

ENG TECH 1PR3 Programming Principles

Introduction to VB.NET

Variables, operators, and form controls

Lab 01

Be sure to assign all input to appropriate variables. Do NOT use the textbox control name directly in the calculations. Instead, assign the value of a textbox control to a variable and use the variable in the calculations. Assign the result of the calculations to an appropriate form control. Ensure the forms are well-behaved. A form must contain an Exit button, sensible tabbing and alt-shortcuts where appropriate.

1. The acceleration of gravity (g) on the surface of three planets are given in the following table,

Planet	$g \text{ (m/s}^2\text{)}$	$g \text{ (ft/s}^2\text{)}$
Earth	9.81	32.19
Mercury	3.61	11.84
Mars	3.75	12.30

Write a VB program that should display the value of g in m/s^2 and ft/s^2 for given planets. Design a VB form that should contain a button for each planet and two label controls. The form should also contain an Exit button. When the user clicks the planet button, the application displays the value of g in corresponding label controls (m/s^2 and ft/s^2) with the following properties:

Planet	Display Properties (Run Time) for Label Controls	
	(m/s^2)	(ft/s^2)
Earth	Alignment – MiddleLeft TextColor – Blue BackColor – Yellow	Alignment – BottomLeft TextColor – Red BackColor – Cyan
Mercury	Alignment – MiddleRight TextColor – Red BackColor – Cyan	Alignment – TopRight TextColor – Blue BackColor – Yellow
Mars	Alignment – MiddleCenter TextColor – Green BackColor – Yellow	Alignment – BottomRight TextColor – Yellow BackColor – Green

Set the BorderStyle property of m/s^2 label control to Fixed3D and ft/s^2 to FixedSingle.

2. In the operating room, anesthesiologists use mass spectrometers to monitor the respiratory gases of patients undergoing surgery. One gas that is often monitored is the anesthetic isoflurane of mass m [kg]. In a spectrometer, a singly ionized molecule of isoflurane (charge = $q = +e$) moves at a speed of v [m/s] on a circular path that has a radius r [m]. Then the magnitude of the magnetic field is given by

$$B = \frac{m v}{r |q|}$$

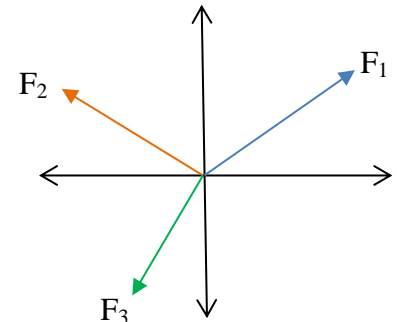
Create a VB application that will calculate the magnitude of the magnetic field. Use textboxes for user input. Display input and output values in a label control with calculated value to three decimal places. Display m, v and |q| in exponential format. Use the following values as user input,

$$m = 3.06 \times 10^{-25} \text{ kg}, \quad v = 7.2 \times 10^3 \text{ m/s}, \quad r = 0.10 \text{ m}, \quad |q| = 1.60 \times 10^{-19} \text{ C}$$

3. Create a VB application that will calculate the magnitude (R) of resultant Force Vector, if three Force Vectors (F_1 , F_2 , F_3) are given at different angles (θ_1 , θ_2 , θ_3), where angles are measured from positive x-axis.

$$R = \sqrt{(S_x)^2 + (S_y)^2}, \text{ where}$$

$$S_x = \sum_i F_i \cos \theta_i, \quad S_y = \sum_i F_i \sin \theta_i, \quad i = 1, 2, 3$$



When the user runs your application, it should present six input boxes to enter three forces (Newton) and three angles (degree), and then calculate the magnitude of the resultant force. Use Try-Catch block for catching run-time errors and a message box for displaying errors. Display input and output values in tabular form as shown below with numbers to 3 decimal places. Set display font style as “Courier New”.

Input Values:			X-Component	Y-Component
	Force (N)	Angle (Degree)		
Force 1	---	---	F1	---
Force 2	---	---	F2	---
Force 3	---	---	F3	---
			Sum	S_x
			Resultant	S_y
				R

NOTE: X-component of Force 1 is $F_1 \cos(\theta_1)$ and y-component is $F_1 \sin(\theta_1)$

Submitting the Lab

In order for your Lab/Assignment to be eligible for grading you must submit the following:

- The code must contain your Full Name and Student ID in a comment block at the top of each form module.
- A .zip compressed file containing the entire VB.NET project to AVENUE. Use .zip compression only (no RAR, TAR etc). If there is more than one project, create a separate .zip file for each individual project. Be sure to add all project files and folders to the .zip file. If the compressed file is missing files/folders such that the project will not open or run, the lab/assignment will receive a grade of 0.
- A Word .doc (or .docx) file containing:
 - A cover page that includes your name, Student ID, and MAC ID
 - The form code (event and other subprocedures and functions) including programmer's block
 - Screen captures of the form showing sample input and output.

Upload the Word file and .zip file(s) **separately** to the appropriate assignment drop-box on AVENUE.

Labs and assignments will not be accepted for evaluation if any of the above items are omitted and will result in a grade of 0.