

## ME. 301 Mechanical Engineering laboratory 1

### Introductions



## Objective

To provide the basic principles and theories before start doing an experiment

### Fields in Mechanical Engineering



- ◆ Mechanics of solid
- ◆ Dynamics
- ◆ Mechanics of fluid
- ◆ Thermodynamics

## 2. Regular

1. Student who comes later than 15 minutes will not be allowed to attend the experiment
2. Proper dressing
3. Student should prepare necessary equipments using in experiment, i.e., scale, calculator etc.
4. Pay attention in the experiment and student should study or try to understand how the experimental equipments work
5. Student must respect the instructor
6. Being always aware of safety
7. After finishing the experiment, student must clean and clear the table

## 3. Experimental procedures

- ✦ Experiment is the simulation under the controlled conditions
- ✦ Using appropriate equipments for the measurements
- ✦ Analyze the experimental data and use them for explanations

## Experimental procedures

- ✦ **Planning** (what we expect from the results)
- ✦ **Design the experiment**
- ✦ **Preparation for the experiment** (equipments, material etc.)
- ✦ **Experiment and collecting data**
- ✦ **Analyze the experimental results**
- ✦ **Report** (standard form)

## 4. Collecting data

- ✦ **Uncertainty of the equipments**
- ✦ **Using equipments in improper manner**
- ✦ **Mistake while collecting data**

## Significant figures

45.1

451

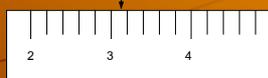
451.0

451,000

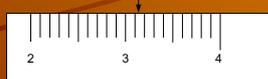
$4.51 \times 10^5$

$4.510 \times 10^5$

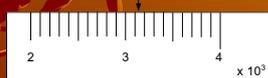
## Significant figures



3.1



3.15



$3.15 \times 10^3$

## 5. Experimental analysis

### Data analysis

The experimental data:

$$a = 3.15$$

$$b = 41.75$$

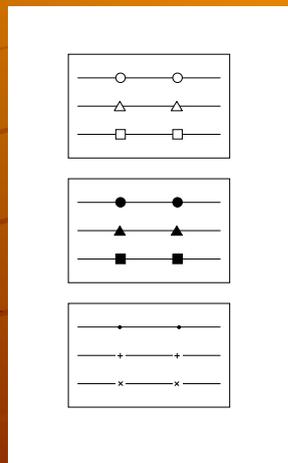
and  $c = 50.025$

Results  $d = a.b + c = 181.5375$

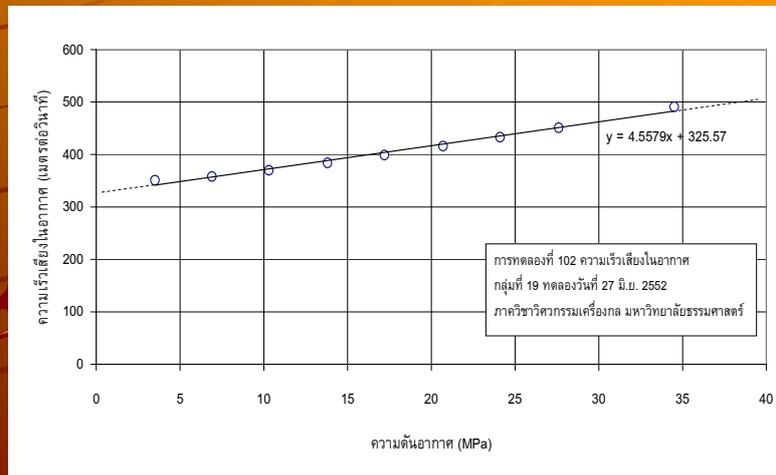
$$\therefore d = 182$$

## Experimental results

📊 Graph

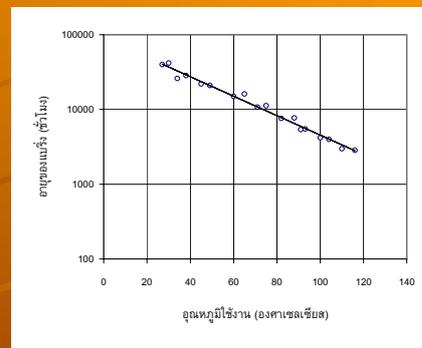
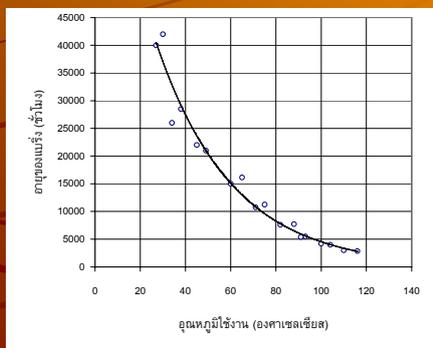


## Graph (good implementation)



## Example of using semi-log scale

$$y = a e^{bx}$$



## Discussion

- ✦ Discuss based on the objectives and trends of the graphs
- ✦ Statistical analysis with a predicted equation
- ✦ Comparison between theoretical and experimental data
- ✦ Analyze the sources of the errors from the experiments

## 6. Report

- ✦ **Short report:** All students must submit this short report after finishing the experiment
- ✦ **Full report:** One report / group after the experiment 7 days
- ✦ **Further information:**  
<http://www.engr.tu.ac.th/~cdulyach/me301/me301.pdf>

## Full report

- ✦ A4 paper
- ✦ Browallia font (14 pt)
- ✦ Symbol: Times New Roman (12 pt)
- ✦ Using equation editor
- ✦ Numbering all equations

## Content of full report

- ✦ Cover (from instructor)
- ✦ **Abstract**
- ✦ **Introduction**
- ✦ **Equipments**
- ✦ **Experimental procedures**
- ✦ **Results**
- ✦ **Discussion**
- ✦ **Conclusions**
- ✦ **References**