# Physics Laboratory Report

## <Experiment Title>

*Name\_Group\_Member\_1, Name\_Group\_Member\_2, Name\_Group\_Member\_3, Name\_Group\_Member\_4 (underscore your name in the list)*

**Objective:** Describe the goal of the experiment, for example, “Measure speed of a uniformly moving object”

### Theory

Uniform motion is such a motion in which the speed of the object is constant. In uniform motion along a line (one-dimensional uniform motion) the position of the object as a function of time is given with the formula

x(t)=V\*t.

Respectively, displacement of the object for an interval of time Δt is given by

Δx=V\*Δt,

where V is the speed of the object.

**Procedures**

The procedure of the experiment is as follows:

1. Air Table will be used to perform measurements of the position of a uniformly moving slab as a function of time.
2. The Air Table will be prepared, checked, and turned on.
3. The spark timer will be set at 0.1 second intervals.
4. The slab will be placed on the Air Table and pushed slightly, and its position will be traced on the trace-sheet automatically.
5. The position of each 0.1 second mark on the trace-sheet will be measured using a meter and recorded.

**(Notes:**

1. You should briefly describe the theory and the procedure of the experiment in **Theory** section; for example, for the “Uniform motion” experiment you should briefly say what the uniform motion is, what position and speed of the object are, how they are related in the uniform motion, and how you will perform your experiment.
2. You should present all your measurements originally obtained during the experiment in the lab in the **Data** section, usually using table format; for example, for the “Uniform motion” experiment you will need to present all the measurements of the position and time that you obtained in the lab.
3. You should describe the calculations that you did to obtain your *final* results from the original measurements in the **Results** section. In the end of Results section your also should *clearly and separately* state the result of your calculations. For example, for the “Uniform motion” experiment you will need to show the calculations of the object’s speed from your original data, and the result of the calculation should be separately stated in the end.
4. A copy of your original signed data sheet from your lab work should be attached with your report. If your data sheet is too big to be copied, then the original data sheet should be attached with the report of one of your group members. The reports that will not have original signed data sheets *will receive score* ***zero***.
5. Normally you should calculate the error in your calculations of the final result (see the “Measurements and errors” document on our website). If you do not have the calculations of the error in the final result, your score will be decreased by 10%;
6. Your report should be in written English, but if English is a real problem for you, reports in Turkish *will be accepted*, but reports in Turkish will receive 10% lower score.)

### Data

Original measurements (copy of the original signed data sheet is attached):

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Time (sec) | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 |
| Position (cm) | 1.5 | 2.1 | 2.5 | 3.0 | 3.4 | 3.8 | 4.4 | 5.0 |

### Results

As described in Theory section, Speed of uniform motion can be calculated from the measurements of its position as a function of time using formula: V=Average(Δx/Δt), where Δx is change in the position of the object and Δt is the change in time between two measurements, and these are averaged over all measurements. The error in such measurement of the speed can be calculated using the standard deviation for the set of values for Δx/Δt, δV=STD(Δx/Δt)/√n, where n is the number of measurements.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Time (sec) | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 0.8 |
| Pos (cm) | 1.5 | 2.1 | 2.5 | 3.0 | 3.4 | 3.8 | 4.4 | 5.0 |
| Δx (cm) |  | 0.6 | 0.4 | 0.5 | 0.4 | 0.4 | 0.6 | 0.6 |
| Δt (sec) |  | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| Δx/Δt (cm/sec) |  | 6 | 4 | 5 | 4 | 4 | 6 | 6 |

Using these, we calculate the speed as:

V=(6+4+5+4+4+6+6)/7=5 cm/sec

The error in the calculated value for the speed is:

δV=√((6-5)2+(4-5)2+(5-5)2+(4-5)2+(4-5)2+(6-5)2+(6-5)2)/72=0.35 cm/sec.

Final result for the speed:

**V=(5±0.35) cm/sec**