NAME-SURNAME– SIGNATURE:

DEPARTMENT**:**

GROUP
NUMBER:

EXPERIMENT NO	2
EXPERIMENT TITLE	**:** TWO-DIMENSIONAL MOTION

OBJECTIVE OF THE EXPERIMENT *(5 points)*

THEORY OF THE EXPERIMENT *(5 points):*

1) **What kind of motions occurs along the x- axis in projectile motion? Write an equation that shows the x- component of velocity as a function of time.**

   Answer the same question for the y-axis.

2) **Define the concepts of the h_{max} (maximum height) and R (range) in projectile motion and write their numerical equations with explanations.**

3) **What are the components of the acceleration vector in projectile motion? Write the answer with an explanation.**

EXPERIMENTAL SETUP

1. **Draw the setup used in the experiment.** *(3 points)*

2. **Write the names of the materials used in the experiment and briefly explain them.** *(3 points)*

PROCEDURE OF THE EXPERIMENT

Explain the steps of the experiment procedure completely and sequentially. (4 points)

MEASUREMENTS AND CALCULATIONS

1) Measure the values of **h** (the height of the wedge from the ground) and **d** (the hypotenuse length of the inclined plane) of the setup used during the experiment. *(5 points)*

h=…………cm   d= .... cm

2) Fill the table below appropriately using the data you obtained.
(5points)

Table 1

Point No	X_n	Y_n	t_n	V_{xn}	V_{yn}	V_n
0					---	
1						
2						
3						
4						
5						
6						

3) Calculate the y- components of the velocity at each point, using the equation $V_{yn=\frac{yn+1-yn-1}{tn+1-tn-1}}$

and record them in the table . (V_{yo}excluded) *(10 points)*

4) Draw an x-t graph on graph paper using the data from the table.Find the horizontal velocity value (V_{xn}) of the moving object (which is the same at every point) from the slope of graph and record it in table.

5) Calculate the speed (Vn) of the object as it passes through each point using the Pythagorean theorem and record it in table. *(5points)*

6)   Find the initial velocity component V_{yo} using the equation $V_{y0}=V_{x0}\tan\alpha$ *(5 points)*

7)   Draw a **Vy -t** graph on graph paper and find the accleration of the movibg object **Y**- direction from the slope of the graph. *(9 points)*

8)   Calculate the error between the experimental acceleration value and the theoretical acceleration value you found. *(5 points)*

9)   Draw a $y - t$ graph on graph paper using the data from the table and read the maximum height (h_{max}) from the graph. *(9 points)*

10) Find the maximum height the object can reach using the formula $h_{max} = \dfrac{v_{0y}^2}{2a}$ and compare it with value you read from the graph. *(5 points)*

Experiment Questions

1. 1.Using some of your values, verify the relationship between speed and the x- and y-components of velocity. What does it mean for the y -component of the velocity to be negative? *(3 points)*

2. When is the speed at its minimum value, and when is it at its maximum value? Is it zero at any time? *(3 points)*

3. Find the range (R) using the theoretical range formula. Compare the observed range with the value calculated using the formula. *(3 points)*