2025 –2026

رئاسة الجامعة المستنصرية

عمادة كلية الطب

فرع علم وظائف الأعضاء

مختبر الفيزياء الطبية / المرحلة الاولى

((نرحب بالطلبة الجدد اجمل الترحيب ,راجيين لهم سنة دراسية موفقة ونتاج علمي وافر))

تعليمات عامة

1- يدخل الطالب الى مختبر الفيزياء الطبية بالزي الجامعي الموحد والصدرية البيضاء.

2- يجلب الطالب الملزمة للاستعانة بها حين اجراء التجارب العملية.

3- يكون تحضير التجارب قبل الوصول الى المختبر وستقام امتحانات قصيرة فجائية في درس العملي عن مادة الاسبوع المنصرم والحالي.

4- يدخل الطالب المختبر في الوقت المحدد بالجدول المعلن ولايسمح بالتأخير...اما في الحالات الاضطرارية فيراجع الطالب الاستاذ المشرف قبل دخول المختبر.

5- لايسمح للطلبة من مجاميع اخرى الدخول الى المختبر اثناء درس العملي ولايسمح للطلبة بمغادرة المختبر والعودة اليه.

Introduction

Practical work in physics is intended to teach the student how to select and set up apparatus skillfully. Furthermore, it makes careful observations and precise measurements while at same time realizing the limitations of the measuring instruments employed. Also, it uses the experimental results obtained to the best advantage.

Conducting the experiment

The student should follow the gives instructions, both what to do and when to do it.

First, should understand what the experiment is about, what it is intended to measure and the exact form in which the result is to be stated.

Second, applying the method outlined and the experimental details mentioned in the text. With regard to the latter, student should be train how to get the best out of the apparatus that are available, what sort of things to lookout for and concentrate upon, what to eliminate and where to improve.

Writing the account of the experiment

1- Title: This should be a clear statement of the objects of the experiment
2- The aim of experiment
3- Theory: A brief descriptive of theoretical and background information
4- Methodology: It indicate the procedures of the experiment
5- Measurements or Reading: These should be recorded where possible in tabular form, this method being both compact and easy to follow. Record measurements in the most convenient unit.

6- Result: A clear statement for the result of an experiment is as essential as an accurate title to indicate its objective.

7- Calculation: It is at this stage that conversion of all measurements to the appropriate SI unit should take place before any working out is begun or substitution made in any formula that may be given.

8- Discussion and errors: writing of an experiment should always content the discussion of the sources of inaccuracy in the experiment, the possible errors involved in the various measurements taken and the problem error in the final result.

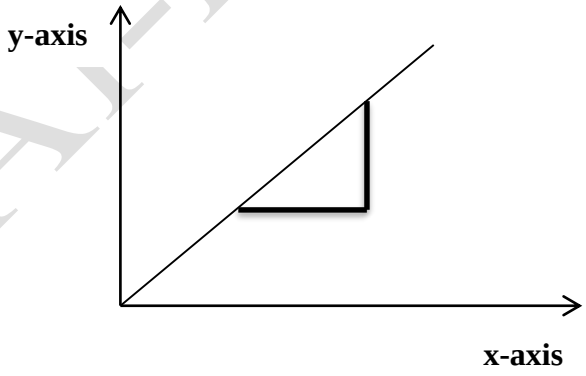
9- Medical application: The experiment should always end with a medical application.

Types of graph

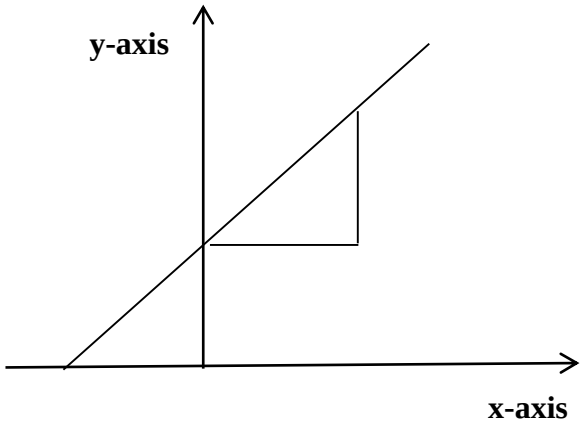
- Straight line relationship:

where: X = x axis
Y= y axis
Slope (m) = $\frac{y_2-y_1}{x_2-x_1}$

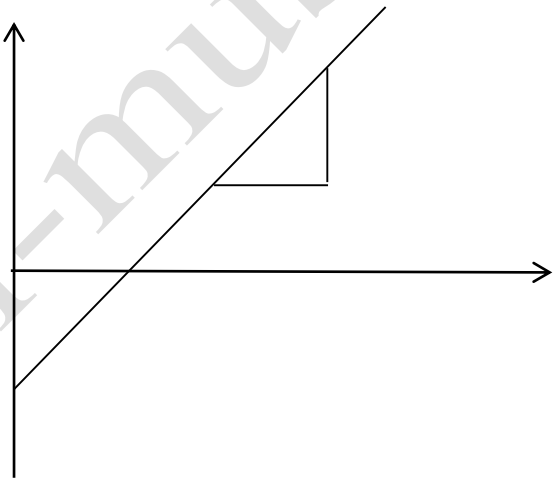
1- Y = mX (Through origin point)



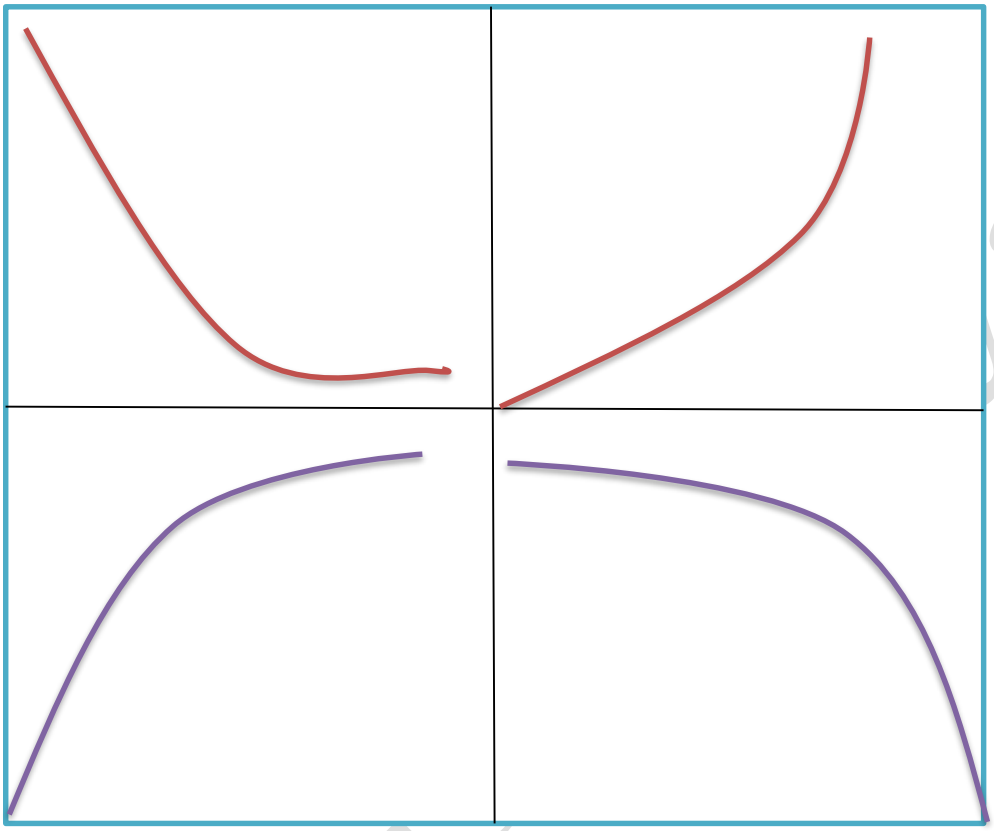
2- Y = mX + C (positive intercept)



3- Y = mX – C (Negative intercept)

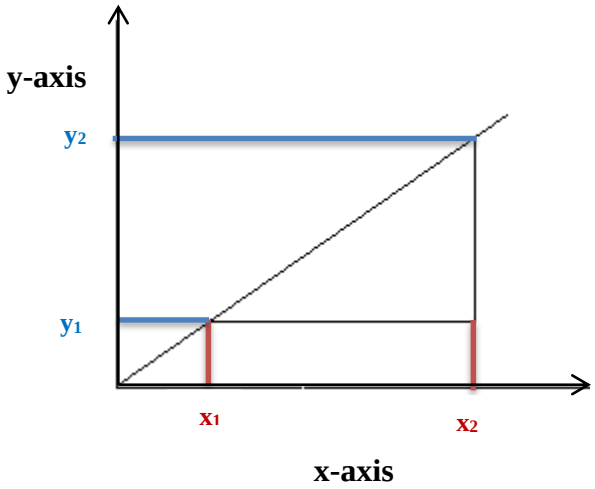


Curve relationship



The slope measurements

Slope (m) = $\frac{y_2 - y_1}{x_2 - x_1}$



The errors

1- The error in any particular measurement is an estimate:

a- The error in any scale is taken to be half the distance between adjustment scale marking for example:

The current measured on an ammeter whose scale divisions is 0.1 apart is judged to be 2.7A.

The possible % error is $\frac{0.1}{2.7} \times 100\% = 3.7\%$

b- Error may be lessened taking several observations of the same reading.

Some quantities are difficult to measure accurately and so we seek to improve the accuracy of their measurement by taking several additional readings the measurement of the diameter of a wire is an obvious Example:

Let us suppose the six readings of the micrometer screw gauge are 1.22, 1.25, 1.24, 1.22, 1.26 and 1.24 mm

$$\textbf{Mean} = \frac{1.22 + 1.25 + 1.24 + .22 + 1.26 + 1.24}{6} = 1.24\ mm$$

In order to calculate the most likely error in this mean, first evaluate the deviations of the reading. These are the differences without regard to sign between each reading and the mean, then calculate the mean of the deviations (0.02, 0.01, 0.0, 0.02, 0.02, and 0.0)

The mean of the deviation is:

$$\textbf{Mean} = \frac{0.02+0.01+0.0+0.02+0.02+0.0}{6} = 0.01\ mm$$

This is the likely error in the mean reading of 1.24 mm which should now be stated 1.24 ± 0.01 mm.

2- The effect on the final result when several independent measurements are involved. Most experiments at this stage of practical physics involve a calculation base on equation such as those in the following example:

$$V = \frac{(4II)L^2.b.h}{C} + D$$

Where: 4II is constant

% error in V=2(%error in L) +% error in b + % error in h +% error in C + % error in D

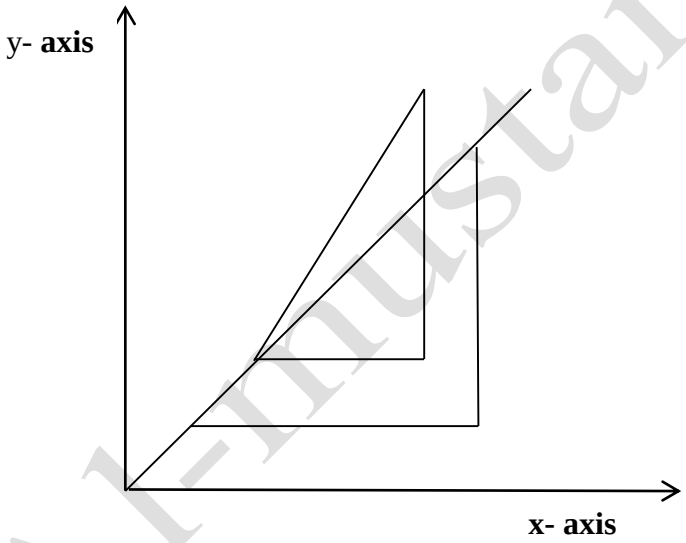
3- The error in any graphs is calculated via the following:

The first step: Draw the line with a ruler to have the best straight line. This line should be passing through most of the measurement points.

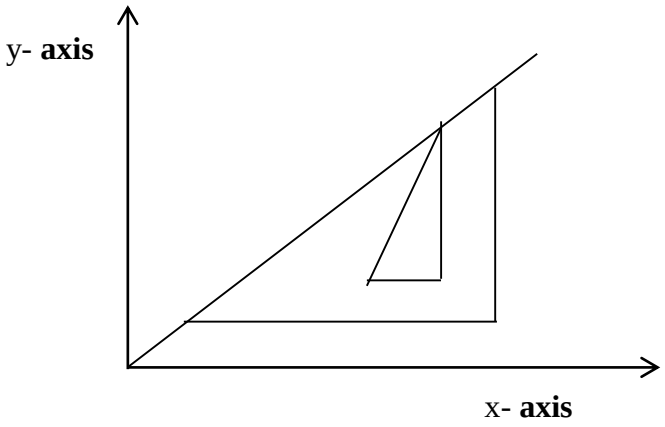
- The second step: Estimate the centroid of the this line
- The third and final step: Pivot a ruler about the centroid and then dot in the lines of greatest and least slope that can be drown from these three lines. The maximum possible error in the slope can be found by the slope of the best straight line (m), the slope of the greatest (m_1) and the least slope through the centroid are ($m_{2)}$.

The possible % error in the slope is:

$$\% \text{ error (greatest)} = \frac{(m1-m)}{m} \times 100\%$$



$$\% \text{ error (least)} = \frac{(m2-m)}{m} \times 100\%$$



The SI system of units

Physical quantity	Unit	Symbol
Length	Meter	M
Mass	Kilogram	Kg
Time	Second	Sec
Electric current	Amper	A
Electric voltage	Voltage	V
Electric resistant	Ohm	Ω
Energy	Joule	J
Force	Newton	N
Power	Watt	W
Electric capacitance	Farad	F
Inductance	Henry	H
Frequency	Hertz	Hz
Viscosity	Newton meter^{-2}second	Nm^{-2}s
Pressure	Millimeter mercury	mm Hg
Electric charge	Coulomb	C
Temperature	Degree/ Kelvin	K
Magnetic flax density	Tesla	T