Examiner Tips

General Tips for both Paper 3 & 4 - Practical Test and Alternative to Practical

• When asked to take a single reading, make sure you include the unit.

• Do not write anything you are not asked for – you are not expected to write an account of the experiment unless asked to do so.

• If you are asked to "use your results" to explain something, then quote them, do not just mention the theory you know!

• If you are reading a measuring instrument, give all the values on the scale, e.g. on a hundredth of a second stopwatch, write 9.24 s – not 9 or 9.2 s (and not 09:24 s).

• Significant figures are important in the practical papers. Do not quote too many – or too few! Give just the right number. Many marks are lost by giving too few significant figures. This usually occurs when reading a scale where the value is on a major mark, e.g. 6 V . If the scale measures to 0.1 V , then the reading is 6.0 V , and you must include the point zero! There are usually 2 or 3 significant figures in most readings. Think carefully if you ever use more or less.

• In calculated values, you should never give more significant figures then were used in the data, e.g. the average of 27.95, 26.54 and 27.36 is actually 27.28333333 but should be given as either 27.28 to the four significant figures given in the data or 27.3 as the variation of the readings suggests that four significant figures are too many.

• Normally you can measure an instrument to the accuracy shown by the smallest scale division. However

- If using a liquid in glass thermometer, you should be able to estimate within the degree markings, e.g. to 0.5oC or even 0.25oC.

- If using a ruler you can usually measure to about 0.3-0.5 mm even though the smallest division is a mm.

• Make sure you understand technical terms used in the question; for example extension means the increase in length increase in length of a spring when a load is added; calibration means "to put a to put a

scale on a measuring instrument ", which applies to any measuring instrument.

Compiled by: Mustafa Asif

• When measuring vertical heights, a setsquare should always be used to ensure the ruler is vertical. The setsquare can be shown correctly positioned in a diagram.

• Make sure you can explain the difference between the source of error and what you could do to reduce it, e.g. in transferring a hot object from one place to another: the source of error is the heat it loses during the transfer and you could reduce this error by reducing the distance it has to be moved.

• If a question asks for the effect of changing something such as "the length of the wings" then make sure your answer shows a comparison, e.g. "the long er the wings, the longer the time to fall".

• When measuring time or length be careful to explain the meaning clearly; for example "longer" can mean either a longer time or a longer length. There is no confusion if you use the words "a longer time" or "a shorter time".

When recording your readings in a table:

• Write down all your readings clearly. Do not do a calculation in your head or on your calculator without writing the readings down first and saying what they are. Then the examiner can see what you have done and give you the credit you deserve.

• Write both the quantity and unit in the heading. Note that the quantity means current, not "reading on the ammeter". Don't write the unit after every reading in the table which makes it difficult to see the values clearly; a heading should say current / ampere current / ampere or just I / A.

• You do not need a column labelled"reading number" which just goes 1, 2, 3 1, 2, 3 etc. If you are given a table outline in which to record your results, this will use one of them and you will not have enough columns for your results.

• Make sure you have taken sufficient readings, e.g. if you are asked to measure the temperature of a cooling liquid for five minutes, then a reading every minute gives you too few readings. Every 30 seconds is acceptable.

• Make sure you record readings that cover the whole range; for example record the

temperature for the full time suggested in the question and don't forget to note down the

temperature when you start the stopwatch.

• Make sure all the readings of one quantity in a table have the same number of decimal places

as these reflect the accuracy of the measuring instrument. Trailing zeros are often missed

out.

Paper 4 Tips - Alternative to Practical

This paper asks you questions about how you would perform practicals in the laboratory at your

school. So you need experience of actual practicals not just alternative to practical papers.

When you observe your teacher demonstrating experiments, you should:

• watch closely how the apparatus is set up.

• think about any problems with the apparatus that occur during the experiment.

• think about any sources of error in taking the readings.

When you do practical work at school, you should:

• handle the apparatus carefully.

• think about how the apparatus is set up.

• ask your teacher for help if you are not sure.

• think about how you take down the readings in a clear table – never just write numbers on a

page, as you may well forget what they were later!

• think about the number of significant figures in your readings.

Answering the examination Paper

• When answering questions about sources of error in an experiment, just writing "more

accurate" is usually not enough - more detail is required

• Sometimes the answers appear too obvious, but they are good practical points; .for example

when choosing a measuring cylinder of the correct size to measure the volume of some

marbles, the measuring cylinder must be large enough to hold all the marbles!

• If a question involves familiar equipment used in a novel way, e.g. circuits or ray diagrams:

- take time to look at the equipment used in the question; do not assume that it is the same

as an experiment you have seen before.

- follow round the circuit or the rays of light to be sure you understand what is happening.

Some experiments

Measuring Speed of Sound

Procedure:
1. Measure a distance d from person A to person B in an open field using measuring tape.
2. Person A fires the pistol.
3. Person B starts the stopwatch when he sees the flash of pistol and stops it when he hears the sound. The time interval t is recorded.
4. Using speed = d / t , we can calculate the speed.

Person A
with pistol

Person B with
stopwatch
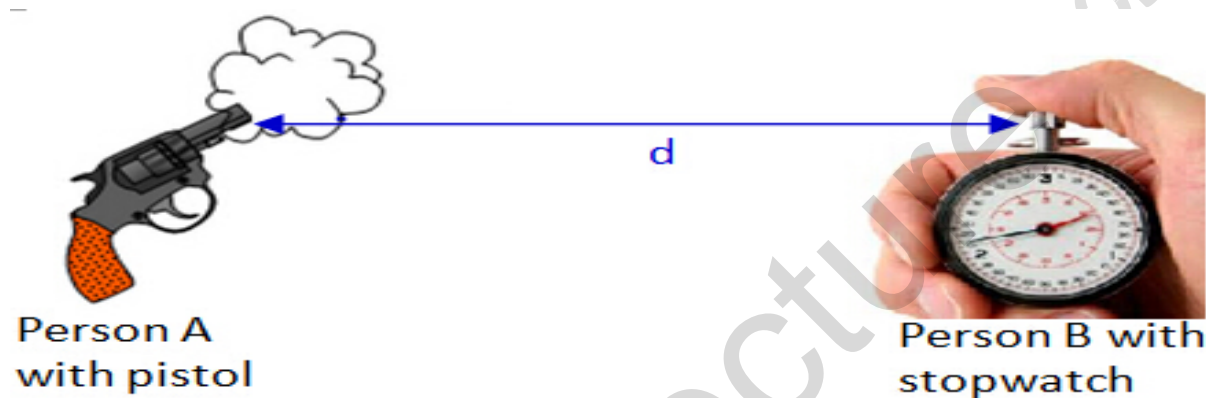
Indirect Method (Echo Method)
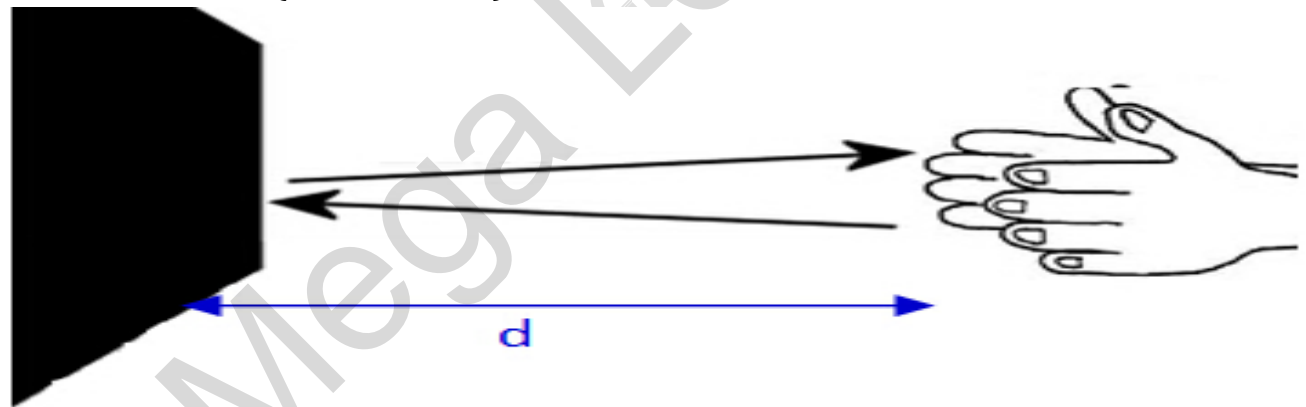
Procedure:
1. Measure the distance d from the wall to the clapper in an open field using measuring tape.
2. Make a sharp clapping sound and repeat the sound at regular intervals to coincide with the echoes. In other words, the second clap coincides with the echo from the wall from the first clap.
3. Start counting the clap at zero as the stopwatch is started, count the number of claps and stop the stopwatch at 50 claps.
4. Repeat step 3 to find the average time for 50 claps. Hence, calculate the time interval t between claps.
5. Using speed = 2 d / t, we can calculate the speed.

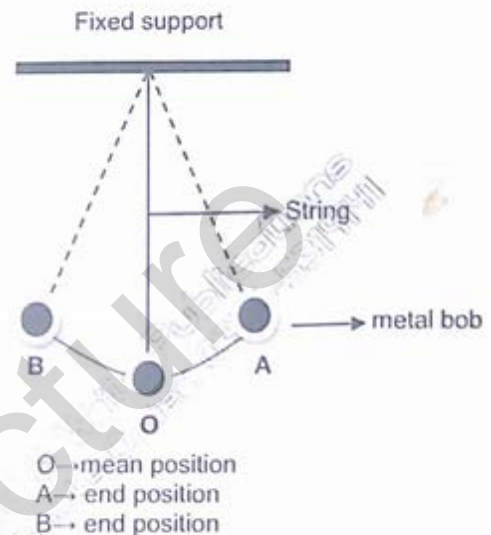## Pendulum

THE SIMPLE PENDULUM:

A simple pendulum consists of a metal bob, attached at the end of string, hanging from a support.

BASIC TERMS OF PENDULUM:

- **Oscillation:**
  One complete round trip of a pendulum is called oscillation. i.e. from O→A→B and back to O.

- **Time Period (T):**
  Time taken by a pendulum to complete one oscillation.

- **Frequency (f):**
  It is number of oscillations completed in one second.

  $f = \frac{1}{T}$

  where f = frequency, measured in Hertz (Hz).

Fixed support

String

metal bob

B   A

O

O→mean position
A→ end position
B→ end position

How to determine time period of a Pendulum using stop watch?

- Set the pendulum into motion.

- Note time for 20 oscillations by using stopwatch.
- Find the time for one oscillation by using the formula:

$$T = \frac{t}{n}$$

Where
t = time noted by watch.
n = no. of oscillations.
T = time period.

Plotting magnetic field

Magnetic Field:

"The space around a magnet within which it can exert force on magnetic objects".

The direction of magnetic field is represented by magnetic field lines. The magnetic field lines have following properties:

➢ Magnetic field lines start from N-pole and end on S-pole.

➢ Lines do not intersect each other.

➢ If lines at a point are closer, the magnetic field is stronger there and vice versa.

➢ The magnetic field lines between two like poles produce neutral point. At this point resultant field is zero.
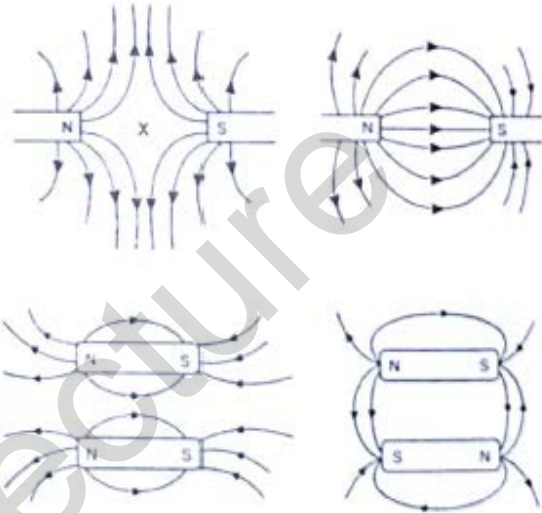
PLOTTING OF MAGNETIC FIELD LINES WITH A COMPASS:

Keep the plotting compass near the N-pole of magnet. Mark a dot where compass needle points. Shift the S-position of needle on dot and mark a new dot where the compass now points. Similarly mark a series of dots from North to South pole of magnet. Join these dots to plot magnetic field lines around a bar magnet.

Parallax error
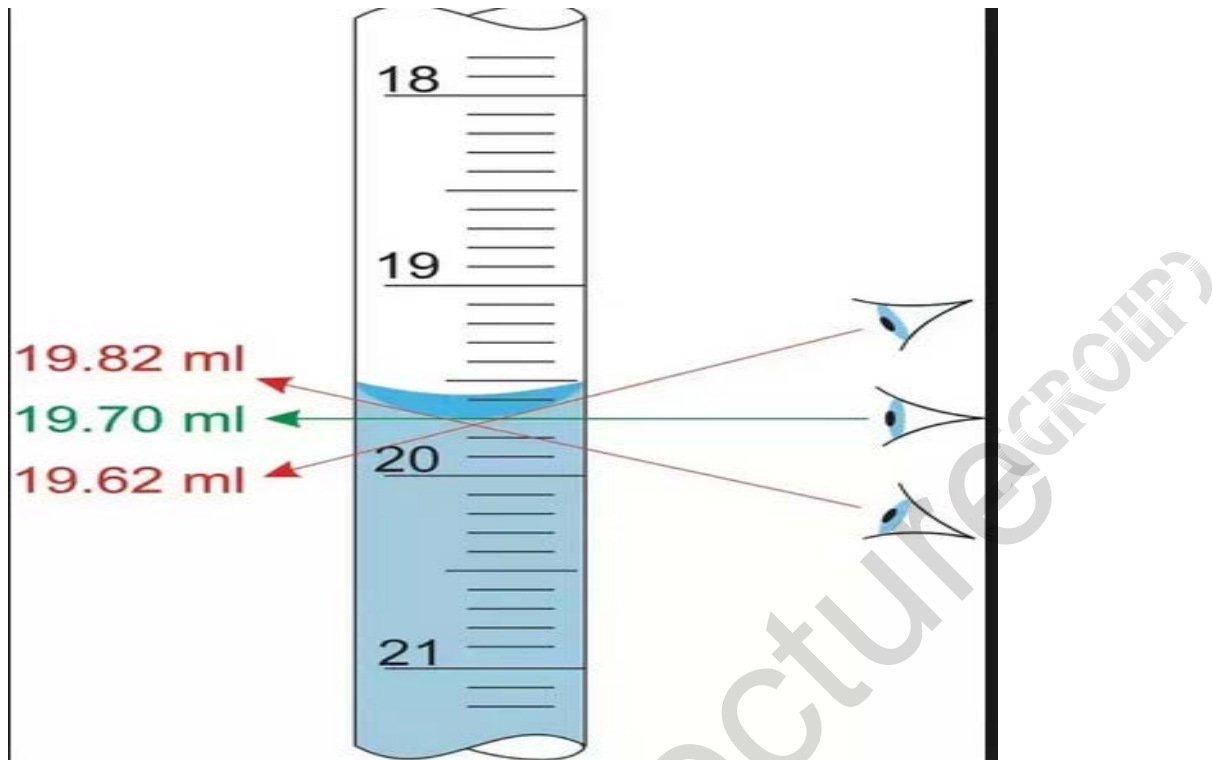
Parallax error is an **error** caused by humans, while measuring a quantity if your eye is not at the proper angle to the scale you're reading, it will cause **parallax error.** Place your eye at the level of the appropriate measurement marking when measuring the level of a liquid in a graduated cylinder. Read the lower part of the curved surface of the liquid -- the meniscus -- to gain an accurate measurement and avoid parallax errors.

Ray box practical with plane mirror
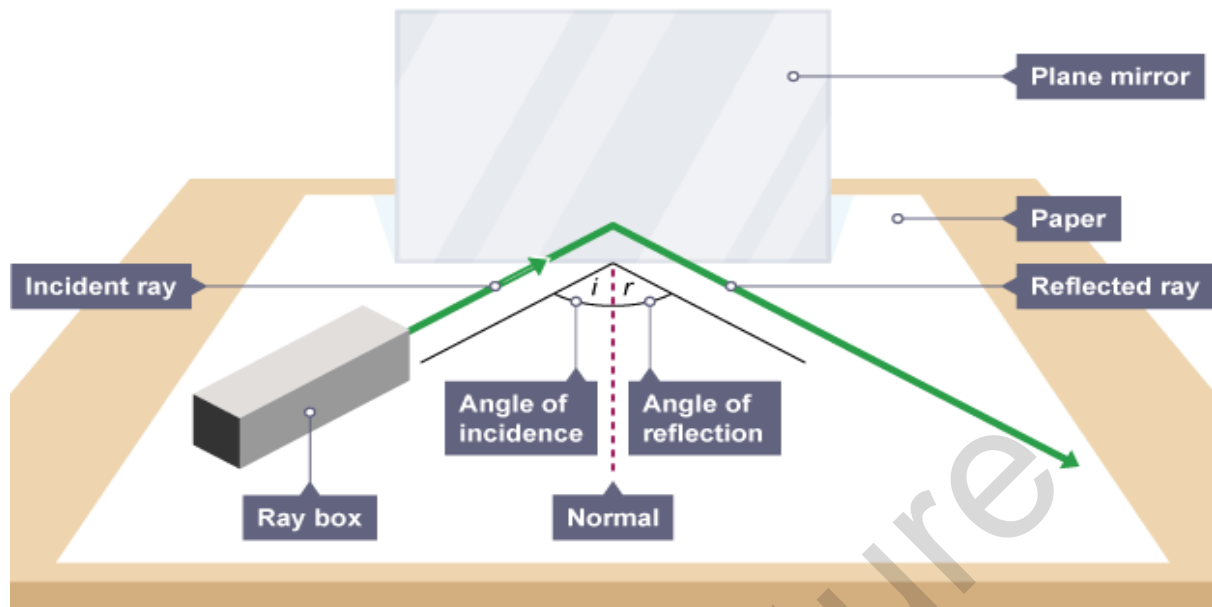
To investigate the reflection of light by a plane mirror.

Method

1. Set up a ray box, slit and lens so that a narrow ray of light is produced.
2. Place a 30 centimetre (cm) ruler near the middle of a piece of plain A3 paper. Draw a straight line parallel to its longer sides. Use a protractor to draw a second line at right angles to this line. Label this line with an 'N' for 'normal'.
3. Place a plane mirror against the first line.
4. Use the ray box to shine a ray of light at the point where the normal meets the mirror. This is the incident ray.
5. The angle between the normal and the incident ray is called the angle of incidence. Move the ray box or paper to change the angle of incidence. The aim is to see a clear ray reflected from the surface of the mirror.
6. Using a pencil on the paper, mark the path of:
   o the incident ray with a cross
   o the reflected ray with a cross
7. Remove the mirror. Join the crosses to show the paths of the light rays.
8. Measure the angle of incidence and angle of reflection for the mirror.
9. Repeat steps 2 - 8 for several different angles of incidence.

Experiment: To locate position of image in plane mirror.

Apparatus:
Mirror strip, Drawing board, Paper, Paper pins, Pencil, Protractor, ruler.
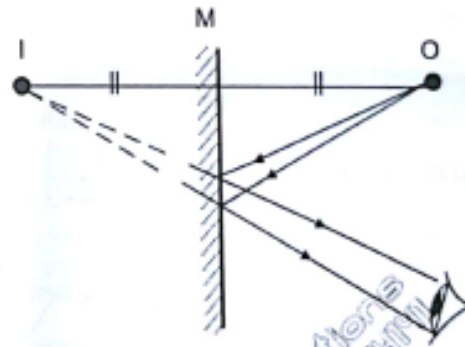
Procedure:
- Fix the paper on drawing board. Insert a paper pin P on paper, before the mirror strip.
- Draw two incident rays from Pin, on mirror.
- Draw the reflected rays from mirror obeying laws of reflection   i.e. i=r.
- Extend the reflected rays backwards. The point of intersection of extended lines gives the position of image of Pin P.

Characteristics of Image: The image produced in plane mirror has following characteristics:
- Image size is equal to object size.
- Image distance is equal to object distance.
- Image is upright.
- Image is virtual.
- Image is laterally inverted.

Experiment: To find refractive index n= Sin i/ Sin r of a glass block.
Apparatus: Glass block, drawing board, paper, pencil, ruler, Paper pins, Protractor.
**Procedure:**
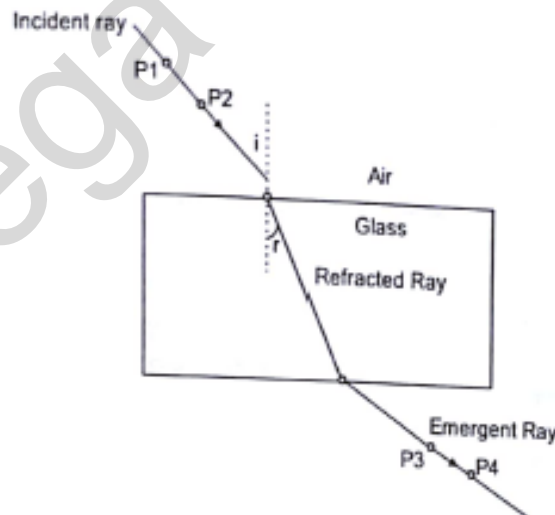
- Place the glass block on paper and mark its boundary.
- Insert 2 pins P1 and P2 on one side of glass block, making incident ray.
- Insert 2 more pins P3 and P4 on the other side of glass block, in the straight line of image of P1 and P2.
- Remove the pins and complete the Fig. by drawing incident, refracted and emergent rays.
- Measure angles i and r with protractor and use formula n = Sin i/ Sin r.

2.   The angle of incidence is greater than critical angle i.e. i > c.

Experiment: To demonstrate the total internal refraction.

Apparatus: Ray box, semi circular glass block, paper drawing board, pencil, Protractor.

Procedure:
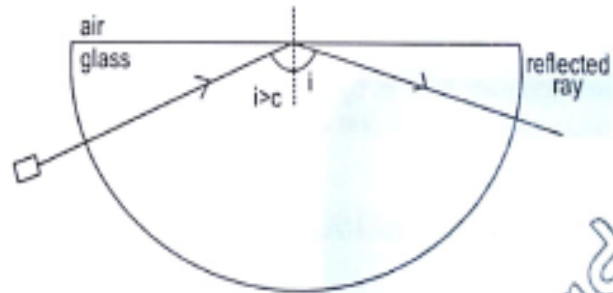
> Keep these micircular glass block on paper, fixed on drawing board.
> Fall the light ray from ray box, on the circular side of glass block.
> Keep on increasing the angle of incidence of ray, such that the ray bounces back into glass.
> The reflection of light ray from straight side of glass block shows the total internal reflection.
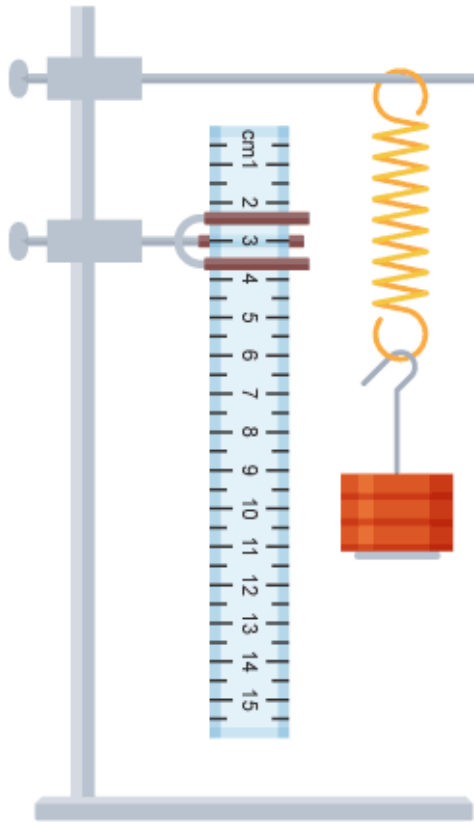
Investigate the relationship between force and extension for a spring

There are different ways to investigate the relationship between force and extension for a spring. In this required practical activity, it is important to:

- make and record length accurately
- measure and observe the effect of force on the extension of springs
- collect the data required to plot a force-extension graph

Hooke's law states that the extension of a spring is directly proportional to the force applied, provided that the elastic limit is not exceeded. The aim of the experiment is to investigate the relationship between a force and the extension of a spring, and see if the spring obeys Hooke's law.

Method

1. Secure a clamp stand to the bench using a G-clamp or a large mass on the base.
2. Use bosses to attach two clamps to the clamp stand.
3. Attach the spring to the top clamp, and a ruler to the bottom clamp
4. Adjust the ruler so that it is vertical, and with its zero level with the top of the spring.
5. Measure and record the unloaded length of the spring.
6. Hang a 100 g slotted mass carrier - weight 1.00 newtons (N) - from the spring. Measure and record the new length of the spring.
7. Add a 100 g slotted mass to the carrier. Measure and record the new length of the spring.
8. Repeat step 7 until you have added a total of 700 g.

Results

Results

Force (N)	Length (mm)	Extension (mm)
0 (unloaded)	22	0
1.00	52	30
2.00	83	61
...		

Analysis

1. For each result, calculate the extension:
   - extension = length − unloaded length

2. Plot a line graph with extension on the vertical (y) axis, and force on the horizontal (x) axis. Draw a suitable line or curve of best fit.

3. Identify the range of force over which the extension of the spring is directly proportional to the weight hanging from it.
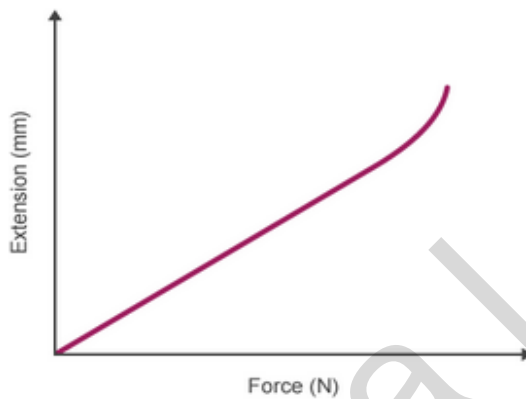
Evaluation

It is important to keep the ruler vertical. Suggest another way to improve the accuracy of the length measurements.

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It is important to keep the ruler vertical. Suggest another way to improve the accuracy of the length measurements.

Hazards and control measures

Hazard	Consequence	Control measures
Equipment falling off table	Heavy objects falling on feet, eg bruise/fracture	Use a G-clamp to secure the stand
Sharp end of spring recoiling if the spring breaks	Damage to eyes and/or cuts to skin	Wear eye protection, use support and gently lower masses whilst loading the spring
Masses falling to floor if the spring fails	Heavy objects falling on feet, eg bruise/fracture	Gently lower load onto spring and step back

Experiment to verify Hook's law.

**Apparatus:** Spring, metre rule, stand, weights or loads.

ARRANGEMENT & PROCEDURE:

- Attach a spring with stand and measure its original length (l_1) with rule.
- Attach a load or weight at the end of spring. Measure stretched length of spring (l_2) with rule.
- Similarly, attach different loads at the end of spring and measure the stretched lengths of spring for each load.
- Record the results in the table
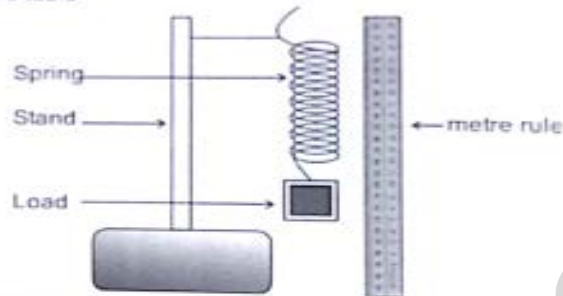
No. of Obs.	Original length (l_1) Cm	Final length (l_2) Cm	Extension(l_2-l_1) Cm	Load/weight N
1				
2				
3				
4				
5				

- Draw the graph between extension and load, the graph is a straight line, passing through origin. So Hooke's law is verified.
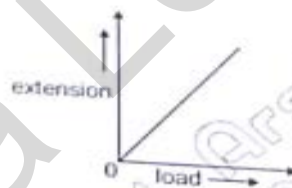
To determine density of Liquid:

Apparatus: beam balance, burette, beaker and stand.

PROCEDURE:

1. Find the mass (m_1) of an empty beaker with beam balance.
2. Shift a known volume (V) of the liquid from burette into beaker.
3. Find the mass (m_2) of beaker and the liquid with beam balance.

Burette
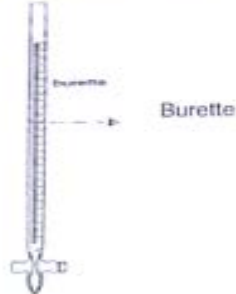
Calculation:

The mass of liquid = m = $m_2 - m_1$
Use the formula:

$$Density = \frac{mass}{volume}$$

to find density of given liquid.

TO DETERMINE DENSITY OF REGULAR OBJECT:

Apparatus: beam balance, ruler, regular shaped object

Procedure:

1. Determine the mass of regular object with beam balance.
2. Measure the length (ℓ), breadth (b) and height (h) by using a meter rule.

Calculation:

The volume of object = $\ell \times b \times h$
Use the formula,

$$Density = \frac{mass}{volume}$$

Physics P4 5054/04

TO DETERMINE DENSITY OF IRREGULAR OBJECT:

Apparatus: Beam balance, measuring cylinder, irregularly shaped object.

Procedure:

1. Find the mass of irregular object with Beam balance.
2. Fill measuring cylinder with water up to volume (V_1)
3. Completely immerse the object into water. Find the new volume (V_2).
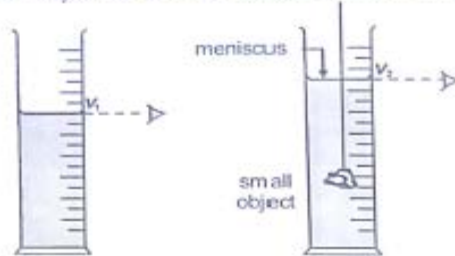

Calculation:

The volume of irregular object = $V_2 - V_1$

Use the formula: density = $\dfrac{mass}{volume}$

to determine density of irregularly shaped object.

Precautions:

➢ Avoid parallax error.
➢ Place the measuring cylinder on a flat surface.
➢ Read the volume from bottom of meniscus.
➢ The object must be completely immersed into liquid.
➢ Measure mass of object, before measuring its volume.

Note:

➢ If object floats in water, then tie a sinker to object. Subtract the volume of the sinker from the final reading.
➢ If the object is too big to be lowered into the measuring cylinder, use a displacement come to determine volume of solid.

Physics P4 5054/04
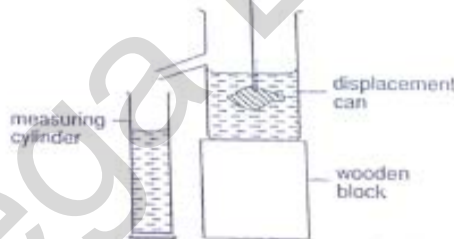
Experiment: To investigate the Principle of Moments

Apparatus: Uniform metre rule, load (W_1), load (W_2), strings, knife edge, Retort stand.
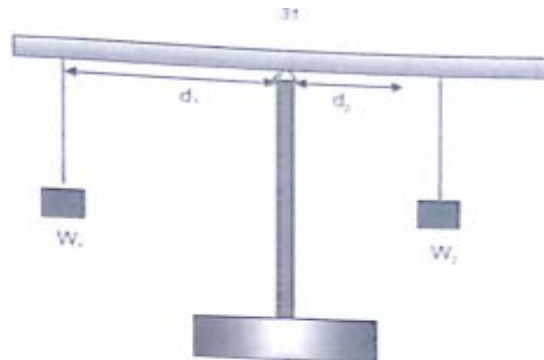
Procedure:

1) Set up the apparatus as shown in Figure with the knife edge at the 50 cm mark.
2) Balance the system by adjusting the distances d_1 and d_2.
3) Vary d_1 and change d_2 so that the system is balanced for 5 sets of d_1 and d_2.
4) Calculate the anticlockwise moments $W_1 \times d_1$ and the clockwise moments $W_2 \times d_2$ and tabulate as follows:

Table:

W_1	d_1	W_2	d_2	$W_1 \times d_1$	$W_2 \times d_2$

Unit - 5

To determine position of c.m or c.g of plane lamina of irregular shape by plumb line.

Apparatus: Irregular lamina, Stand, Plumb line, Cork and Pin.
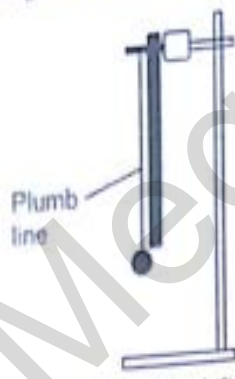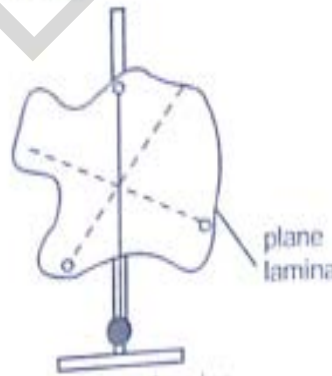

Fig. Plumb line

Fig. Irregular Lamina

1. Make three small holes near the edges of the lamina.
2. Suspend the lamina through one of the holes using a pin.
3. Hang a plumb line on the pin in front of the lamina.
4. When the plumb line is steady, draw a line on the lamina along the plumb line.
5. Repeat the above procedure for the remaining two holes.
6. The point of intersection of the three lines on the lamina is the position of centre of mass or centre of gravity.

Precautions:

1. The lamina should be free to swing about its point of suspension.
2. The parallax error must be avoided.

EXPERIMENT TO DEMONSTRATE ATMOSPHERIC PRESSURE:

Fig. shows a thin-walled metal can, attached to a vacuum pump. Before the air was pumped out, the pressure inside the can is equal to that outside. As the air is pumped out, a partial vacuum of very low pressure forms inside the can and immediately the great external atmospheric pressure crushes the can. It is assumed that the material of the can is thin or flexible.


Effect of atmpspheric pressure
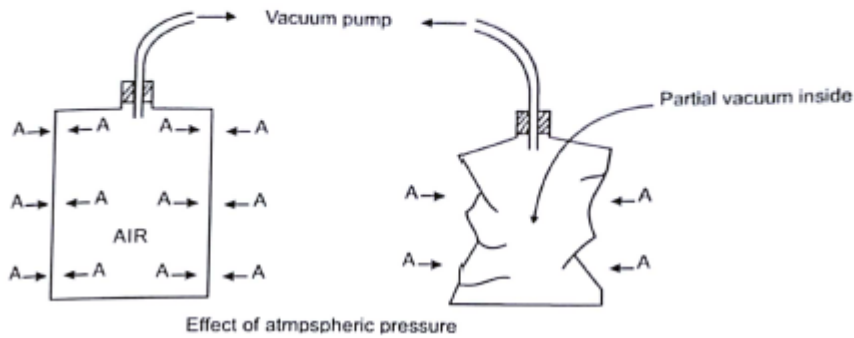
Experiments to demonstrate conduction, convection and radiation.

Experiment# 1: *To investigate the thermal conduction through different solids.*
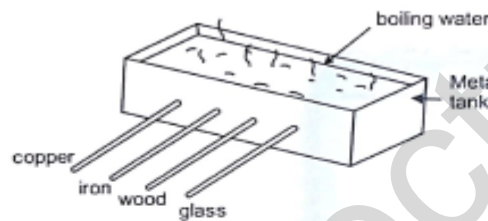
Four rods of different materials but of the same size, coated with wax are inserted in a metal tank. Pour boiling water into tank, so that the ends of rods are submerged. The level to which wax melts on different rods, determines the conduction rate of solids.

Experiment # 2: *To demonstrate that water is a poor conductor of heat.*
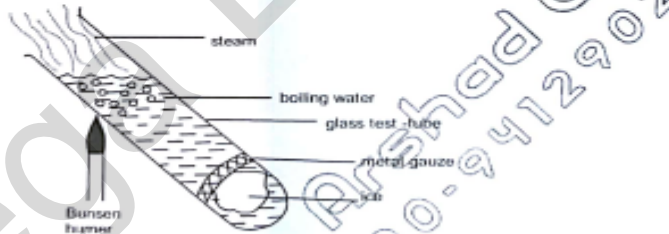
Place the ice cube at the bottom of test tube which is filled with water. Cover the ice cube with wire gauze, so that ice cube may not float. Heat the test tube at the upper end. It has been observed that water boils at the top but ice does not melt at the bottom. It shows that water is a poor conductor of heat.

Unit - 19

Experiment #3: To demonstrate convection through the liquid.

Fill the flask with water. Keep few crystals of Potassium Permanganate ($KMnO_4$) at the bottom of flask. Heat the flask from bottom. The water at the bottom being less dense rises upwards, along with crystals of $KMnO_4$. The purple streaks moving upwards and then downwards are observed in the flask, which show the presence of convection current.
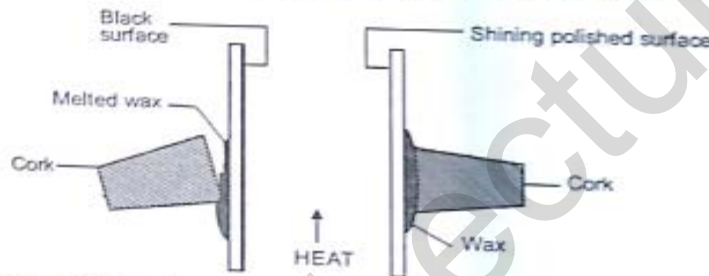

Convection current
potassium permanganate
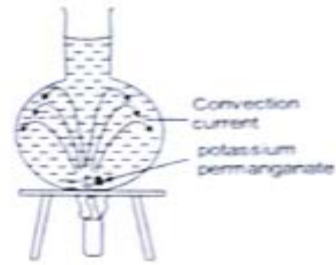
Experiment # 4: To demonstrate convection through air.

Keep the burning candle at the bottom of chimney A and smoldering paper at the top of chimney B. The hot air above candle rises upwards and more dense air along with smoke enters from chimney B and travels towards chimney A. The path of smoke indicates presence of convection current.


smouldering piece of paper
movement of smoke
Connection current
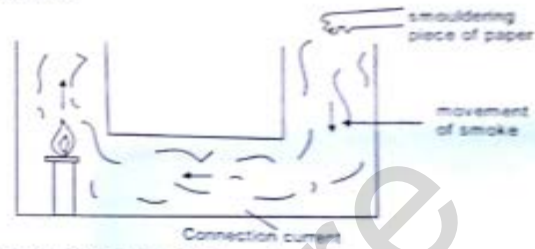
Experiment # 5: To demonstrate that black surface absorbs more infer red radiations than white surface.

Black surface
Shining polished surface
Melted wax
Cork
Cork
Wax
HEAT

Take two metal plates of same size, one is dull black and other one smooth shiny. Stick Corks with wax on opposite sides of the plates. Heat the plates equally. It has been observed that wax attached to black plate melts and its Cork falls down earlier than that of white plate.
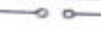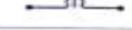
Experiment # 6: To demonstrate that black surface emits more infra-red radiations than white surface.

Take a metal tank and fill it with hot water. Make one side of container dull black and other shiny white. Keep two metal plates holding wax and Cork at equal distances on both sides of tank. It has been observed that wax melts earlier and Cork falls down, from the plate facing black side of tank.

black surface
white surface
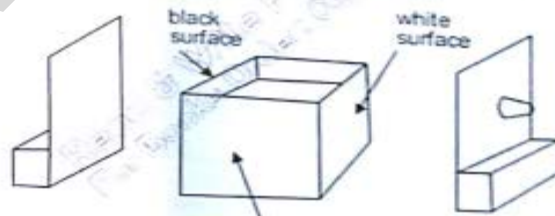
ELECTRICAL SYMBOLS:
Common devices in electric circuits.

Symbol	Device	Symbol	Device	Symbol	Device
	Switch		Lamp		Galvanometer
	Cell		Fixed resistor		Ammeter
	Battery		Variable resistor (or rheostat)		Voltmeter
	Power supply		Fuse		2 way switch
	Wires joined		Coil of wire		Earth connector
	Wires crossed		transformer		Capacitor

EXPERIMENT TO DEMONSTRATE THE FORCE ON A CURRENT CARRYING CONDUCTOR:

When a current carrying wire is placed in a magnetic field then a magnetic force is produced on the wire. Suppose a stiff copper wire is placed at right angles to the field, provided by U-shaped magnet. When switch is closed, a current flows through the wire. The wire moves upwards, indicating that an upward force acts on wire.
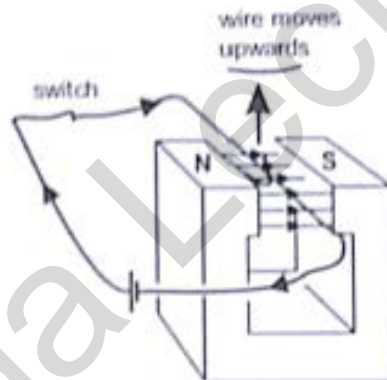
Observations:
The magnitude of magnetic force on the current carrying conductor is increased:
➤ By increasing strength of a magnetic field.
➤ By increasing amount of current passing.
The direction of magnetic force on the current carrying conductor is reversed:
• By reversing the direction of current.
• By reversing the direction of magnetic field.
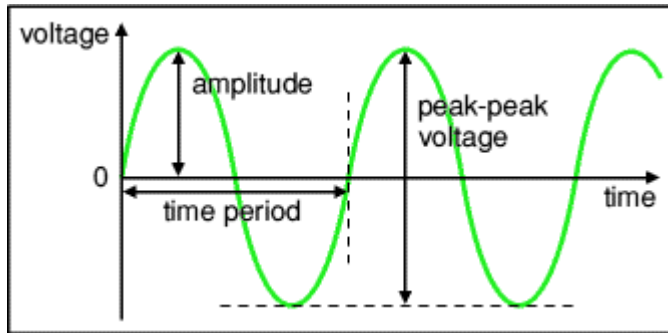
- **Amplitude** is the maximum voltage reached by the signal. It is measured in **volts**, **V**.
- **Peak voltage** is another name for amplitude.
- **Peak-peak voltage** is twice the peak voltage (amplitude). When reading an oscilloscope trace it is usual to measure peak-peak voltage.
- **Time period** is the time taken for the signal to complete one cycle. It is measured in **seconds (s)** but time periods tend to be short so milliseconds (ms) and microseconds (μs) are often used.
  1ms = 0.001s and 1μs = 0.000001s.
- **Frequency** is the number of cycles per second. It is measured in **hertz (Hz)**, but frequencies tend to be high so kilohertz (kHz) and megahertz (MHz) are often used.
  1kHz = 1000Hz and 1MHz = 1000000Hz.

Frequency and time period

Frequency and time period are the inverse of each other:

Frequency and time period

Frequency and time period are the inverse of each other:

$$\text{frequency} = \frac{1}{\text{time period}}$$

and

$$\text{time period} = \frac{1}{\text{frequency}}$$

Physics ATP Question/Answer Notes

Q1. How to check for zero error in
a: (i) Vernier caliper
(ii) Micrometer screw gauge
(iii) Meter rule
(iv) Stopwatch
Ans:
(i) Close the jaws of the vernier caliper fully. When the zeros of both MAIN SCALE and
VERNIER SCALE are not aligned together, the zero error is present.
(ii) Before placing an object, turn the thimble until the spindle and anvil meet. If the reading
on the thimble is not alligned with the zero mark on the datum line, a zero error is present.
(iii) Refer to this.
(iv) Just check what the stopwatch reads on reset. If it isn't 00:00, a zero-error is present.
Readings are subtracted accordingly.
Q2/3. How to check for zero error in
(i) Voltmeter
(ii Ammeter?
Ans: For both of them, disconnect them (from the circuit) and check if the pointer is pointing
at the zero mark on the scale. If they aren't, a zero-error is present.
Q4/5. Why the pointer reading ammeter/voltmeter is gently tapped before taking a reading?
Ans: To reduce the friction between the needle and the pivot.
Q6. When making a ray diagram, why should rays and normal be as thin as possible?
Ans: Thin lines make it possible to obtain precise readings; with thick lines it is difficult to
measure accurate angles (of incidence, reflection etc.).
Q7. What is the purpose of a rachet in a micrometer?
Ans: To prevent undue pressure from being exerted.
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Q8. A liquid reaching the maximum temperature quickly. Give one reason.
Ans: It is due to convectional currents. The water expands and gains heat energy and its
density lowers down, and it moves upwards and the lower part of the apparatus is replaced
by cold water which has higher density.
Q9. Why is the temperature 20°C marked on the measuring cylinder?

Ans: The scale on the cylinder is calibrated to give accurate readings when the liquid is at
20°C.

Q10. Why an image is measured from a position behind the screen rather than front?

Ans: If it was measured from the front, it would block the rays of light and disturb the
apparatus.

Q11: WHAT IS A MEANT "GOOD ELECTRICAL" CONNECTION?

Ans: It means that the components are connected properly and are tightly screwed in the
circuit. This also reduces the circuit's internal resistance.

Q14: STATE ONE PRECAUTION, OTHER THAN AVOIDING PARALLAX ERROR THAT
SHOULD TAKE WHEN USING A SCHOOL LAB THERMOMETER, TO ENSURE
ACCURATE MEASUREMENT OF TEMPERATURE?

Ans: Check the mercury level when the reading becomes steady. If the thermometer is in a
liquid, make sure it is 1/3rd immersed and that the liquid is stirred before taking the reading.

Q16: WHAT IS THE AFFECT OF "LENGTH" OR "M ASS" ON TIME PERIOD OF
PENDULUM?

Ans: Length - The period of a pendulum increases with length.

Mass - No effect.

Q17: WHAT ARE THE CONDITIONS TO GET ACCURATE FIXED POINTS?

Ans: Immerse 1/3rd of the thermometer into the funnel containing ice, avoid parallax error
when reading the temperature on the thermometer, use ice shavings to ensure good
contact between the bulb of the thermometer and the ice, wait for the temperature to
become steady before taking the reading, etc. Ice point is 0°C and steam point is 100°C.

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Q18: WHY WHILE DETERMINING THE BOILING POINT OF WATER, THERMOMETER IS
HELD IN STEAM?

Ans: Because the steam is pure and has specific melting point. If the reading is taken from
the water, it may not accurate as water may not be pure.

Q20: WHAT OBSERVATION MADE DURING THE EXPERIMENT WOULD CONFIRM
THAT THE GIVEN METAL IS A GOOD CONDUCTOR OF HEAT?
Ans: Experiment - Using 4 rods (copper, iron, glass and wood) which have the same
dimensions, coat one end of the rods evenly with wax. Then fill a tray of water in boiling
water and submerge the end of the rods in the tray. From observation, the wax melts the
farthest along the copper rod, showing that copper (a metal) is a good conductor of heat
while the other rods (insulators) are poor conductors of heat.

Q22: WHAT IS THE PUPOSE OF LAGGING?
Ans: Lagging is done to provide heat insulation (in boilers, pipes etc.) and trap heat from
escaping.

Q23: HOW YOU MIGHT CHECK THAT YOU HAVE MADE GOOD ELECTRICAL
CONNECTIONS?
Ans: Ensure that all components are screwed in tightly and that they work properly. If the
resistance of the circuit is low, the electrical connection is usually good.

Q24: GIVE A REASON FOR MAKING THE LENGTH OF EACH NORMAL AT LEAST
6CM?
Ans: This will help in measuring angles accurately as the radius of a protractor is normally
6cm.

Q25: WHAT ADVANTAGE IS THERE IN USING TRACING PAPER FOR THE SCREEN?
Ans: The image of the object can be viewed without obstruction of light. Also, the size of the
image can be conveniently measured by using a metre rule on the back of the tracing paper
without disturbing the apparatus.

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Q26: WHY THE EYE NOT PLACED TOO CLOSE TO THE END OF THE RULE?
Ans: If the object is too close, the distance between the object and retina is low and hence
the image of the object is not formed on the retina, so we cannot see the object clearly.

Q27: WHAT WOULD BE THE EFFECT ON THE IMAGE IF THE CENTRE OF THE

OBJECT AND THE CENTRE OF THE LENS ARE NOT AT THE SAME HEIGHT?

Ans: If they aren't parallel to each other, the image will be partial or blurred.

Q28: WHAT IS THE PURPOSE OF VARIABLE RESISTOR?

Ans: To adjust the current in the circuit.

Q30: BEFORE CLOSING THE SWITCH, WHY IS THE RHEOSTAT ADJUSTED TO ITS
MAXIMUM VALUE?

Ans: This makes sure minimum current f lows in the circuit, so when the circuit is closed the
ammeter doesn't get damaged.

Q31: WHY IS A COMPASS TAPPED WHEN BEING USED?

Ans: To eliminate friction on the compass needle.

Q32: WHAT IS THE ADVANTAGE OF USING SMALLER COMPASS?

Ans: It is can be used to allign the weak magnetic fields.

Q33: WHY SHOULD CARD MOVE FREELY ON THE PIVOT? (referring to a card being
hung from a hole on a support)

Ans: To ensure the card does not stick to the pivot due to friction (which ensures that the
card is hanging in equilibrium position).

Q34: WHAT IS PLUMBLINE?

Ans: A line from which a weight is suspended to determine the depth or verticality.

Q35: WHY THE PLUMBLINE SHOULD HANG SO THAT IT ALMOST TOUCHES THE
CARD?

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Ans: This will help in avoiding parallax error.

Q37: WHAT IS THE MEANING OF OF C WRITTEN ON A THERMOMETER?

Ans: It means the temperature is measured in Celcicus.

Q38: WHAT PRECAUTIONS ARE TO BE TAKEN WHILE MAKING A CIRCUIT?

Ans: Ensure that all connections are tight, make sure the components are functional and
clean, use a DC supply with low voltage (to minimize potential hazards), make sure the
power supply has a rating nearly equal to the lamp or bulb, make sure ammeter is in series
and voltmeter is in parallel, etc.

Q39: WHAT IS A JOCKEY?

Ans: A jockey is a metal slider that wears away a line of the insulation so it can make

electrical contact with the metal underneath.

Q40: HOW WOULD YOU CLEAN THE DIRTY JOCKY?

Ans: Rub the jockey with sand paper.

Q41: HOW COULD LID HELPS TO KEEP THE CONTENTS OF LAGGED CONTAINER

FROZEN?

Ans: It prevents heat from the surroundings entering the container.

Q42: WHY THERMOMETER HELD IN STEAM FOR DETERMINING THE UPPER FIXED

POINT OF THERMOMETER?

Ans: Because the steam is pure and has specific melting point. If the reading is taken from

the water, it may not accurate as water may not be pure.

Q43: WHAT COULD CAUSE THE POINTER TO AT POSITION BELOW 0?

Ans: By reversing the polarity..

Q44: STATE THE PRECAUTIONS WHILE TAKING A READING FROM

i. Voltmeter

ii. Ammeter

Ans: Check for zero-error, tap them before taking the reading, avoid parallax-error, etc.

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Q45: WHAT WILL BE THE EFFECT ON THE CIRCUIT IF THE DIRTY JOCKEY IS USED?

Ans: A dirty jockey will hinder the flow of current in the circuit BECAUSE the resistance will

increase dramatically.

Q46: HOW WILL YOU "RECORD" READINGS?

Ans: Using the appropriate instruments, the readings are recorded and noted (on a piece of

paper, etc.)

Q47: HOW WILL YOU DISPLAY / REPRESENT YOUR READING?

Ans: The relevant quantities can be tabulated.

Q48: HOW WILL YOU FIND RESULT FROM YOUR REPRESENTED READINGS?

Ans: A graph can be plotted between the relevant quantities and results can be obtained by

deducing data from the graph (e.g. averages, a quantity from the graph, etc.).

Q49: WHAT PRECAUTIONS WOULD YOU TAKE WHILE TAKING READINGS FROM

MEASURING INSTRUMENTS? (GENERAL PRECAUTIONS)

Ans: Avoid parallax error, wait for a steady reading, remember to add/subtract if there are

zero-errors, etc.

Q50: WHAT IS AN OSCILLATION?

Ans: The process of the bob swinging back and forth steadily and coming back to its original
position.

Q52: HOW WILL YOU NEASURE THE LENGTH OF A PENDULUM?

Ans: Using a meter rule and set-square. Place the meter rule close to the thread and note
the length of the upper and lower ends of the pendulum (l1 and l2). The length l is
calculated by l2 - l1.

Q53: WHAT IS THE USE OF SET SQUARE?

Ans: They are used to allign the ruler to get the correct reading. They help to avoid parallax
errors.

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Q55: WHAT IS A MEASUREMENT?

Ans: The size, amount of degree of a physical quantity.

Q56/57: What is an accurate/precise reading?

Ans: Accuracy - the measure of how close you are to the true answer.
Precision - the measure of how closely all your individual measurement match each other.

Q58/59/61: Define responsiveness, range and sensitivity of a thermometer.

Ans: Range - The minimum and maximum temperatures that the thermometer can
measure.
Sensitivity - It is the length of increase of the liquid per degree rise in temperature.
Responsiveness - How quickly the thermometer can register a change in temperature.

Q60/62: How can we increase the responsiveness, range and sensitivity of the
thermometer?

Ans:

To increase range:

(a) make the thermometer stem longer
(b) make the bore(capillary) bigger
(c) use a liquid with a lower expansivity

To increase sensitivity:

(a) make the bore smaller
(b) use a bigger bulb
(c) use a liquid with a higher expansivity

To increase responsiveness:

(a) use a thin glass bulb

(b) use a liquid that conducts heat better

Q63: WHY THE BORE OF CAPILLARY TUBE IS UNIFORM?

Ans: This improves the thermometer's sensitivity (by giving a large change in length of

the mercury thread for a small change in temperature).

Q64: WHY THE WALLS OF LONG TUBE ABOVE THE BULB ARE MADE THICK? Ans: Acts as a magnifying glass to easily read the mercury thread in the

stem.

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Q65: WHAT IS THE ADVANTAGE OF SMALL SIZE OF THERMOMETER? Ans: It makes it cheap to produce, portable, etc.

Q66: WHY THE MERCURY IS CONTAINED IN A THIN-WALL GLASS BULB?

Ans: This allows for rapid conduction of heat through the thin glass wall to the

mercury contained in the bulb.

Q67: WHAT IS THE PUPOSE OF CONSTRICTION IN THE CLINICAL THERMOMETER?

Ans: The constriction prevents mercury from flowing back into the bulb.

Q68: WHAT DOES THE STATEMENT MEAN, THAT THE SCALE OF THERMOMETER IS

LINEAR?

Ans: It is the uniform expansion of liquid to temperature.

Q69: WHY THE CROSS-SECTION OF THE STEM OF THERMOMETER IS PEARSHAPED?

Ans: This acts as a magnifying glass in one direction for easy reading of the mercury

thread.

Q70. What factors to consider before measuring something?

Ans: The magnitude should not exceed the limit of the instrument, and the instrument must

be sensitive enough to detect a meaningful measurement.

Q80. When iron fillings are used, why must the current be large?

Ans: So that the field is stronger and hence the field can be detected.

Q81. Why must smaller fillings be used?

Ans: So that the weaker magnetic fields are also shown.

Q82. Why must the oscillations be counted from center of swing?

Ans: The chain is moving the fastest at the center of swing.

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