statements are clearly used in JavaScript.

Step 6. Ask trainees to read key reading 2.2.2.

Points to Remember

- For using any conditional statement, you need to determine the condition that you want to evaluate and select the appropriate conditional statement based on your task.



Application of learning 2.2.

As a software developer, you are hired by your school to develop a web application that allows trainer to input marks of trainees, and the application will determine and display the largest mark from a list of entered marks in JavaScript.

Checklist

Elements	Indicators	Observation	
		Yes	No
1. Conditional statements are well used in JavaScript program	1.1 Variables are declared		
	1.2 Data types are selected		
	1.3 If else if statement is used		
	1.4 Output function is selected		
	1.5Output is generated		
Decision			

Indicative content 2.3: Using Loop functions in JavaScript

Duration: 8 hrs

Theoretical Activity 2.3.1: Description of Loop functions in JavaScript

Notes to the trainer:

- Trainer may use small groups while describing loop functions in JavaScript.
- Use video for describing loop functions in JavaScript as didactic material.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Help trainees in forming groups.
Step 2. Introduce the activity and ask trainees to answer to the following questions:
i. What do you understand about the term “Loop”.
ii. List types of loops available in JavaScript.
iii. Differentiate while loop from do… white loop in JavaScript.
Step 3. JavaScript loops offer several advantages. Give some of them
Step 4. Ask trainees to write answers provided on flipchart/pape
Step 5. Engage trainees in presenting their findings / answers to the whole class.
Step 6. Provides expert view and clarifies ideas by using didactic materials.
Step 7. Address any questions or concerns.
Step 8. Ask trainees to read the key reading 2.3.1 in the trainee manual.

Points to Remember

- **A JavaScript loop** is a sequence of instructions that is continually repeated until a certain condition is reached. It provides a way to automate repetitive tasks, iterate over data structures, and control the flow of execution. JavaScript offers five types of loops and these are: for loop, while loop, do-while loop, for-in loop and for-of loop. JavaScript loops offer several advantages such as Efficiency, Code reusability, Control flow, Code readability, code maintainability and more.

Practical Activity 2.3.2: Use Loop functions in JavaScript

Notes to the trainer

- The trainer requires to avail computers in good working conditions as this activity should be conducted in computer lab.
- Trainer may have sample programs in JavaScript demonstrating the use of loops.
- Prepare Video for using conditional statements in JavaScript as didactic material.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Introduce the topic and ask trainees to do the task described below:

As a software developer, you are requested to open the computers, then the IDE and use loop functions in the JavaScript program.

Step 2. Explain the task and provide clear work instruction.

Step 3. Demonstrate how to use the loop functions while demonstrating, explain the steps to use loop functions in JavaScript programming.

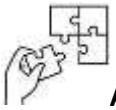
Step 4. Ask trainees to use a loop function in their own JavaScript program and generate the output.

Step 5. Verify whether the use loop functions in JavaScript program are clearly applied.

Step 6. Ask trainees to read key reading 2.3.2 for more clarifications.

Points to Remember

When using loops, firstly you must identify the specific task or set of instructions that need to be repeated and then choose the appropriate loop type from different types of loops. The best loop suits your task based on its requirements and the data structure you are working with is one to be selected.



Application of learning 2.3.

You are tasked to work on a web application that generates and displays the multiplication table for a given number. The application will iterate from 0 to 15 and show the multiplication results for each iteration. JavaScript will be used to perform the iterations and calculate the results.

Checklist

Elements	**Indicators**	**Observation**	
		Yes	**No**
1.Loop functions are well used in JavaScript	1.1 Variables is declared		
	1.2 Loop is selected		
	1.3 Variable is initialised		
	1.4 Condition is set		
	1.5 The incrementation is used properly		
	1.6 The output is displayed		
Decision			

Indicative content 2.4: Using Functions in JavaScript

Duration: 12 hrs

Theoretical Activity 2.4.1: Description of functions in JavaScript

Notes to the trainer:

- Trainer may use small groups while describing functions in JavaScript.
- Use video for describing functions in JavaScript as didactic material.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Engage trainees to from groups
Step 2. Introduce the activity and ask trainees to answer to the following questions:
i. Explain the term “function” as used in JavaScript programming.
ii. Differentiate built-in functions from user defined functions.
iii. Give the advantages of using functions in programming.
Step 3. Ask trainees to write provided answers on flipchart/paper.
Step 4. Engage trainees in presenting their findings / answers
Step 5. Provide expert view and clarifies ideas by using didactic materials.
Step 6. Address any questions or concerns.
Step 7. Ask trainees to read the key reading 2.4.1 in the trainee manual.

Points to Remember

- Functions in JavaScript are blocks of reusable code that can be defined and invoked to perform specific tasks. A function may be a user defined function or a built-in function.

Practical Activity 2.4.2: Use of functions in JavaScript.

Notes to the trainer

- The trainer requires to avail computers in good working conditions as this activity should be conducted in computer lab.
- Trainer may have sample programs in JavaScript demonstrating the use of functions.
- Prepare Video for using functions statements in JavaScript as didactic material.

Key steps:

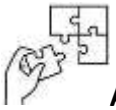
While delivering this activity, pass through the following steps:

Step 1. Introduce the topic and ask trainees do the task described below:
As a software developer, you are requested to open the computers, then the IDE and use functions in the JavaScript program.

Step 2. Explain the task and provide clear work instruction.
Step 3. Demonstrate how to use functions in the JavaScript program, while demonstrating, explain the steps of using functions in JavaScript.
Step 4. Ask trainees to use functions in JavaScript and monitor the procedures.
Step 5. Verify whether the functions are clearly used in JavaScript program.
Step 6. Ask trainees to read the key readings 2.4.2 in trainee manual.

Points to Remember

- You can define function to perform specific tasks. The defined function accepts parameters, returns values, and even passes functions as arguments to other functions.



Application of learning 2.4.

You are tasked to develop an e-commerce website with a shopping cart feature using JavaScript. Functions are used to handle various aspects of the shopping cart, such as adding items, calculating the total, and processing the checkout.

Checklist

Elements	**Indicators**	**Observation**	
		Yes	**No**
1.Functions are applied in JavaScript	1.1 Functions are declared		
	1.2.Parameters are selected		
	1.3 Functions are defined		
	1.4 Functions are called		
	1.5 Output is generated		
Decision			

Indicative content 2.5: Using objects in JavaScript

Duration: 8 hrs

Theoretical Activity 2.5.1: Description of objects in JavaScript

Notes to the trainer:

- Trainer may use small groups while describing JavaScript objects.
- Trainer may prepare images for real world objects.
- Use video for describing objects in JavaScript as didactic material.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Involve trainees in forming groups.
Step 2. Introduce the activity and request trainees to answer to the following questions:
i. What do you understand about the term “object”.
ii. Give the ways of creating an object.
iii. Explain the ways of accessing object properties.
Step 3. Ask trainees to discuss in their groups and write answers provided on flipchart/paper.
Step 4. Engage trainees in presenting their findings / answers to the whole class.
Step 5. Provide expert view and clarify ideas by using didactic materials.
Step 6. Address any questions or concerns.
Step 7. Ask trainees to read the key reading 2.5.1 in the trainee manual.

Points to Remember

An object is a fundamental data type that allows you to represent and organize complex data structures. It is a collection of key-value pairs, where each key (also known as a property) is a unique identifier, and each value can be of any data type. There are three (3) ways of creating an object in JavaScript and these are: By object literal**,** by creating instance of Object directly and by using an object constructor.
Properties and methods in JavaScript can be defined or accessed in two ways:
using dot notation (`object.property`) or bracket notation (`object['property']`).

Practical Activity 2.5.2: Using objects in JavaScript

Notes to the trainer

- The trainer requires to avail computers in good working conditions as this activity should be conducted in computer lab.
- Trainer may have sample programs in JavaScript demonstrating the use of objects.
- Prepare Video for using objects in JavaScript as didactic material.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Introduce the topic and ask trainees to do the task described below:
As a software developer, you are requested to open the computers, then the IDE and use object in the JavaScript program.
Step 2. Explain the task and provide clear work instruction.
Step 3. Demonstrate how to use objects in the JavaScript program, while demonstrating, explain the steps of using objects in JavaScript.
Step 4. Ask trainees to use objects in JavaScript and monitor the procedures.
Step 5. Verify whether the objects are used clearly in JavaScript program.
Step 6. Ask trainees to read the key readings 2.5.2 in trainee manual

Points to Remember

- Accessing Properties and Methods in JavaScript use dot notation or bracket notation. Dot notation is typically used when you know the property or method name in advance, while bracket notation is useful when the name is dynamic or contains special characters.

Application of learning 2.5.

You are tasked to develop a Library Management System using JavaScript, where objects are employed to represent books, library patrons, and transactions. This system allows librarians to manage the library's inventory, track book borrowings, and maintain patron information.

Checklist

Elements	**Indicators**	**Observation**	
		Yes	**No**
1. Object are well used in JavaScript	1.1 Objects are created		
	1.2 Objects are accessed		
	1.3 Output is produced		
Decision			

Indicative content 2.6: Using arrays in JavaScript

Duration: 6 hrs

Theoretical Activity 2.6.1: Description of arrays in JavaScript

Notes to the trainer:

- Trainer may use small groups for describing arrays in JavaScript.
- Use video for describing arrays in JavaScript as didactic material

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Introduce the activity and help trainees in forming groups.
Step 2. In formed groups request trainees to answer to the following questions:

i. What do you understand about the term “array”.
ii. Describe types of arrays.
iii. Explain how to access array elements.

Step 3. Asks trainees to write provided answers on flipchart/paper.
Step 4. Engage trainees in presenting their findings / answers to the whole class.
Step 5. Provides expert view and clarifies ideas by using didactic materials.
Step 6. Address any questions or concerns.
Step 7. Ask trainees to read the key reading 2.6.1 in the trainee manual.

Points to Remember

A JavaScript array is a special type of object that allows you to store multiple values in a single variable. It is an object that represents a collection of similar type of elements. JavaScript arrays are divided into One-dimensional arrays and multi-dimensional arrays. Accessing array elements in JavaScript can be done using index-based notation.

Practical Activity 2.6.2: Apply arrays in JavaScript

Notes to the trainer

- The trainer requires to avail computers in good working conditions as this activity should be conducted in computer lab.
- Trainer may have sample programs in JavaScript demonstrating the use of arrays.
- Prepare Video for using arrays in JavaScript as didactic material.

Key steps:

While delivering this activity, pass through the following steps:

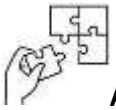
Step 1. Introduce the topic and ask trainees do the task described below:

As a software developer, you are requested to develop a sample JavaScript program by using arrays.

Step 2. Explain the task and provide clear work instruction.
Step 3. Demonstrate how to apply arrays, while demonstrating, explain the steps to apply arrays in JavaScript programming.
Step 4. Ask trainees to use arrays in JavaScript and monitor the procedures.
Step 5. Verify whether the arrays are clearly used in JavaScript.
Step 6. Ask trainees to read the key readings 2.6.2 in trainee manual.

Points to Remember

- To apply arrays in JavaScript, you can Declare an Array, Add Elements, Access Element, Modify Elements, Iterate Over Elements and Use Array Methods for performing required tasks on arrays.



Application of learning 2.6.

You need to use JavaScript arrays to store and manipulate student information. The system should allow teachers to input grades, calculate averages, and identify students who need additional support. you are tasked to develop a student grade tracking system for a school.

Checklist

Elements	Indicators	Observation	
		Yes	No
1.Arrays are well used in JavaScript	1.1 Array is well declared		
	1.2 Values are stored in array		
	1.3 Loop is used for iteration		
	1.4 Average is calculated		
	1.5 Condition for additional support is set		
	1.6 The output is produced		
Decision			

Indicative content 2.7: Using JavaScript in HTML

Duration: 14 hrs

Theoretical Activity 2.7.1: Description of JavaScript in HTML

Notes to the trainer:

- Trainer may use small groups to describe JavaScript in HTML.
- Use video as didactic material for explaining JavaScript in HTML.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Help trainees in forming groups and introduce the activity by requesting them to answer the following questions:

i. What are HTML Events
ii. Describe window object
iii. Define canvas in HTML
iv. Describe JavaScript form validation
v. Describe HTML DOM

Step 2. Ask trainees to write answers provided on flipchart/paper.
Step 3. Engage trainees in presenting their findings / answers to the whole class.
Step 4. Provides expert view and clarifies ideas by using didactic materials.
Step 5. Address any questions or concerns.
Step 6. Ask trainees to read the key reading 2.7.1 in the trainee manual.

Points to Remember

- HTML events in JavaScript refer to actions or occurrences that can be detected and responded to by JavaScript code within an HTML document. Events in JavaScript play a crucial role in creating interactive and dynamic web applications. The `window` object is a fundamental part of JavaScript in a browser environment which provides a gateway to interact with the browser window, access its **properties** and **method.**
- The `<canvas>` element in JavaScript provides a versatile and powerful platform for creating and manipulating graphical content dynamically. With its drawing context

and various **drawing operations**, **you can create Gradients**, render images, and design interactive visual elements on the web.

Practical Activity 2.7.2: Apply JavaScript in HTML

Notes to the trainer

- The trainer may deliver this content in computer lab and is required to avail computers in good working conditions.
- Trainer may have sample JavaScript codes showing the use of JavaScript in HTML.
- Use video for use JavaScript in HTML as didactic material.

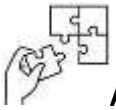
Key steps:

While delivering this activity, pass through the following steps:

Step 1. Introduce the topic and ask trainees to do the task described below:
As a software developer, you are asked to open the computers, then the IDE and use JavaScript in HTML in JavaScript programming.
Step 2. Explain the task and provide clear work instruction.
Step 3. Demonstrate how to apply JavaScript in HTML. While demonstrating, explain the steps required to apply JavaScript in HTML.
Step 4. Ask trainees to apply JavaScript in HTML and monitor the procedures.
Step 5. Verify whether HTML in JavaScript used JavaScript programming is clearly applied.
Step 6. Ask trainees to read key reading 2.7.2.

Points to Remember

- By implementing JavaScript form validation, you can enhance the user experience by ensuring that the data submitted through HTML forms meets the required criteria.



Application of learning 2.7.

Build a JavaScript project to create an age calculator. From the final version of the project, create a container with the title age calculator with an input of a date. If the user clicks on the date input, he/she can choose the date of their birthday. For example, if the user chooses a date in 2002 and clicks on Calculate Age, he/she can see the age is calculated based on this date and saying your age is 22 years old.

Checklist

Elements	Indicators	Observation	
		Yes	No
1.JavaScript is used in HTML	1.1 Variables are declared		
	1.2 Data types are selected		
	1.3 The corrects method is selected		
	1.4 The selected method is used		
	1.5 Output is produced		
Decision			

Indicative content 2.8: Applying regular expressions

Duration: 6 hrs

Theoretical Activity 2.8.1: Description of regular expressions in JavaScript

Notes to the trainer:

- Trainer may use small groups for describing regular expressions.
- Use video as didactic material for explaining regular expressions in JavaScript.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Engage trainees in groups forming.
Step 2. Introduce the activity and ask trainees to answer to the following questions:
i . Explain the term “regular expression”
ii. Describe the following terms used in regular expression:
a. Modifiers
b. Groups
c. Metacharacters
d. Quantifiers
Step 3. Ask trainees to write answers provided on flipchart/paper.
Step 4. Ask trainees to presents their findings to the whole class.
Step 5. Provide the expert view and clarifies ideas by using didactic materials.
Step 6. Address any questions or concerns.
Step 7. Ask trainees to read the key reading 2.8.1 in the trainee manual.

Points to Remember

- Regular expressions in JavaScript are a valuable tool for handling pattern matching and string manipulation tasks, providing efficient ways like Modifiers, Groups, Metacharacters, Quantifiers to work with text patterns.

Practical Activity 2.8.2: Apply regular expressions in JavaScript

Notes to the trainer

- The trainer may require availing computer in good working conditions as this content is going to be delivered in computer lab.
- Trainer may have sample JavaScript codes showing the use of regular expressions in JavaScript program.
- Use video for using regular expressions in JavaScript as didactic material.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Introduce the topic and ask trainees to do the task described below: .

As a software developer, you are asked to go to the computer lab, open the computers, then the IDE and apply regular expressions in a JavaScript program.

Step 2. Explain the task and provide clear work instruction.

Step 3. Demonstrate how you can apply regular expression in JavaScript, while demonstrating explain the steps to apply regular expressions in JavaScript

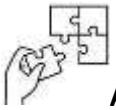
Step 4. Ask trainees to apply regular expressions and monitor the procedures.

Step 5. Verify whether regular expressions are used clearly in JavaScript program.

Step 6. Ask trainees to read the key readings 2.8.2 in trainee manual.

Points to Remember

- Regular expressions are used with the RegExp methods test() and exec() and with the String methods match(), replace(), search(), and split().
- When you want to know whether a pattern is found in a string, use the test() or search() methods; for more information (but slower execution) use the exec() or match() methods.



Application of learning 2.8.

you are developing a user registration form for a website, and you want to ensure that users enter valid information. You are tasked to use regular expressions in JavaScript to validate certain fields.

Checklist

Elements	Indicators	Observation	
		Yes	No
1. Regular expressions are applied correctly	1.1 Modifiers are used		
	1.2 Any quantifier is used		
	1.3 Regular expression methods are applied		
	1.4 Certain fields are validated		
Decision			

Indicative content 2.9: Error handling

Duration: 4 hrs

Theoretical Activity 2.9.1: Identification of error handling in JavaScript

Notes to the trainer:

- Trainer may use small groups for explaining error handling in JavaScript.
- Use video as didactic material for explaining error handling in JavaScript.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Engage trainees in forming groups.
Step 2. Introduce the activity and ask trainees to answer to the following questions:
i. What do you understand about the term "error handling''
ii. What are different types of errors in JavaScript?
iii. Explain the difference between Try & catch in error handling.
iv. Explain the throw statement in error handling.
Step 3. Ask trainees to write answers provided on flipchart/paper.
Step 4. Ask trainees to present their findings to the whole class.
Step 5. Provide expert view and clarifies ideas by using didactic materials.
Step 6. Address any questions or concerns.
Step 7. Ask trainees to read the key reading 2.9.1 in the trainee manual**.**

Points to Remember

- **Errors** are statements that don't let the program run properly. JavaScript codes can encounter different errors when it is executed. These errors may be one of the followings: Syntax error, Reference Error, Type Error, Evaluation Error, Range Error, URI Error and/or Internal Error. Errors in programming can be caused by programming mistakes, incorrect input, or other unforeseeable events. The strategy that handles the errors or exceptions in JavaScript at runtime is known as error handling.

Practical Activity 2.9.2: Handling error in JavaScript

Notes to the trainer

- The trainer may avail computer in good working conditions as this content has to be delivered in computer lab.
- Use video as didactic material to explain error handling in JavaScript

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Introduce the topic and ask trainees to do the task described below:

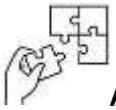
As a software developer, you are asked to open the computers, then the IDE and handle error in JavaScript program.

i. What do you understand about the term “error handling’’
ii. What are different types of errors in JavaScript?
iii. Explain the difference between Try & catch in error handling.
iv. Explain the throw statement in error handling.

Step 2. Explain the task and provide clear work instruction.
Step 3. Demonstrate how you can handle error in JavaScript While
Step 4. Demonstrating and explaining steps followed to handle error in JavaScript.
Step 5. Ask trainees to handle errors in JavaScript program and monitor the procedures.
Step 6. Verify whether errors are correctly handled in JavaScript program.
Step 7. Ask trainees to read the key readings 2.9.2 in trainee manual

Points to Remember

- The try statement allows you to define a block of code to be tested for errors while it is being executed. When an error occurs, JavaScript will normally stop and generate an error message.



Application of learning 2.9.

You are developing a web application that allows users to submit a form with their personal information. The form includes fields like name, email, and age. You're using JavaScript for client-side validation, and you are tasked to implement error handling to provide a better user experience.

Checklist

Elements	Indicators	Observation	
		Yes	No
1.Errors are correctly handled	1.1 Try statement is used		
	1.2 catch statement is used		
	1.3 Throw statement is used		
	1.4 The project is opened in vs code		
Decision			

Learning outcome 2 end assessment

Written assessment

1. The following statement are related to regular expressions as used in JavaScript program. Read them carefully and state whether it is True or False.

   i. In JavaScript, there are three ways to write a string, they can be written inside single quotes (' '), double quotes (" "), or backticks (` `).

   ii. A named function definition executes automatically.

   iii.The asterisk quantifier (*) specifies that zero or more of the preceding characters must match.

The answer is:

i. True

ii. False

iii. True

2. Analyse the JavaScript codes given below and choose the correct output from the results provided.

```
int a=1;
if(a>10)
{
document.write(10);
}
else
{
document.write(a);
}
```

a) 10
b) 0
c) 1
d) Undefined

The answer is **c**

5. Give the output of the following JavaScript codes**.**

```
<script type >
var mango =  new Object ();
mango.color = "yellow";
mango.price= 200;
mango.sweetness = 8;
```

```
mango.howSweetAmI = function (
document.write("Good Fruit");
}document.write("color:  " +mango.color)
document.write("price:  " +mango. price)
document.write("<br>");
mango. howSweetAmI()
</script>
```

Answer

color: yellow price: 200
Good Fruit

4. Match the following items of A column which correspondin g to B column.

A	**B**
1. setTimeout()	A. This function can be used to call the function after each duration milliseconds.
2. setInterval ()	B. This function can be used to call the function after a millisecond delay.
3. clearTimeout()	C. This function can be used to clear the timer that has been set by the setTimeout()

Answer

1……..B
2……..A
3……..C

Practical assessment

By using any loop of your choice Write a JS code to print a pattern shown below.

```
*
* *
* * *
* * * *
* * * * *
```

Checklist

Elements	Indicators	Observation	
		Yes	No
Loops are properly used	Variables are declared		
	Variables are initialised		
	Conditions are set		
	Increment / decrement is used		
	Output is generated		
Decision			

Further information to the trainer

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Ourschar, F. (n.d.). *Untitled gist.* Retrieved from https://gist.github.com/ourschar/f88cfcdc3367f79e5ec5e81f92e73ace

SEMrush. (n.d.). *JavaScript.* Retrieved from https://www.semrush.com/blog/javascript/

W3Resource. (n.d.). *JavaScript error handling exercises.* Retrieved from https://www.w3resource.com/javascript-exercises/error-handling/

<script>
var a = document.createElement('p');
a.innerHTML = 'Hello';
document.querySelector('#test').appendChild(a);
</script>

Indicative contents
3.1 Preparing project environment
3.2 Create pages with HTML
3.3 Apply CSS to HTML pages
3.4 Apply JavaScript

Key Competencies for Learning Outcome 3: Apply JavaScript in project

Knowledge	Skills	Attitudes
● Description of JavaScript project environment	● Preparation of project environment ● Creating a project folder and file structures ● Creating of HTML pages ● Applying CSS files to HTML pages ● Applying JavaScript in a project	● Being Problem solver ● Being Attentive ● Being confident ● Being a critical thinker ● Being analytical and details oriented ● Being Team worker

Duration: 50 hrs

Learning outcome 3 objectives:

By the end of the learning outcome, the trainees will be able to:

1. Prepare properly project environment according to the work to be done
2. Create correctly HTML pages based on project requirements
3. Manipulate properly CSS files within HTML pages
4. 4. Apply effectively JavaScript functions in accordance with project requirements

Resources

Equipment	Tools	Materials
• Computer • Projector	• Text editor • Node js • Browser	• Internet

Advance Preparation:

Before delivering this learning outcome, you are recommended to:

- Avail computers with text editor and web browser installed.
- Prepare video(s) to be used as didactic material.
- Have sample project where JavaScript applied.

Indicative content 3.1: Apply JavaScript in Project

Duration: 10 hrs

Theoretical Activity 3.1.1: Description of JavaScript project environment

Notes to the trainer:

- Trainer may use small groups for describing JavaScript project environment.
- Use video as didactic material for describing project environment in programming.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Engage trainees in forming small groups.
Step 2. Introduce the activity and ask trainees to answer to the following questions:
What do you understand about the following terms used in JavaScript?
i. JavaScript project environment.
ii. project folder.
Step 3. Ask trainees to write answers provided on flipchart/paper.
Step 4. Engage trainees in presenting their findings / answers to the whole class.
Step 5. Provides expert view and clarifies ideas by using didactic materials.
Step 6. Address any questions or concerns.
Step 7. Ask trainees to read the key reading 3.1.1 in the trainee manual.

Points to Remember

- In the context of JavaScript or programming in general, the term "project folder" refers to a directory or folder on your computer's file system that contains all the files and resources related to a particular software project or application.

Practical Activity 3.1.2: Preparation of project environment

Notes to the trainer

- The trainer may avail computer in good working conditions as this content has to be delivered in computer lab.
- Use video as didactic material to show how to prepare project environment.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Introduce the topic and ask trainees to do the task described below:

As a Software developer, you are asked to go to computer lab and prepare a project environment in JavaScript while creating folders and structuring folders and files.

Step 2. Explain the task and provide clear work instruction

Step 3. Demonstrate how you can prepare a project environment and while demonstrating explain the steps to prepare a project environment.

Step 4. Ask trainees to prepare project environment in JavaScript and monitor the procedures.

Step 5. Verify whether project environment in JavaScript is clearly prepared.

Step 6. Ask trainees to read the key readings 3.1.2 in trainee manual.

Points to Remember

- Structuring folders and files for a JavaScript project is essential for maintaining a clean and organized codebase.

Application of learning 3.1.

You are a developer tasked with setting up the development environment for a new JavaScript project. The project involves building a web application that allows users to create and share interactive quizzes. You need to ensure that your environment is properly configured to support efficient development, testing, and deployment of the application.

Checklist

Elements	Indicators	Observation	
		Yes	No
1. Project environment is well prepared	1.1 Project folder is created		
	1.2 The project folder is opened		
Decision			

Indicative content 3.2: Create pages with HTML

Duration: 10 hrs

Theoretical Activity 3.2.1: Description of HTML pages.

Notes to the trainer:

- Trainer may use small groups for describing pages creation with HTML.
- Use video as didactic material for explaining the creation of pages with HTML.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Engage trainees in forming groups.
Step 2. Introduce the activity and ask trainees to answer to the following questions:
   i. What do you understand about HTML pages?
   ii. Explain HTML tables and HTML forms
   iii. Discuss about the elements of HTML table
   iv. Explain HTML Form and give its importance in creating HTML pages
Step 3. Monitor the activity and ask trainees to write answers provided on flipchart/paper.
Step 4. Engage trainees in presentation of their findings to the whole class.
Step 5. Provide expert view on presented contents and address any questions or concern
Step 6. Ask trainees to read key readings 3.2.1 in trainee manual.

Points to Remember

- A table is a structural element used to display data in a tabular format, which consists of rows and columns. Tables are often used to present data in a structured and organised manner, making it easier for users to read and understand information. To create table in HTML we use tags which are instructions to format a web page content. Examples of these tags are <table>….</table> , <td>…</td>, <tr>…</tr> and <th>…</th> .
- In HTML, a "form" is a structural element used to create interactive user interfaces that allow users to input and submit data to a web page or a web application. There are different types of form controls that you can use to collect data using HTML form:

these are Text Input Controls, Checkboxes Controls, Radio Box Controls, Select Box Controls, etc.

Practical Activity 3.2.2: Creation of pages with HTML

Notes to the trainer

- The trainer may avail computer in good working conditions as this content has to be delivered in computer lab.
- Trainer may have sample HTML created pages with tables and forms.
- Use video as didactic material to show how to create pages with HTML.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Introduce the topic and ask trainees to do the task described below:

As a software developer, you are asked to go to the computer lab to create HTML pages by including Tables and Forms.

Step 2. Explain the task and provide clear work instruction.

Step 3. Demonstrate how you can create pages with HTML by including tables and forms. While demonstrating, explain steps to be followed in creating pages with HTML.

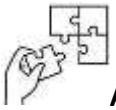
Step 4. Ask trainees to create pages with HTML (Table, form) and monitor the procedures.

Step 5. Verify whether forms and tables used in html pages are clearly created.

Step 6. Ask trainees to read the key readings 3.2.2 in trainee manual

Points to Remember

- The HTML **<form>** tag is used to create an HTML form and it has following syntax:
  <form action="Script URL" method="GET|POST">
  form elements like input, textarea etc.
- The most frequently form used methods are GET and POST and both methods are used to transfer data from client to server in HTTP protocol. Additionally, GET method is used for retrieving the data. Conversely, POST method is used for or updating the data.



Application of learning 3.2.

You need to create a basic HTML page to track your monthly expenses. The goal is to design a form where you can input your expenses, and the page will display the expense records in a table.

Checklist

Elements	Indicators	Observation	
		Yes	No
1.Pages with HTML are created	1.1 Form is created		
	1.2 Form controls to collect data are used		
	1.3 Form tags are properly used in HTML		
	1.4 Form tag attributes are properly used in HTML		
Decision			

Indicative content 3.3: Apply CSS to HTML pages

Duration: 15 hrs

Theoretical Activity 3.3.1: Description of CSS to HTML pages

Notes to the trainer:

- Trainer may use small groups for describing CSS.
- Use video as didactic material for explaining the use of CSS to HTML pages.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Help trainees in formulation of small groups.
Step 2. Introduce the activity and ask trainees to answer to the following questions:
i. What do you understand about the term CSS?
ii. Describe the ways through which CSS can be added to HTML.
Step 3. Ask trainees to write provided answers on flipchart/paper.
Step 4. Engage trainees in presentation of their findings to the whole class
Step 5. Provides expert view and clarifies ideas by using didactic materials.
Step 6. Address any questions or concerns.
Step 7. Ask trainees to read the key reading 3.3.1 in the trainee manual.

Points to Remember

- CSS is the acronym of “Cascading Style Sheets”. CSS is a computer language for laying out and structuring web pages (HTML or XML). Applying CSS (Cascading Style Sheets) to HTML pages is a fundamental part of web development, as it allows you to control the presentation and styling of your web content.

Practical Activity 3.3.2: Applying CSS to HTML pages

Notes to the trainer

- The trainer may avail computer in good working conditions as this content has to be delivered in computer lab.
- Trainer may have sample program where CSS applied to HTML pages.
- Use video as didactic material to show how to use CSS while creating HTML pages.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Introduce the topic and ask trainees to do the task described below: .
As a software developer, you are asked to the computer lab, apply CSS to HTML pages by using Inline CSS, Internal CSS, External CSS and Imported CSS
Step 2. Explain the task and provide clear work instruction.
Step 3. Demonstrate how you can apply CSS to HTML pages While
Step 4. demonstrating, explain steps to be followed when applying CSS to HTML.
Step 5. Ask trainees to apply CSS to HTML and monitor the procedures.
Step 6. Verify whether CSS is clearly applied in HTML pages.
Step 7. Ask trainees to read the key readings 3.3.2 in trainee manual

Points to Remember

- CSS can be added to HTML by using **Inline CSS**, **Internal CSS**, **External CSS or imported CSS.** To apply CSS to HTML pages, you need to include the CSS rules within your HTML document or link to an external CSS file.

Application of learning 3.3.

You have successfully created the Expense Tracker web page using HTML. Now, apply CSS to improve the visual appearance and layout of the page. You want to enhance the design by adding styles to the form, table, headings, and buttons.

Checklist

Elements	Indicators	Observation	
		Yes	No
1.CSS is correctly applied to HTML	1.1 Form is created		
	1.2 Form controls to collect data are used		
	1.3 Form tags are properly used in HTML		
	1.4 Form tag attributes are properly used in HTML		
	1.5 Table is created		
	1.6 Table tags are used		
	1.7 Table tag attributes are applied		
	1.8 Styles are to HTML elements using CSS		
Decision			

Indicative content 3.4: Apply JavaScript concepts in project

Duration: 15 hrs

Theoretical Activity 3.4.1: Description JavaScript concepts used in a project

Notes to the trainer:

- Trainer may form small groups of trainees for describing the use of JavaScript concepts in a project.
- Use video as didactic material for explaining the use of JavaScript in concepts in a project.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Engage trainees in formulation of small groups.
Step 2. Introduce the activity and ask trainees to answer to the following question:
Step 3. What do you understand about the following terms as used in JavaScript?

i. Variables
ii. Operators
iii. Conditional statements
iv. Looping statements
v. Functions
vi. Objects

Step 4. Ask trainees to write answers provided on flipchart/paper.
Step 5. Engage trainees in presentation of their findings to the whole class
Step 6. Provides expert view and clarifies ideas by using didactic materials.
Step 7. Address any questions or concerns.
Step 8. Ask trainees to read the key reading 3.4.1 in the trainee manual.

Points to Remember

- There are some concepts in JavaScript that are essential for building interactive and dynamic web applications. Understanding these concepts will help you write efficient and effective JavaScript code. These concepts are variables, operators, conditional statements, Looping statements, functions, and objects.

Practical Activity 3.4.2: Applying JavaScript concepts in a project

Notes to the trainer

- The trainer may avail computer in good working conditions as this content has to be delivered in computer lab.
- Use video as didactic material to show how to apply JavaScript in a project.

Key steps:

While delivering this activity, pass through the following steps:

Step 1. Introduce the topic and ask trainees to do the task described below:
As a software developer, you are asked to go to the computer lab to apply JavaScript concepts.
Step 2. Explain the task and provide clear work instruction
Step 3. Demonstrate how to apply JavaScript concepts. While demonstrating, explain the steps to apply the JavaScript concepts in a project.
Step 4. Asks trainees to apply JavaScript concepts and monitor the procedures.
Step 5. Verify whether JavaScript concepts are clearly used in JavaScript project.
Step 6. Ask trainees to read key reading 3.4.2.

Points to Remember

- To apply JavaScript concepts effectively in your web development projects, follow these steps:
    1. Set Up Your Development Environment
    2. Link JavaScript to HTML
    3. Understand Basic Syntax and Data Types
    4. Write Functions
    5. Implement Control Structures
    6. Work with Arrays and Objects

Application of learning 3.4.

You have created an Expense Tracker web page with HTML and applied CSS to improve its visual appearance. Now add JavaScript functionality to calculate and display the total expenses for the entered items. The page should update the total whenever a new expense is added.

Checklist

Elements	Indicators	Observation	
		Yes	No
1.JavaScript is applied in a project	1.1 Variables are declared		
	1.2 Operators are used		
	1.3 Conditional statements are applied		
	1.4 Loops are properly used		
	1.5 Functions are used		
	1.6 Objects are used		
Decision			

Learning outcome 3 end assessment

Written assessment

1. Choose the correct answer

i. A set of opening, and closing tags are _____ to create a table

a. required
b. unnecessary
c. optional
d. rows

Answer: d. required

ii. The <td> tag is used to create a_____

a. row
b. table
c. heading
d. column

Answer: d. column

iii. What is the correct syntax for referring an external CSS?

A. <link rel="stylesheet" type="text/css" href="mystyle.css">
B. <stylesheet rel="stylesheet" type="text/css" href="mystyle.css">
C. <style rel="stylesheet" type="text/css" href="mystyle.css">
D. All of the above

Answer: A) <link rel="stylesheet" type="text/css" href="mystyle.css">

2. Fill in the blank the correct word(s)

i. Inline styles are written within the _____ attribute**.**

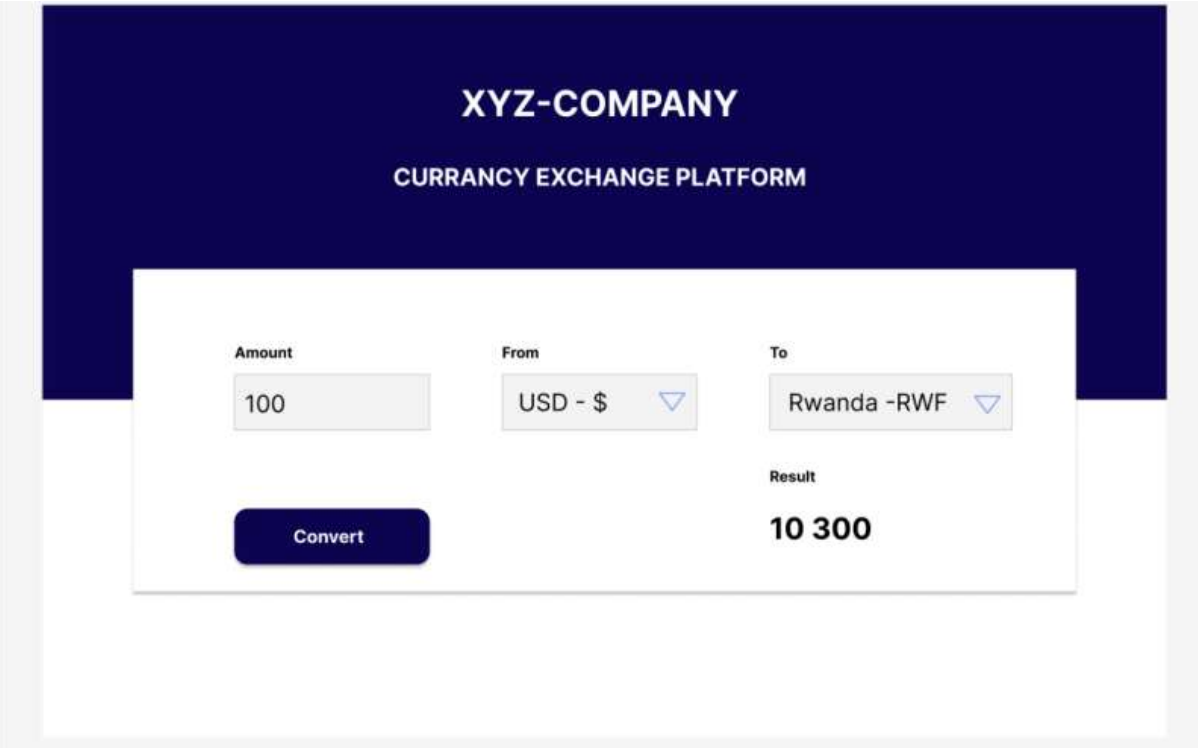
Answer: Inline styles are defined within the **style** attribute of the relevant element.

ii.The _____ property is used to define the background color in CSS.

Answer: The **background-color** property is used to define the background color in CSS.

Practical assessment

XYZ Company is a forex bureau located in Rubavu District, they exchange money from one currency to another with cash. In that company, they use a manual calculator in exchanging currencies. They want to have an online web calculator project for currency exchange. This platform will be able to convert amounts from one currency to another. They hired a UI/UX Designer to design a mockup for the project ,that mockup is provided below.



XYZ Company hired you as a frontend developer to develop the platform above by using HTML, CSS and JavaScript.

Checklist

Elements	Indicators	Observation	
		Yes	No
1.avaScript is properly integrated in HTML based on project structure	1.1 HTML structure are created		
	1.2 Convert button is created		
	1.3 Input Text are formatted		
	1.4 HTML event listener are applied (onclick)		
	1.5 Window object methods And Properties are used		
	1.6 JavaScript form is validated		
2.Variables are correctly used based on task	2.1 Variable initialisation is applied		
	1.2 Variables are declared		
3.Datatype are correctly used based on variables	Datatypes are applied		
	3.1 Type casting is applied		
4. Operators are correctly used based on task	4.1 Assignment operators are used		
	4.2 Arithmetic operators are used		
	4.3 Comparison /Ternary operators are applied		
5.Conditional statements are properly implemented according to the control flow	5.1 If else / Switch case statement is used		
6. Functions are appropriately used based on the task	6.1 Function call is respected		
	6.2 Built-in functions are used		
	6.3 Function call is respected		
7. Errors are properly catched and handled based on JavaScript error handling mechanism	7.1 Try and catch is respected		
	7.2 Errors are catched and handled		
8. Project environment is well prepared according to work to be done	8.1 Project folder is created		
	8.2 Folder and files structure is respected		
9. CSS files are well created and manipulated with HTML pages	9.1 Colors are used		
	9.2 Alignment is respected		
	9.3 Borders are formatted		
Decision			

Further information to the trainer

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