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**OCCUPATIONAL CERTIFICATE:**

**SOFTWARE ENGINEER**

**Week two Practical (C#)**

## **Mathematics**

## **MAT621**

**2025**

**OCCUPATIONALCERTIFICATE:**

**SOFTWARE ENGINEER**

**Formative Assessment 1**

# Software Design Engineering

## **SDE631**

**2025**

 **Project Question: Rocket Velocity and Position Calculation (100 Marks)**

A rocket's velocity is given by the formula v(t) = 3t² meters per second, where t is the time in seconds. The position s(t) is obtained by integrating the velocity, resulting in s(t) = t³ meters (assuming initial position s(0) = 0 ).

Write a C# console application to calculate and display the velocity and position of the rocket at t = 2 seconds**. Your program should**:

a) Define the time t as 2 seconds. (10 marks)

b) Calculate the velocity using the formula v = 3 ×t² (20 marks)

c) Calculate the position using the formula s = t³ (20 marks)

d) Output the results in the format: "At t=2 seconds, velocity is 12 m/s and position is 8 meters." (20 marks)

e) Ensure the program uses appropriate data types (e.g., double for calculations) and includes necessary namespaces. (10 marks)

f) Add error handling to manage invalid input (e.g., negative time). (10 marks)

g) Include comments explaining each step of the calculation. (10 marks)

**Steps to follow:**

Create a new C# console project.

In the Main method, declare a variable for time t and set it to 2.

Compute velocity as 3 \* Math.Pow(t, 2).

Compute position as Math.Pow(t, 3).

Add try-catch block to handle negative time values.

Use Console.WriteLine to display the results in the specified format.

Compile and run the program to verify the output.