PHY191 - GENERAL PHYSICS PRACTICAL SUMMARY

Length, mass, time, temperature and current of electricity are examples of _____ quantities

Physical

Length, mass, time, temperature and current of electricity are called _____ quantities.

Fundamental physical

Fundamental quantities are used to obtain derived quantities

True

_____ quantities are used to obtain derived quantities

Fundamental

Fundamental quantities are used to obtain _____quantities

derived

Force, velocity, pressure and density are examples of _____ quantities

Derived

There are _____ types of variables

Two

There are two types of variables: independent variable and _____ variable

dependent

There are two types of variables: independent _____ and dependent variable

variable

A _____ gives a vivid picture of how two physical quantities are related.

Graph

The following are the advantages of graphs:

- if t is plotted against x the relationship between the two variables

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- the corresponding values of x and t other than those actually observed or measured can be read from the graph
- it is possible to verify a known or expected relationship between x and t and to determine the numerical values of constants occurring in it
- the relationship between x and t is of a simple form and is not known or is suspected before hand, a graph enables us to discover this form of relationship.

The following are the types of graphs

- linear graph through the origin
- linear graph not passing through the origin

LINEAR GRAPH THROUGH THE ORIGIN

Consider the equation

$$y = mx$$

where, x is the independent variable
y is the dependent variable
m is a fixed number

When x=0 then y=0
When x = I then y = m
When x = 2 then y = 2m
When x = 3 then y = 3m and so on.

If we therefore plot the graph of y on the vertical axis and x on the horizontal axis we would obtain a graph as shown in fig. 3.1.

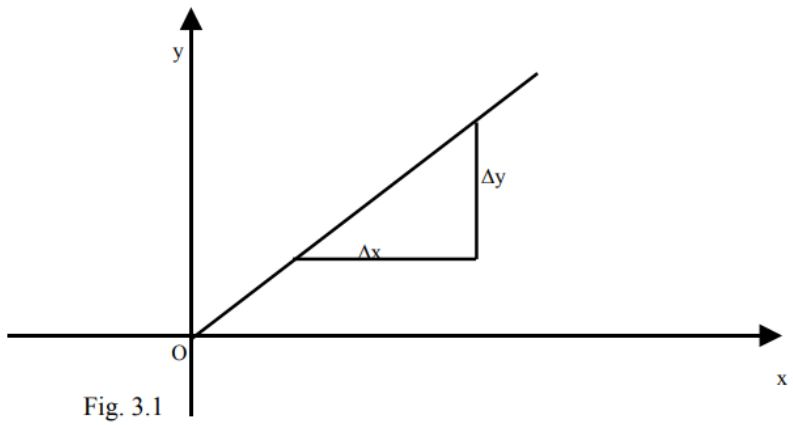


Fig. 3.1

We would have a straight line graph passing through the origin.
You will observe that the ratio of $\frac{y}{x} = m$ = a constant that is y is directly proportional to x.

The gradient or the slope of the graph is obtained from this ratio:

$$\text{Increase in y} - \frac{\text{Increase in y}}{\text{Increase in x}} = m = \frac{\Delta y}{\Delta x}$$

Thus a straight line through the origin shows that the quantity y is directly proportional to x. The constant of proportionality, m is given by the slope or the gradient of the graph.

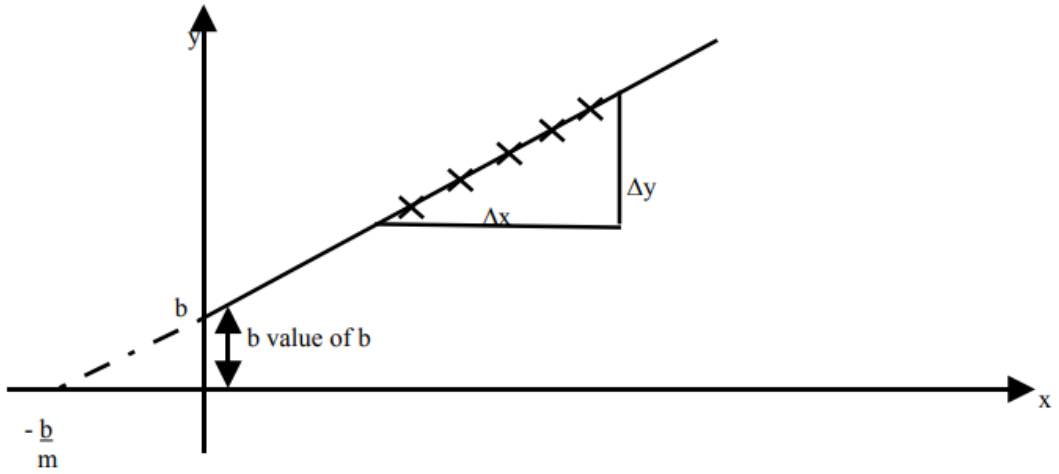


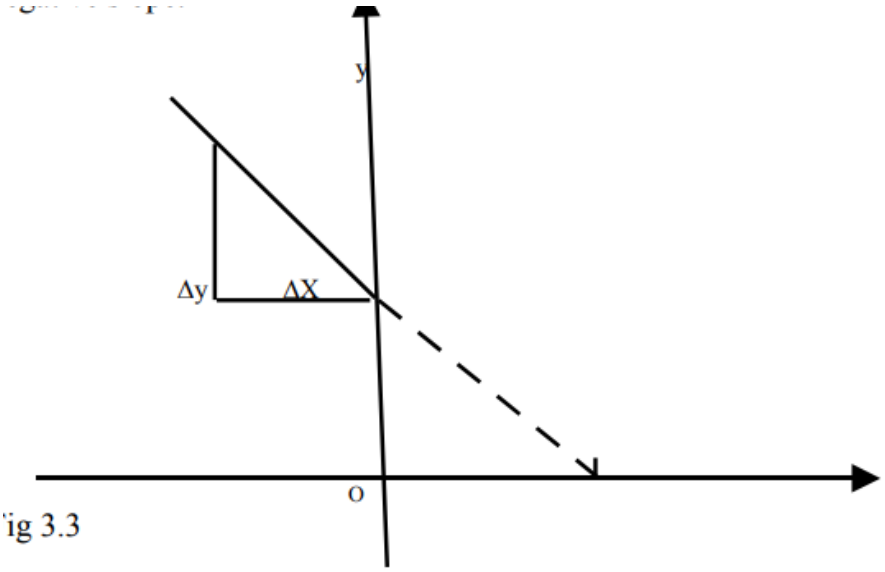
Fig. 3.2

You will also observe that when x = 0, y = b gives the intercept of the graph on the y-axis.
When y = 0 then $x = -\frac{b}{m}$ gives the intercept of the graph on the x-axis.

The relationship between y and x is also linear. It is however to be noted that this is not a direct relationship.
The slope or the gradient of the graph is given by

$\frac{\text{Increase in y}}{\text{Increase in x}} = \frac{\Delta y}{\Delta x}$ while b is the intercept on the axes

If the line slopes downwards as shown in fig. 3.3, then the graph is said to have a **negative slope.**



ig 3.3

Then y = -mx + b .
In conclusion, therefore, whenever the graph of y against x is a straight line, this shows that the relationship between y and x is linear and can be expressed as

y=mx+b

If the graph passes through the origin when b = 0 then y is directly proportional to x.

The slope or gradient = $\frac{\text{Increase in y}}{\text{Increase in x}}$ = m

REDUCING NON-LINEAR EQUATION TO LINEAR EQUATION

Consider the expression that relates the period of oscillation of a simple pendulum (T) with the length (l) of the pendulum.

$$T = 2\pi \sqrt{\frac{\ell}{g}}$$

If T is plotted against $\sqrt{\ell}$ there will be no linear relationship between T and $\sqrt{\ell}$ But on squaring both sides of the equation we would obtain this expression

$$T^2 = 4\pi^2 \frac{\ell}{g}$$

$$\therefore T^2 = \frac{4\pi^2}{g} \ell$$

Plotting the graph of T2 on the vertical axis and ℓ on the horizontal axis will give us a **straight line passing through the origin**

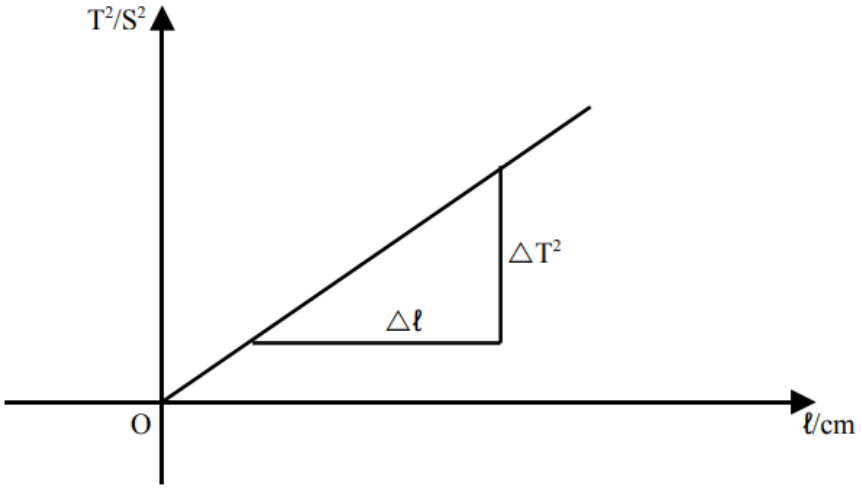


Fig. 3.4

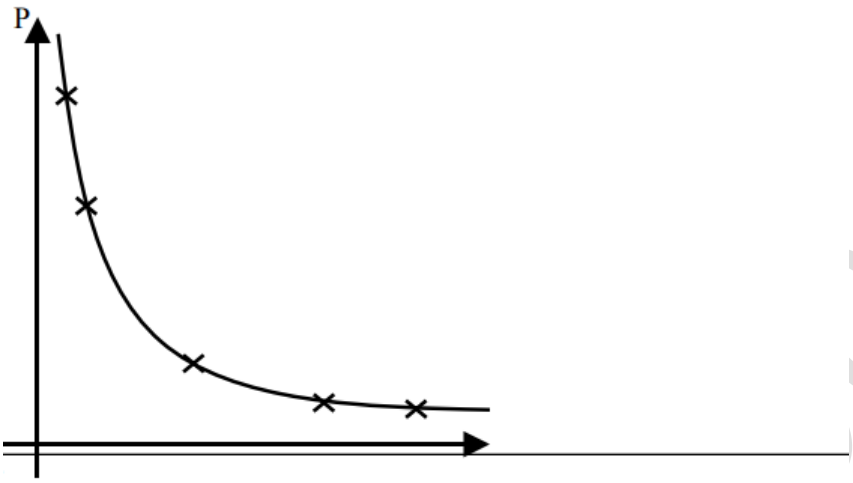
The slope or the gradient of the graph is given as

$$\frac{\Delta T^2}{\Delta \ell} = \frac{\text{Increase in } T^2}{\text{Increase in } \ell} = m = \frac{4\pi^2}{g}$$

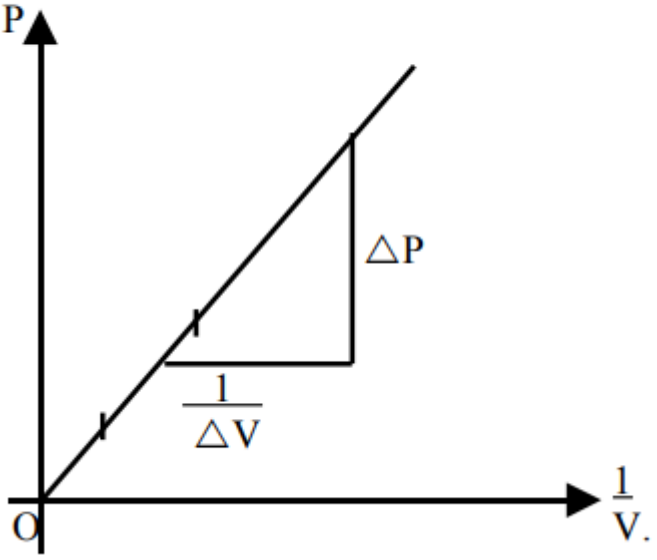
The value of g, acceleration due to gravity may then be obtained, by substitution of values of known variables in the relation.

Boyle's law shows the relationship between the pressure exerted on a given mass of gas (P) and its volume V provided the temperature of the gas is kept constant.

If the values of P are plotted against the corresponding values of V, we do not obtain **a linear relationship**



(i) O V.



By rearranging the expression we would obtain this

$$P = k \frac{1}{V}$$

When P is therefore plotted against 1/V, the reciprocal of V, then we obtain a **straight line passing through the origin**

The oscillation of a weighted spiral spring is another example. There is a relationship between the period of oscillation T, the loaded mass M and the effective mass of the spiral spring m.

$$T = 2\pi \sqrt{\frac{M+m}{k}}$$

where, k is the spring constant.

$$T = 2\pi \sqrt{\frac{M+m}{k}}$$

where, k is the spring constant.

We then reduce the expression to a linear one by squaring both sides of the equation.

T2

$$T^2 = 4\pi^2 \frac{(M+m)}{k}$$

$$\therefore T^2 = \frac{4\pi^2}{k} M + \frac{4\pi^2}{k} m \text{ compare this equation with}$$

$$y = ax + b \text{ where } y \cong T^2, \frac{4\pi^2}{k} M \cong ax \text{ and } \frac{4\pi^2}{k} m = b$$

By plotting the values of T2 against the corresponding values of M, we would obtain **a straight line graph which does not pass through the origin**

REDUCING TO A LINEAR EQUATION FROM UNKNOWN RELATIONSHIP

Suppose two physical quantities P and Q are related as P = kQn

Where the values of k and n are not known we can reduce the expression to a linear one by taking the logarithm of both sides of the equation.

$\log P = \log k + n \log Q$ or

$\log P = n \log Q + \log k$

compare it with

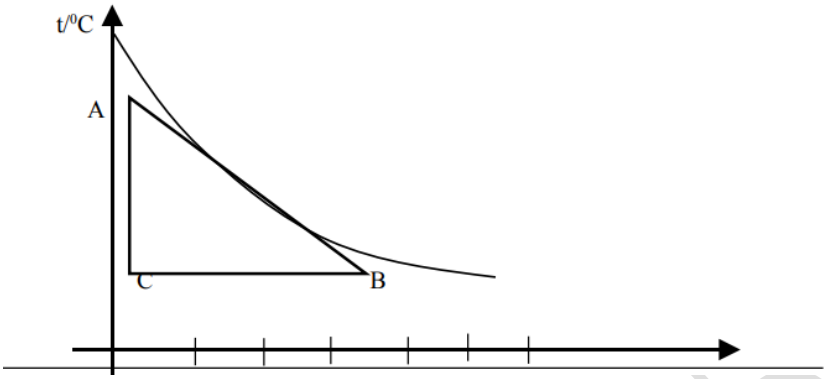
$y = nx + b$ where $n \log Q \cong nx$ and $\log k \cong b$.

Therefore if we plot log P on the vertical axis against log Q on the horizontal axis, we shall obtain **a straight line graph**

Displacement-time, velocity-time and Newton's cooling curves are examples of _____ graphs

Nonlinear

Time in minutes	0	1	2	3	4	5	6
Temperature in °C	45.0	33.0	26.1	21.7	19.1	17.4	16.5



The gradient or slope is obtained from the tangent drawn on the graph at time t = 2 min.

The gradient is defined as AC= negative which is about 5.6 °C per minute. BC

The negative sign shows that **the temperature is falling**.

Graphs are pictorial ways of showing how two_____ measurements are related.

Physical

The maximum possible error in a measurement is _____ of the unit of measurement.

1/2 (half)

A measurement reported to 5.32 cm is more precise than a measurement reported to 5.3 cm.

Indicate which measurement in each pair is more precise.

a. 17.9 cm or **19.87 cm**

b. 16.5 s or **3.21 s**

c. 20.56 °C or 32.22 °C **(Equally precise)**

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Note: Measurements in bold are more precise

The possible error in a measurement is equal to _____
0.05 cm

The exact method of expressing the relative error

Measurement	Unit of measure	Possible error	Relative error
3.2 cm 98.6 cm	0.1 cm 0.1 cm	0.05 cm 0.05 cm	0.02 0.0005
7.4 s 98 s	0.1 s 1 s	0.05 s 0.5 s	10.007 0.005

_____ is the ratio of possible error to the total measurement
Relative error

The relative error of a measurement of 98.6 cm is_____
0.0005

The relative error of a measurement of 3.2 cm is_____
0.02 cm
The possible errors of a measurement of 7.4s is _____
0.05 s

The possible errors of a measurement of 98 s is_____
0.5 s

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Consider the following pairs of measurements. Indicate which measurement in each pair is more accurate.

a. 40.0 cm or 8.0 cm
b. 0.85 m or 0.05 m

SOLUTION

(a) The relative errors are:

$$\frac{0.05}{40} = \frac{5}{4000} = \frac{1}{800}$$

$$\frac{0.05}{8} = \frac{5}{800} = \frac{1}{160}$$

Therefore the measurement 40.0 cm is more accurate.

(b) 0.85 m

The diameter of the sun is, 390, 000, 000 metres

The diameter of hydrogen atom is only 0.000000000106 metres

In scientific notation we write the diameter of the sun as 1.39 x 109 m and the diameter of the hydrogen atom as 1.06 x 10-10 m.

All non-zero digits are significant.
True

Note: In measurements such as 0.05 m or 0.005 m, none of the zeros is significant.

Measurement	Unit of measurement	Possible Error	Relative error
0.5m	0.1 m	0.05m	0.1
0.05 m	0.01 m	0.005 m	0.1
0.005 m	0.001 m	0.0005 m	0.1
0.00005 m	0.00001 m	0.000005 m	0.1

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S/No.	Measurement	Possible error	Relative error
1.	0.2 m	0.05 m	$\frac{0.05\text{ m}}{0.2\text{ m}} = 0.25$
2.	0.20 m	0.005 m	$\frac{0.005\text{ m}}{0.20\text{ m}} = 0.025$
3.	0.2000 m	0.00005 m	$\frac{0.00005\text{ m}}{0.2\text{ m}} = 0.00025$
4.	25 m	0.5 m	$\frac{0.5\text{ m}}{25\text{ m}} = 0.2$
5.	250 m	0.5 m	$\frac{0.5\text{ m}}{250\text{ m}} = 0.002$
6.	25000 m	0.5 m	$\frac{0.5\text{ m}}{25000\text{ m}} = 0.00002$
7.	102 m	0.5	$\frac{0.5\text{ m}}{102\text{ m}} = 0.0049$
8.	1002 m	0.5	$\frac{0.05\text{ m}}{1002\text{ m}} = 0.000499$

The _____ of a measurement is a function of possible error
Precision

_____ is related to relative error that occurs in a measurement.
Accuracy

Scientific measurements are expressed by using the_____.
Scientific notations

Exact measurement is impossible.
True

In _____ notation a measurement is expressed as a decimal number between one and ten multiplied by powers of ten.
Scientific

Possible error is only _____the unit of measurement.
one-half

Precision is a function of possible error only.
True

Relative error is the ratio of _____ to total measurement
possible error

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A digit is significant if and only if it affects the _____
relative error

A meter scale can measure only up to _____ mm
1

A vernier calliper can measure the length of an object up to _____ mm
0.1

A spherometer and screw gauge can measure lengths up to _____mm.
0.01

There are _____types of errors in measurement
Two

Errors in measurement can be classified into two broad headings namely - **Systematic errors** and **Random errors**.

The systematic errors is also called_____
Determinant errors

_____ errors are due to causes which can be identified.
Systematic

The following are types of systematic errors

- zero error
- back lash error
- end correction
- errors due to changes in the instrument parameters
- Defective calibration
- Faulty observation

An error due to wear and tear in the instruments is called _____
back lash error

When the readings obtained show a scatter of values, it is due to_____ error
Random

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S/No	Data	Deviation (d)
1.	3.69	0.01
2.	3.67	0.01
3.	3.68	0.0
4.	3.69	0.01
5.	3.68	0.0
6.	3.69	0.01
7.	3.66	0.02
8.	3.67	0.01
	A = 3.68	$\bar{d}$ = 0.009

The average deviation is **0.009**

The error in sin 30° is **± 0.008**

Determine the error of sine of 90°, when the error in the angle is 0.5°. Compare your result with that of the example above.

SOLUTION

(i) sin 90° = 1.000, sin 90.5° = cos 0.5° = 1.000, sin 89.5° = 1.000

In this case error in sin 90° is zero.

ERROR PROPAGATION IN GRAPHING

While plotting a graph we will use the following guidelines:

- A brief title may be given at the top
- Label the axes with the names of the physical quantities being presented along with units.
- We should choose the range of the scales on the axis so that the points are suitably spread out on the graph paper

We recall that the general equation of a straight line is y = mx + c where m is the slope of line and c the vertical intercept in the value of y when x = 0. From the graph we can thus write V = aT + V0. By comparing the above equation we can conclude that the slope of the graph gives the acceleration

and the intercept gives the velocity Vo at T =0. From the graph Vo = 0.32 ms-1. To determine the slope we consider two points on the straight line, which are well separated.

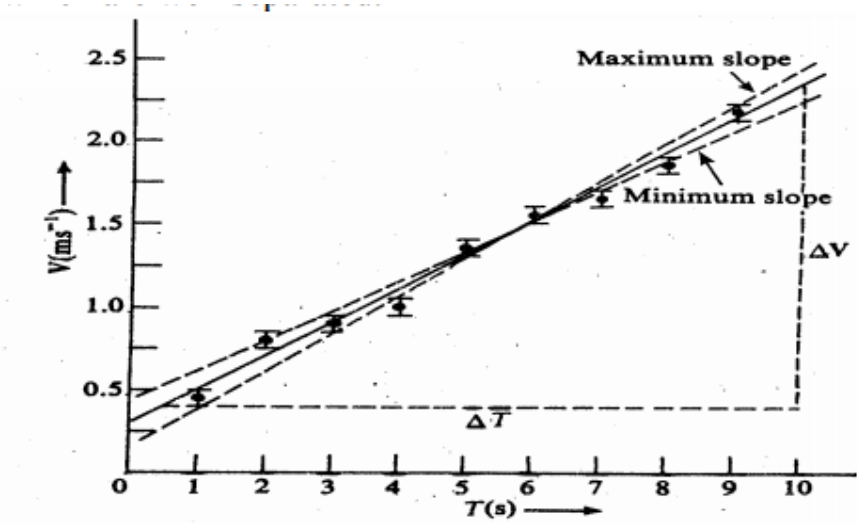


Fig. 2: Graph between velocity and time

Then,

$$a = \text{Slope} = \frac{V}{T} = \frac{2.35 - 0.40\ (ms^{-1})}{10.0 - 0.5\ (s)} = 0.20\ ms^{-2}$$

Table 3

Day of any month	Money left in the man (m) N K x 10^2	Log N
1st	200. 00	4.301ø
2nd	100. 00	4.000 ø
3rd	50. 00	3. 699 ø
4th	25. 00	3. 398
5th	12. 00	3.097
6th	6. 00	2.706
7th	3. 12	2.494
8th	1. 00	2.193

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Day of any month	Log M
1st	3.301
2nd	2.000
3rd	1.699
4th	1.397
5th	1.097
6th	0.796
7th	0.494
8th	0.193

Now plot log M against days as shown in fig. 4. You obtain a graph in which points are more clearly spaced evenly and hence you can more easily draw a straight line through the points.

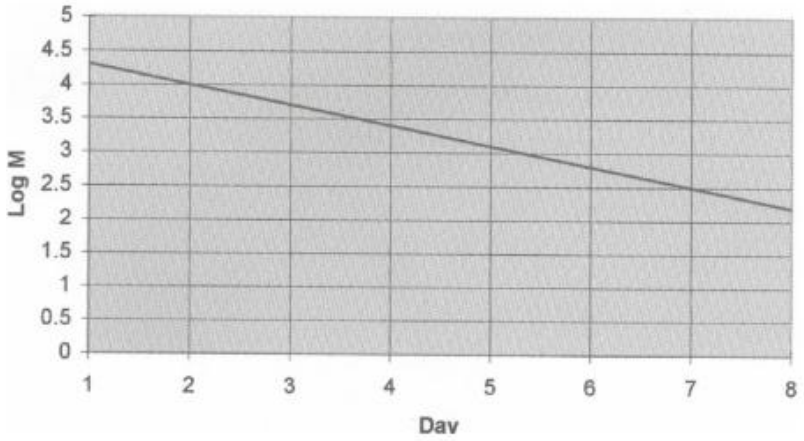
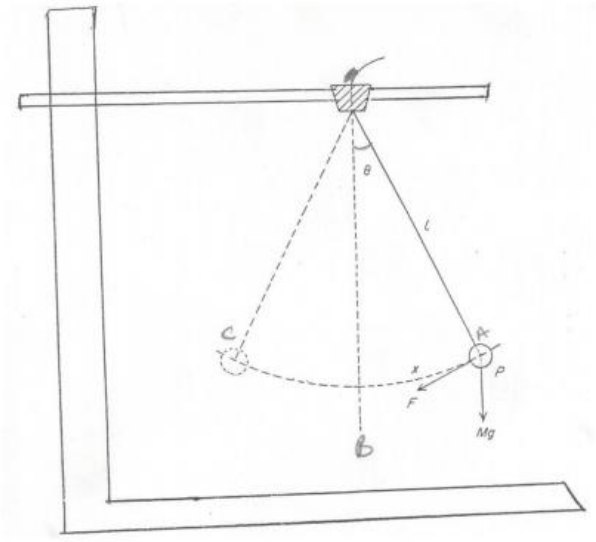


Fig. 4 Graphical representation of Table 3

Determination of acceleration due to gravity by means of the Simple Pendulum

APPARATUS

- Small pendulum bob made up of lead or brass
- Cotton thread
- Split cork
- Meter rule
- Stop watch
- Retort stand and clamp

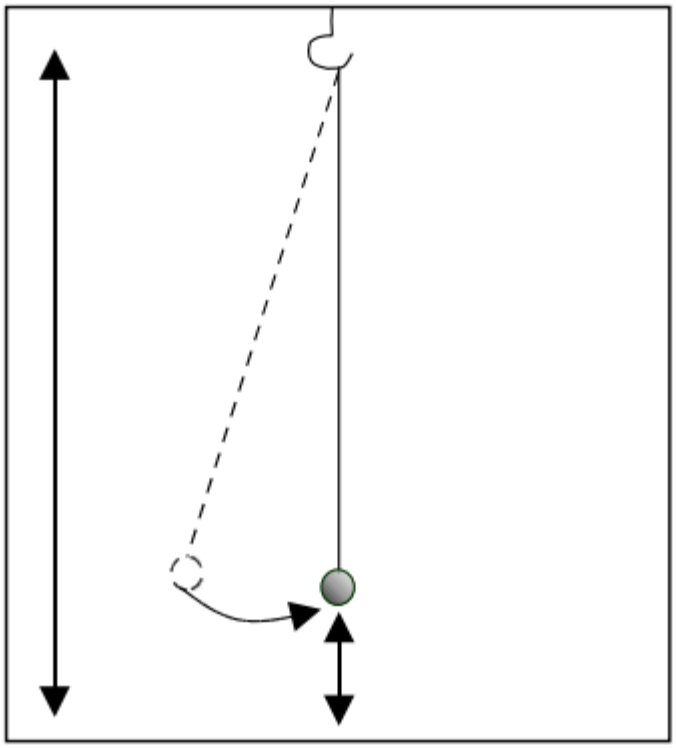


iWhen an object moves to and fro in such a way that its acceleration is directly proportional to its displacement and is always directed to its equilibrium position, then, that object is said to perform a simple harmonic motion is called _____

A simple harmonic motion (SHM)

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DIAGRAM



We know that the period of oscillation (T) of a simple pendulum of length (ℓ) is expressed as

$$T = 2\pi\sqrt{\frac{\ell}{}}$$

If we therefore have a simple pendulum hanging from a ceiling, the only measurement available to us is the height of the pendulum bob from the floor of the room or the laboratory.

If the height of the room or laboratory is H and the height of the bob above the floor is h, therefore the length of the simple pendulum (ℓ) measured from the ceiling H is

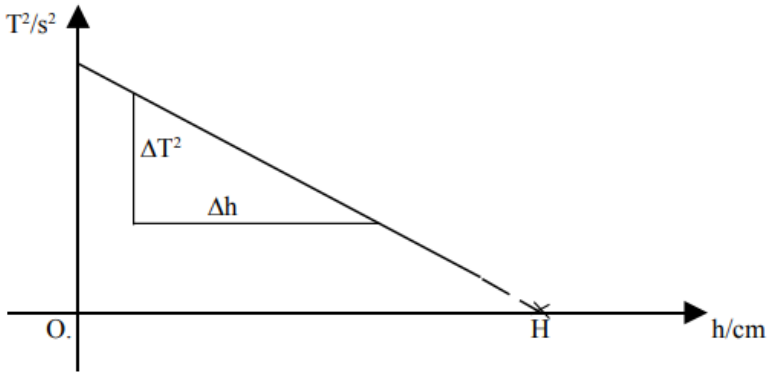
$$\ell = H - h$$

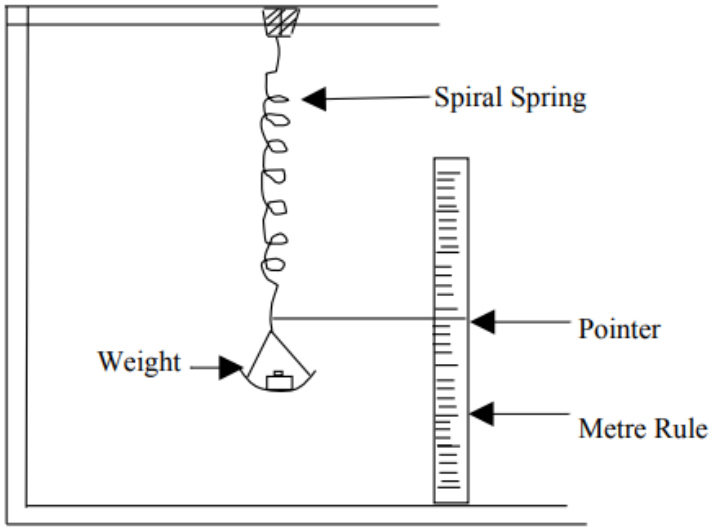
We can now write the period of oscillation T as

$$T = 2\pi\sqrt{\frac{H - h}{}}$$

If we therefore plot the values of T2 against h we will obtain a graph similar to a linear graph

The intercept of the graph on the x-axis i.e. when $T^2 = 0$ gives us the height H of the room.





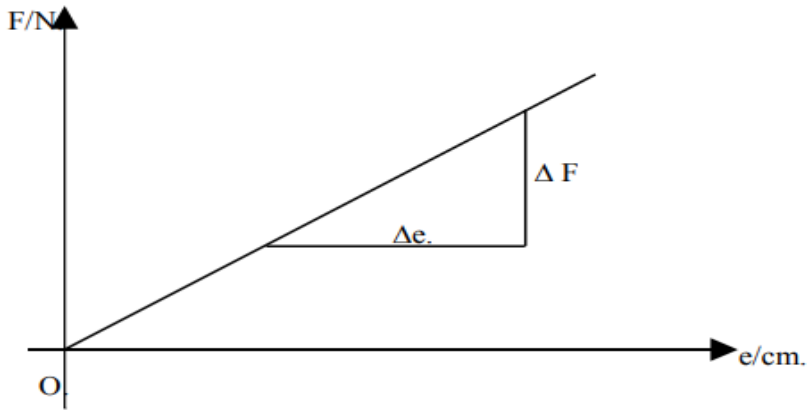
_____ law states that the force on an elastic material is directly proportional to the extension produced by the force provided the elastic limit is not exceeded.

Hooke's

i.e. $F = -ke$

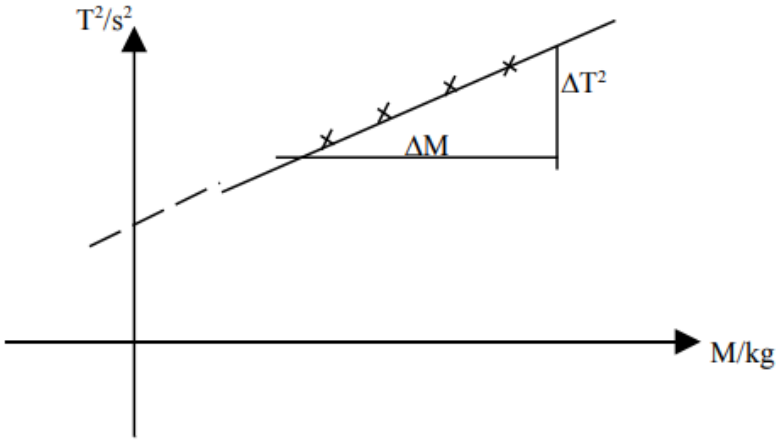
where k is the force constant of the spiral spring. The negative sign shows that the original shape of the spring can be restored.

If the graph of the force F is plotted against the extension (e) we shall obtain a linear graph



Where the slope m = $\frac{\Delta F}{\Delta e}$ = k the force constant provided the elastic limit is not exceeded.

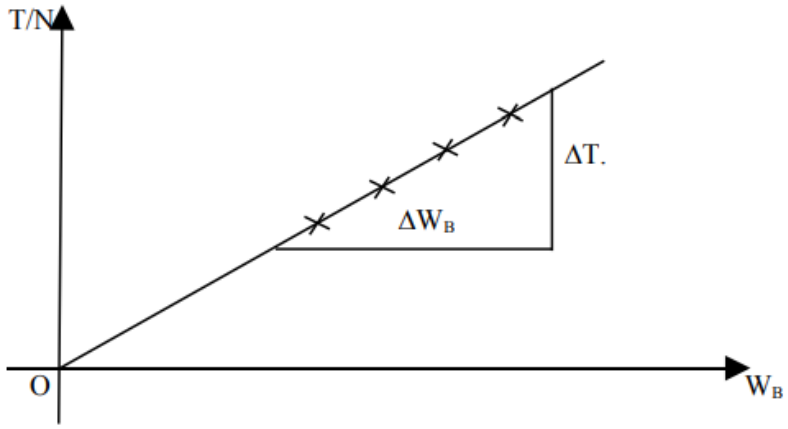
A linear graph shows that Hooke's law is obeyed while the slope obtained gives the force constant (k)



The slope $\frac{\Delta T^2}{\Delta M} = \frac{4\pi^2}{k} = m$

∴ The value of k can be obtained

The intercept on the x-axis gives us the value of m when $T^2 = 0$.



The slope or gradient of the graph gives the coefficient of static friction between

The _____ of the liquid is defined as the ratio of the mass of the liquid over the mass of an equal volume of water.
relative density

In a simple pendulum experiment, 20 oscillations were completed in 50s. Calculate the period of the pendulum.
0.02s

A body of mass 2 kg moves in a circular path with a uniform speed of 10 m/s. If the radius of the path is 5m, calculate the magnitude of the centripetal force action on the body.
40N

Which of the apparatus is not needed for the determination of acceleration due to gravity g?
Density bottle

A simple bob executing simple harmonic motion has 2cm and 12Hz as amplitude and frequency respectively. Calculate the period of the motion.
0.083s

The value of acceleration due to gravity depends on one of these_____
Density of bobs

The period of the body performing simple harmonic motion is 2s. If the amplitude of the motion is 3.5 cm, calculate the maximum speed (π=22/7).

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11cm/s

Which of the following is the best equation of a non-linear graph?
y=ax+bx

If the graph produced is a straight line, then the relationship is described as_____
Linear

Graphs showing how two physical measurements are related can be represented in which form?
Pictorially

If y=mx + b, and y is plotted against x; what type of graph will be obtained?
Linear graph not passing through the origin

Relative error can be defined as_____
Ratio of the possible error to the total measurement

What is the relative error, if the possible error is 0.05cm and measurement is 32cm?
0.02

The time taken for a given event is 7.4s and the possible error is 0.05cm, what is the relative error?
0.007

Consider the following pair of measurements 40.0cm or 8.0cm. Which one is more accurate?
40.0cm

Consider the following pair of measurements: 0.45m or 0.04m. Which one is more accurate?
0.45m

If the diameter of hydrogen atom is 0.000000000106 meters. What is the scientific notation?
1.06 x10^-10

The mass of a water molecule is 0.000000000000000000000003g. Express in scientific notation.
3 x10^-23

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In measurement report, the non-zero digits are_____
Significant

A digit is significant if and only if it affects _____.
The relative error

Multiply 1.23 by 2.3. Round off the result to more accurate measurement _____
2.8

Divide 2.1 by 1.54. Round off the result to more accurate measurement.
1.4

Multiply the following figures: 5.2865, 3.8 and 19.62 and round off the result to more accurate value
3.9x10

Divide 9.5362 by 3.2 round off the result to more accurate value_____
3

Straight line graph show that_____
The relationship between the two variable are linear

The major errors in measuring instrument are_____
All of the options

Human errors are based on_____
Judgement and perception

The possible error in measurement is due to
Inherent imprecision in measuring devices

A measurement reported to one hundredth of a centimetre's, such as 4.23cm, we can say_____
It's less precise than 4.2cm

The temperature of two places are recorded to be 30.56C and 32.22C we can say that they are_____
Equally precise

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The variables in the function y=Ae-kxare x and y. A negative slope will be obtained if a graph of_____

1n y is plotted against x

Which of the following pair of quantities have identical S I unit?I. Force and surface tension II. Surface tension and spring constant III. Torque and spring constant IV. Young's modulus and pressure

II only

The inverse of the slope of graph of extension against tension in the spring represents _____.

Spring constant

Specific latent heat of fusion of a substance is the quantity of heat required to

Change the state of unit mass of the substance at its melting point

A piece of copper weighing 400g is heated to 100oC and then quickly transferred into a copper calorimeter of mass 10g containing oil of unknown specific heat capacity at 30oC. If the final temperature of the mixture is 50oC and the specific heat capacity of copper is 390JKg-1k-1The heat gained by calorimeter is:

78J

A piece of copper weighing 400g is heated to 100oC and then quickly transferred into a copper calorimeter of mass 10g containing oil of unknown specific heat capacity at 30oC. If the final temperature of the mixture is 50oC and the specific heat capacity of copper is 390JKg-1k-1, calculate the specific heat capacity of the oil.

386.1 JKg-1k-1

Let the measured value of two Widths be the error in the quantity W = W1 + W2 will be____

0.014m

_____ is also known as determinant errors.

Systematic error

In an experiment involving vernier calipers, what kind of error is experienced when the jaws are in contact, the zero of the vernier did not coincide with the zero of the main scale?

Zero error

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The error due to wear and tear of a particular instrument is called____.
Back lash error

Error not due to instrumental problem is _____.
Observational error

_____causes like parallax in reading a voltmeter scale.
Faulty observation

The type of graph equation obeyed if T2 was plotted against M of the equation,
y = ax + b

There are _____ different types of graphs in this course.
4

If W and V are related by equation, W= GVZ is reduced to a linear one, Z represents_____.
slope

_____are due to causes which can be identified.
Systematic error

What is the unit of Mass?
Kilogram

When independent measurements are multiplied or divided the_____ in error in the result is the square root of the sum of squares of fractional errors in individual quantities.
fractional error

Determination of acceleration due to gravitation using simple pendulum is independent of the bob's_____
mass

The fractional error in the quantity____ is given by n times the fractional error in B.
Bn

The error in the result is found by determining how much change occurs in the result when the maximum error occurs in the _____.

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Data

Data collected can be used to show____ between two physical quantities through graphs.
relationship

Which type of motion is executed by a simple pendulum bob?
simple harmonic motion

_____is defined as when an object moves to and fro in such a way that its acceleration is directly proportional to its displacement and is always directed to its equilibrium position.
simple harmonic motion

Materials that can regain their original shape after the deformation (change in dimensions) are called____.
Elastic materials

When θ is very small in simple harmonic motion then sin θ = θ in rad, acceleration, a is proportional to____.
displacement

Holding relative density bottle with a moisture hand results to ____
expansion

At _____ position of Simple Harmonic Motion (SHM) the displacement of the body is zero.
Equilibrium

What is the unit of the specific latent heat of fusion of ice?
Jkg-1

At equilibrium position of Simple Harmonic Motion (SHM) the speed of the body is_____.
Maximum

The dimensional unit of time is_____
T

When a mass is hung on a spring stretches 6 cm, its period of vibration if it is then pulled down a little is _____.
0.5s

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A mass (m) is hung at the end of a spiral spring of force constant of 200N/m. If the spring oscillates with a period of 0.45 s when set in motion, the value of its mass is _____.
1kg

__ ____can be defined as the ratio of the mass of water to the mass of an equal volume of water.
Relative density

Relative density bottle is also called _____.
specific gravity bottle

The dimensional unit of distance is _____
L

Glass is an example of ____ material
Brittle

_____ states that the deformation of a material is proportional to the applied force in the elastic limit.
Hooke's law

When a material cannot recover its original shape, it is said to undergo _____
plastic deformation

_____is a property that makes the surface of liquid to behave as if it is covered with an elastic skin.
surface tension

When you are taking reading from stop watch, you avoid error due to _____.
parallax

Systematic error can be eliminated to an _____.
extent

In an experiment to determine the acceleration due to gravity of a simple pendulum, the measurements needed from the instrument are length of the thread and ____of oscillation of the pendulum bob
time

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The S.I unit of acceleration due to gravity, g is _____.
ms-²

The error due to wear and tear of a particular instrument is called_____.
Back lash error

Error not due to instrumental problem is _____.
Observational error

_____causes like parallax in reading a voltmeter scale.
Faulty observation

A plotted graph showing a straight line through the origin indicates that the two plotted variables are ____ to each other
directly proportional

To record the observations during an experiment the measured values would be recorded to at least _____ decimal places
two

If y is plotted on the vertical axis and x on the horizontal axis in equation y = mx, the slope is m which is the ____ value.
constant

_____ are due to causes which can be identified.
Systematic error

In the equation y = mx + b, m and b are ____.
constants

When independent measurements are multiplied or divided the_____ in error in the result is the square root of the sum of squares of fractional errors in individual quantities.
fractional error

The following values 32, 30, 28, 26 have two significant digits except _____.
30

In recording the observations in an experiment, the calculated values like reciprocal, square, sine of values would be recorded to at least _____ decimal places
three

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The error in the result is found by determining how much change occurs in the result when the maximum error occurs in the _____.
Data

Data collected can be used to show_____ between two physical quantities through graphs.
relationship

Which type of motion is executed by a simple pendulum bob?
simple harmonic motion

_____is defined as when an object moves to and fro in such a way that its acceleration is directly proportional to its displacement and is always directed to its equilibrium position.
simple harmonic motion

Materials that can regain their original shape after the deformation (change in dimensions) are called____.
Elastic materials

An _____is said to perform simple harmonic motion if it moves to and fro in such a way that its acceleration is directly proportional to its displacement and is always directed to its equilibrium position
object

A measurement possessing greater number of significant digits has _____ accuracy
Greater

At _____ position of Simple Harmonic Motion (SHM) the displacement of the body is zero.
Equilibrium

What is the unit of the specific latent heat of fusion of ice?
Jkg-1

If a simple pendulum of mass was displaced such that the bob made 20 oscillations in 45.70 seconds. Calculate the period T of oscillation in second.
2.29

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The period of oscillation is the time taken for the body to make _____complete oscillation

one

When a mass is hung on a spring stretches 6 cm, its period of vibration if it is then pulled down a little is _____.

0.5s

A mass (m) is hung at the end of a spiral spring of force constant of 200N/m. If the spring oscillates with a period of 0.45 s when set in motion, the value of its mass is ____.

1kg

_____can be defined as the ratio of the mass of water to the mass of an equal volume of water.

Relative density

Relative density bottle is also called _____ gravity bottle.

specific

If two values have equal unit of measurement, they are therefore said to be _____ Equally_____.

precise

Glass is an example of _____ material

Brittle

The relationship between any two physical quantities can be determined through the use of _____.

graph

Whose law is this 'the force on an elastic material is directly proportional to the extension produced provided that the elastic limit is not exceeded'

Hooke

If the graph of force F is plotted against the extension e, we shall obtain a _____ graph showing that Hooke's law is obeyed.

linear

A mass of 40kg hung on an elastic spring of length 37.2cm extends to 42.0cm. The force constant of the spring take g as $10ms^{-2}$ is ____.

83.33 Nm^{-1}

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Which of the following measurement done with meter rule is more precise?
17.9 cm

Relative error is _____
the difference between possible error and the total measurement

The two types of variables that can be measured are _____.
X and Y variables

If two values have equal unit of measurement, they are therefore said to be _____
equally precise

The value of acceleration due to gravity depends on one of these:
velocity

The period of the body performing simple harmonic motion is 2s. If the amplitude of the motion is 3.5 cm, calculate the maximum speed (π=22/7).
20.4 cm/s

Which of the following is the best equation of a non-linear graph?
y=ax+bx

If the graph produced is a straight line, then the relationship is described as_____
Linear

Graphs showing how two physical measurements are related can be represented in which form?
Variable

If y=mx + b, and y is plotted against x; what type of graph will be obtained?
horizontal graph

Relative error can be defined as_____
product of the possible error to the total measurement

A measurement possessing greater number of significant digits has _____
less relative accuracy

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The time taken for a given event is 7.4s and the possible error is 0.05cm, what is the relative error?
0.003

Consider the following pair of measurements 40.0cm or 8.0cm. Which one is more accurate?
8.0cm

The following physical quantities are fundament quantities except
Density

Which of the following is correct about types of graph?
linear graph

Multiplication and division rule states that the product or quotient of two measurements should be rounded off _____
to contain less significant digits as the measurement having fewer numbers of significant digits

In measurement report, the non-zero digits are_____
not significance

If x is equal to 1 in the equation y = mx, what will be the value of y?
y = 0

Consider the equation $T= 2\pi\sqrt{(l/g)}$ if T is plotted against π,the graph obtains will be_____
linear graph

Which of these statements about measurement is correct?
All measurements are not exact

Multiply the following figures: 5.2865, 3.8 and 19.62 and round off the result to more accurate value
394.14

Divide 9.5362 by 3.2 round off the result to more accurate value
3.21

Scientific measurements are expressed by using _____
rules

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The major errors in measuring instrument are_____
zero error

Human errors are based on_____
judgement and precision

The possible error in measurement is due to_____
imprecision in measuring devices

Precision is a function of _____
relative error only

The temperature of two places are recorded to be 30.56C and 32.22C we can say that they are_____
equally precise

A digit is significant if and only if _____
it affects the possible error

Which of the following pair of quantities have identical S I unit?I . Force and surface tensionII. Surface tension and spring constant III. Torque and spring constant IV. Young's modulus and pressure
II only

The inverse of the slope of graph of extension against tension in the spring represents _____.
reciprocal of the spring constant

If m and b are constants in the graph of y = mx + b. The value of the constant b represents ___.
intercept on the graph

The following are sources of error in a measuring instrument except _____
they arise due to changes in environment

One of the following is not a systematic error.
errors in judgement of an observer

In equation y = mx
independent varible

The equation y = mx represents the_____

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linear graph passing through the origin

One of the following is not an importance of graph_____
It cannot be used to determine the values other than those actually measured

The two types of variables that can be measured are_____
dependent and independent variables

The derived quatities that can be measured in an experiment include the following except_____
mass

The fundamental quantities that can be measured include the following except_____
volume

The constants that can be measured through experiment include the following except
length of a wire

What is another name for determinant error?
Systematic Error

The equation y mx b for a graph of y versus x indicates_____
Linear graph

Where will thelinear graph of T2 against l gives pass through _____
origin

Which error is responsible for wear and tear of instrument?
Backlash Error

Relative error is the ratio of possible error to the _____ measurement
total

Express 00000009km in scientific notation
9 x 10 7km

A body of mass 2 kg moves in a circular path with a uniform speed of 10 ms If the radius of the path is 5m calculate the magnitude of centripetal force action on the body

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40N

In the Hookes law experiment the elastic constant obtained stands for_____
Elastic limit

In an experiment for effective mass determination of a spiral spring and spring constant acceleration a is square of the angular speed is proportional to the displacement the expression square of the angular speed is_____
frac2piT

What would be the intercept of the graph in a simple pendulum experiment when T2 is plotted against h is _____
none of the options

The dimension of spring constant is identical to that of_____
Surface tension

Effective mass of a spiral spring is determined by_____
Intercept on the x axis

A body weighs 160N in air and 120N when wholly immersed in a liquid of relative density 08 The relative density value of the body is g10ms 2
32

A body of mass 20g appears to have a mas of 13g in oil and 12g in water what is the relative density of oil?
088

A substance of density 4gcm3 causes 60g of turpentine of density 08gcm3 to overflow from a displacement vessel. What is the mass of the substance?
300g

A body of mass 2kg and volume 5x10 4m3 is hanging from a balance graduated in Newtons. What would the balance read when the body is in air and when fully immersed in paraffin of density 800kgm3
16N

The maximum force of friction that must be overcome before the motion between the surfaces begins is _____

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Solid friction

Which of these pairs of measurements is precise?
187 cm or 1787 cm

The relative error of the measurement of length 654 cm of possible error of 005 cm when the unit of measurement is 01 cm is_____
00008 cm

A box of mass 1 kg rests on a frictionless inclined plane which is at an angle of 30o to the horizontal plane Find the constant force that needs to be applied parallel to the incline to move the box up the incline with an acceleration of 1ms2
59N

A box of mass 1 kg rests on a frictionless inclined plane which is at an angle of 30 to the horizontal plane Find the constant force that needs to be applied parallel to the incline to move the box down the incline with an acceleration of 1ms2
39N

A block slides with constant velocity down an inclined plane that has slope with angle theta 30o. Find the coefficient of kinetic friction between the block and the plane
0577

A block slides with constant velocity down an inclined plane that has slope with angle theta 30 o If the block is projected up the same plane with initial speed of25ms how far up the plane will it move before coming to rest
0319 m

A block slides with constant velocity down an inclined plane that has slope with angle theta 30 o If the block is projected up the same plane with initial speed of25ms What fraction of the initial kinetic energy is transformed into potential energy
05

A block slides with constant velocity down an inclined plane that has slope with angle theta 30 o If the block is projected up the same plane with

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initial speed of 25ms After the block comes to rest will it slide down the plane again
It will not slide down

Given that the specific heat capacity of water is 15 times that copper calculate the mass of copper at a temperature of 100oC required to raise the temperature of 200 g of water from 20oC to 24oC assuming no heat loss to the surrounding
Solid friction

Which of these two measured values 5642cm and 800cm is more precise?
5642cm

Which of these two measured values 600g and 50g is more accurate?
600g

What is the intercept of the equation W XY Z when Z is plotted against X
Y

Given that ymx if yxm a constant then_____
y is directly proportionate to x

If ymx b and y is plotted aqainst x what type of graph will be obtained_____
linear graph not passing through the origin

Consider the equation ymx if we plot the graph of y aqainst x the graph obtain is called_____
linear graph through the origin

Which of the following quantity is a derived quantity?
velocity

If the equation of a graph is given as ymx b at x0 yb it means that
the graph intercept on the y axis

Question: the following physical quantities are fundament quantities except
density

We use graph to show_____
a vivid picture of how two physical quantities are related

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If the value of quantity y depends on the value of quantity x then y is_____
dependent variable

The followings are non linear graph except
simple pendulum graph

Consider the equation y mx b it implies that_____
the graph have a negative slope

If two physical quantites P and Q are related as PKQ where K and n are unknown we can reduce the expression to linear by_____
taking logarithm of both side

Consider the equation yax c the graph of the equation will be_____
non linear graph

Quadratic equations can be classified as_____
non linear graph

Straight line graph shows that_____
the relationship between the two variable are linear

Consider the equation ymx it implies that_____
y is not a direct relationship

Boyles law shows that relationship between pressure and_____
volume when temperature is constant

In Boyles which of the following statement is true
P is inversely propotional to T

If F = ma mg sin ϴ$$ and $$ a = -g sin ϴ $$ what does the negative sign indicate?
acceleration does not increase perpetually

The simple pendulum has its equilibrium position at the _____
Center

When ploting a graph what do we consider first?
a brief title at the top

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we can better visualise the functional relationship between two physical quantities by _____
plotting a graph between them

Given distance S = 0.63 ± 0.02 m and time T = 0.63 ± 0.02 m obtain fractional error in velocity V?
0.37 ± 0.02 ms-1

In most of the physics experiments our objective is to determine _____
relationship between physical quantities

When is a digit said to be significant?
when it affect the relative error

When measuring intersteller distances, we use _____, numbers
very small

While measuring interatomic distances, we use _____,` numbers
very large

_____ is defined as the ratio of possible error to the total measurement.
Relative error

A measurement of 5.32 cm and 5.3 cm, which is more precise?
5.32 cm

The instruments having smaller units of measure will give more_____
precise measurement

The _____ is thus due to inherent imprecision in measuring devices.
possible error

The _____ nature of measurement let us reflect on the process of measurement of length.
Inexact

One of the following is a cause of error in experimental measurement_____
faulty component

The negative sign in hooks law signifies _____
restoring force

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How does a spiral spring behave like an elastic material?
subjecting under force

_____ is allowed to dangle freely on the working bench in specific gravity experiment.
the pendulum bulb

Pour out the _____ and clean it again with the_____ and dry
kerosene, Methylated spirit

Weigh the_____, _____ and the_____ all together
bottle, stopper and the kerosene

Fill the bottle with _____ whose relative density is to be determined
Kerosene

Weigh the bottle and stopper empty by using the _____ and record this mass as m1.
weighing balance

Clean the bottle and stopper with_____ and dry it by using a hot air drier.
Methylated spirit

The volumes of the liquid and the water are made to be equal by using the _____
specific gravity bottle

_____ is defined as the ratio of the mass of the liquid over the mass of an equal volume of water
relative density

The relative density of a liquid is defined as _____
Density of the liquid/Density of water

State one material needed for the Determination of relative density of kerosene using the specific gravity bottle.
Balance and weights

What can we obtain by plotting the graph of SinΘ on vertical axis against CosΘ on the horizontal axis
coeficient of static friction

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Attaching different weights on the wooden block can _____ the wooden block.
vary the normal reaction of

The coefficient of friction p, is the coefficient of friction p, is defined as _____
μ = Tan Ɵ

The normal reaction R on the inclined plane is _____
WCosƟ

The limiting frictional force (Fr) is equal to _____
WSinƟ

The _____, which enables the wooden block just to glide, is then noted.
angle Ɵ

By gradually raising the upper board_____ is made between the upper and lower boards.
an angle Ɵ

On top of the upper board is placed a _____
wooden block

The inclined plane is made up of_____ hinged at one end.
two wooden boards

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