

Loyola



EC SCIENCE

8

This special guide is prepared
on the basis of New Syllabus
and Govt. Key

Loyola

Publications

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Less Strain Score More ★

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Mrs. **V. Arul Flora** & Authors Team

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Preface

1. விடைகள் மிக எளிமையாகவும், மாணவ மாணவிகள் எளிதில் புரியும் வண்ணம் 10, 11 மற்றும் 12ம் வகுப்பு அரசுத் தேர்வில் விடைத்தாள் மதிப்பீடு செய்வது போல் விடைக்குறிப்பு (Key) அடிப்படையில் தயாரிக்கப்பட்டுள்ளது.
2. 2 மற்றும் 5 மதிப்பெண் விடைகள் சற்று விரிவாக கொடுக்கப்பட்டுள்ளது.
3. தேவைக்கேற்ப கூடுதல் வினாக்கள் கொடுக்கப்பட்டுள்ளது.
4. 6ம் வகுப்பு முதல் 9ம் வகுப்பு வரை அனைத்து நூல்களும் அரசுத்தேர்வை நோக்கியே எழுதப்பட்டுள்ளது.

குறிப்பு: Loyola EC புத்தகங்களை 10, 11 மற்றும் 12ம் வகுப்பு மாணவ மாணவிகள் வாங்கிப் பயின்றால், அரசுத் தேர்வில் அதிக மதிப்பெண் பெற்று உச்சத்தை தொடலாம் என்பதை மகிழ்ச்சியுடன் தெரிவித்துக் கொள்கிறோம்.

வாழ்த்துக்கள்

அன்புடன்

Loyola Publication



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Unit 1

Measurement

PART I - TEXTBOOK EXERCISES

I. Choose the best answer

- Which one of the following systems of unit is the British System of unit?
a) CGS b) MKS c) FPS d) SI **Ans : c) FPS**
- Electric current is a quantity
a) base b) supplementary c) derived d) professional
Ans : a) base
- SI unit of temperature is _____.
a) celsius b) fahrenheit c) kelvin d) ampere
Ans : c) kelvin
- Luminous intensity is the intensity of _____.
a) laser light b) UV light c) visible light d) IR light
Ans : c) visible light
- Closeness of two or more measured values is called as _____.
a) accuracy b) precision c) error d) approximation
Ans : b) precision
- Which one of the following statement is wrong?
a) Approximation gives a accurate value.
b) Approximation simplifies the calculation
c) Approximation is very useful when little information is available
d) Approximation gives the nearest value only
Ans : a) Approximation gives accurate value

II. Fill in the blanks

	Answers
1. The solid angle is measured in _____	Steradian (Sr)
2. The coldness or hotness of a substance is expressed by _____	Temperature
3. _____ is used to measure electric current	Ammeter
4. One mole of a substance contains _____ atoms or molecules	6.023×10^{23}
5. The uncertainty in measurement is called as _____	Errors
6. The closeness of the measured value to the original value is _____	Accuracy
7. The intersection of two straight lines gives us _____	Plane angle

III. State true or false. If false, correct the statement.

- Temperature is a measure of **total kinetic energy** of the particles in a system
Ans : False - Average kinetic energy
- If one coulomb of charge is flowing in one **minute**, it is called 'ampere'
Ans : False - second
- Amount of substance gives the number of particles present in a substance. **Ans : True**

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4. Intensity of light coming from a candle is approximately equal to one 'candela'. **Ans : True**
 5. **Quartz clocks** are used in GPS Devices **Ans : False - Atomic clock**
 6. Angle formed at the top of a cone is an example for '**plane angle**'. **Ans : False - Solid angle**
 7. The number 4.582 can be rounded off as 4.58. **Ans : True**

IV. Match the following

Column A		Column B	
1	Temperature	a	Closeness to the Actual Value
2	Plane angle	b	Measure of hotness or coldness
3	Solid angle	c	Closeness to two or more measurements
4	Accuracy	d	Angle formed by the intersection of three or more planes
5	Precision	e	Angle formed by the intersection of two planes

Ans : 1. (b), 2. (e), 3 (d), 4 (a), 5 (c)

V. Consider the statement given below and choose the correct option

- a) Both assertion and reason are true and reason is the correct explanation of the assertion.
 b) Both assertion and reason are true but reason is not the correct explanation of the assertion.
 c) Assertion is true, but reason is false
 d) Both assertion and reason are false.
1. **Assertion :** The SI system of units is the suitable system for measurements.
Reason : The SI unit of temperature is kelvin.
Ans : b) Both assertion and reason are true but reason is not the correct explanation of the assertion.
2. **Assertion :** Electric current, amount of substance, luminous intensity are the fundamental physical quantities.
Reason : They are independent of each other.
Ans : b) Both assertion and reason are true but reason is not the correct explanation of the assertion.
3. **Assertion :** Radian is the unit of solid angle.
Reason : One radian is the angle subtended at the centre of a circle by an arc of length equal to its radius.
Ans : * Assertion is false, but reason is true.

VI. Answer very briefly

1. **How many base quantities are included in SI system?**
 Seven
2. **Give the name of the instrument used for the measurement of temperature.**
 Thermometer.
3. **What is the SI unit of luminous intensity?**
 Candela
4. **What type of oscillations are used in atomic clocks?**
 Atomic oscillations.
5. **Mention the types of clocks based on their display.**
 1. Analog clocks 2. Digital clocks.

6. How many times will the 'minute hand' rotate in one hour?

One time

7. How many hours are there in a minute?

1 hour = 60 minutes
 60 minutes = 1 hour
 1 minute = $\frac{1}{60}$ hour
 = 0.01667 hour
 = 0.02 hour

VII. Answer briefly

1. What is measurement?

Finding an unknown physical quantity by using a standard quantity.

2. Name the three scales of temperature.

1. Celsius
2. Fahrenheit
3. Kelvin are the most commonly used scales to measure temperature.

3. Define - Ampere.

One coulomb of charge moving in a conductor in one second.

4. What is electric current?

- Flow of electric charges in a particular direction.
- S.I unit of electric current is ampere (A)

5. What do you mean by luminous intensity?

- The measure of the power of the emitted light in a particular direction per unit solid angle.
- S.I unit - candela (cd)

6. Define - mole.

The amount of substance which contains 6.023×10^{23} entities.

7. What are the differences between plane angle and solid angle?

	Plane angle	Solid angle
1	Angle between the intersection of two straight lines or two planes.	Angle formed by three or more planes intersecting at a common point
2	S. I unit - radian(rad)	S. I unit - steradian (sr)
3	Two dimensional	Three dimensional

VIII. Answer in detail.

1. List out the base quantities with their units.

Quantity	Unit	Symbol
Length	Metre	m
Mass	Kilogram	kg
Time	Second	s
Temperature	Kelvin	K
Electric current	Ampere	A
Amount of substance	Mole	mol
Luminous intensity	Candela	cd

2. Write a short note on different types of clocks.

Different types of clocks are.

1. Types of clocks based on display
2. Types of clocks based on working mechanism.

1. Types of clocks based on display.

i) Analog clocks : It has three hands.

- Hours hand : Short and thick. It shows hour.
- Minutes hand : long and thin. It shows minute.
- Seconds hand : long and very thin. It shows second.
- One rotation in one minute.
- 60 rotation in one hour. Driven mechanically or electronically.

ii) Digital clocks :

- Displays the time directly.
- Shows the time in numericals or other symbols.
- 12 hours or 24 hours display.
- Often called as electronic clocks.

3. Types of clocks based on working mechanism.

i) Quartz clock :

- Activated by electronic oscillations.
- Controlled by a quartz crystal.
- Frequency is very precise.
- More accurate than the mechanical clock.
- Accuracy of one second in energy 10^9 seconds.

ii) Atomic clocks :

- Periodic vibrations within the atoms.
- Accuracy of one second in energy 10^{13} seconds.
- Used in Global positioning system (GPS) Global Navigation satellite system (GLONASS) and International time distribution services.

IX. Higher Order Thinking Question :

1. Your friend was absent to school yesterday. You are enquiring about his absence. He told that he had fever and it was measured to be 100°C . Is it possible to have 100°C fever?, If he is wrong, try to make him understand.

No, it is not possible to have 100°C fever.

- Because our body temperature is only expressed in "Fahrenheit scale" thermometer which is used by the doctors.
- Normal temperature of human body is 98.4°F it is not in celsius degree.
- Celsius degree is used only in weather reports.
- So, my friend has fever of 100°F not 100°C .

PART II - ADDITIONAL QUESTIONS

I. Choose the correct answer

1. Normal temperature of the human body is between

- | | |
|--|--|
| a) 98.40°F and 99.60°F | b) 98.40°F and 98.60°F |
| c) 97.40°F and 98.60°F | d) 97.60°F and 99.60°F |

Ans : b) 98.40°F and 98.60°F

- Assertion (A)** : Celsius, Fahrenheit, kelvin are the most commonly used scales to measure temperature.
Reason (R) : Thermometers are calibrated with some standard scales.
Ans : a) If both assertion and reason are true but reason is the correct explanation of the assertion.
- Assertion (A)** : Clinical thermometers are graduated in fahrenheit scale.
Reason (R) : Weather reports are given in celsius scale
Ans : b) If both assertion and reason are true but reason is not the correct explanation of the assertion.

VI. Very short answer

- Name the metric systems of units.**
CGS, MKS and SI units.
- What is the upper fixed point of the kelvin scale?**
373 K
- Which thermometer measures the temperature of an object without any physical contact?**
Infrared thermometer.
- Give the general formula for the conversion of scales of temperature?**

$$\frac{C-0}{100} = \frac{F-32}{180} = \frac{K-273}{100}$$
- What is the value of 0K in celsius?**
(zero kelvin) 0 K = -273°C.

VII. Short answer

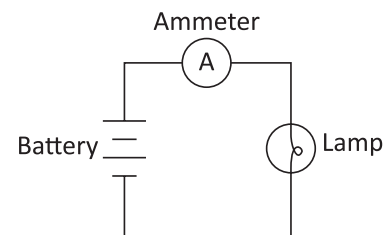
- Name the three things needed for a perfect measurement?**
i) an instrument
ii) a standard quantity
iii) an acceptable unit.
- What are known as superconductors?**
At very low temperature around 30K (-243.2C) some conductors conduct electric current without any loss.
- Define one lumen.**
The luminous flux of the light produced by the light source that emits one candela of luminous intensity over a solid angle of one steradian.
- What is meant by piezo - electric property?**
When a pressure is applied along a particular axis of a crystal, an electric potential difference is developed in a perpendicular axis.
- Give any two uses of super conductors.**
 - To levitate bullet trains from the track.
 - Memory or storage element in the computer.

VIII. Answer in detail

1. Explain how will you measure the current in an electric circuit using circuit diagram.
Components required : Battery, Ammeter, Lamp (Bulb)

Procedure :

- Connect the battery, ammeter and the lamp in series as shown in the figure.
- Note the ammeter reading.
- It is the current in the circuit.



2. Write about rounding off and give the rules for rounding off.

- The result given by a calculator has too many digits.
- This should be rounded off to particular digit.
- Rounding off is used in many areas of physics.

Rules for rounding off :

- Decide which is the last digit to keep.
- Have it the same, if the next digit is less than 5.
- Increase it by one, if the next digit is 5 or greater than 5.

3. Write a note on Greenwich Mean time (GMT) and Indian standard Time (IST).

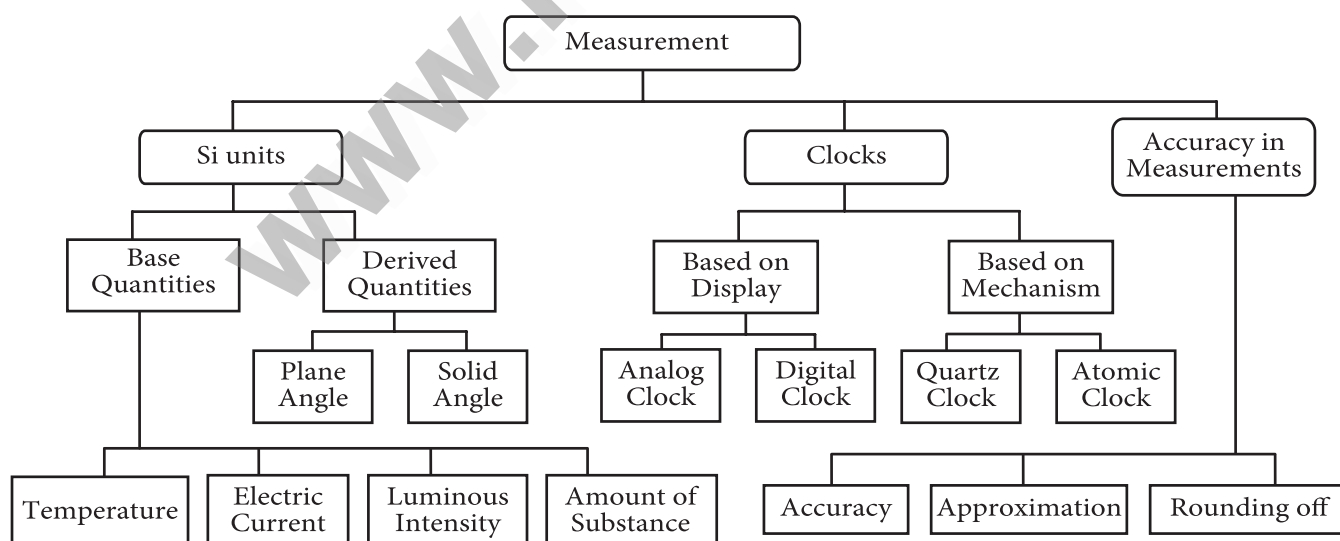
Greenwich Mean Time (GMT) :

- The mean solar time at the Royal observatory, located at Greenwich in London.
- Measured at the longitude of zero degree.
- Earth is divided into 24 zones, with width of 15 degree longitude called as Time zones.
- Time difference between two adjacent, time zones is 1 hour.

Indian standard Time (IST) :

- The location of Mirzapur in Uttar Pradesh is taken as the reference longitude of the Indian standard time.
- It is located at 82.5 degree longitude.
- $IST = GMT + 5.30$ hours.

Mind Map





Force and Pressure

PART I - TEXTBOOK EXERCISES

I. Choose the best answer

1. **If we apply force against the direction of motion of the body, then the body will**
 - a) stop moving
 - b) move with an increased speed
 - c) move with a decreased speed
 - d) move in a different direction

Ans : a) stop moving

2. **Pressure exerted by a liquid is increased by**
 - a) the density of the liquid
 - b) the height of the liquid column
 - c) Both a and b
 - d) None of the above

Ans : c) Both a and b

3. **Unit of pressure is**
 - a) Pascal
 - b) $N\ m^{-2}$
 - c) Poise
 - d) Both a and b

Ans : d) Both a and b

4. **The value of the atmospheric pressure at sea level is**
 - a) 76 cm of mercury column
 - b) 760 cm of mercury column
 - c) 176 cm of mercury column
 - d) 7.6 cm of mercury column

Ans : a) 76 cm of mercury column

5. **Pascal's law is used in**
 - a) hydraulic lift
 - b) brake system
 - c) pressing heavy bundles
 - d) All the above

Ans : d) all the above

6. **Which of the following liquids has more viscosity?**
 - a) Grease
 - b) Water
 - c) Coconut oil
 - d) Ghee

Ans : a) Grease

7. **The unit of viscosity is**
 - a) $N\ m^2$
 - b) Poise
 - c) $Kgms^{-1}$
 - d) No unit

Ans : b) Poise

II. Fill in the blanks

- | II. Fill in the blanks | Answers |
|--|------------------------|
| 1. The pressure of a liquid column ___ with the depth of the column | Increases |
| 2. Hydraulic lift works under the principle of _____ | Pascal's law |
| 3. The property of _____ of a liquid surface enables the water droplets to move upward in plants | Surface tension |
| 4. A simple barometer was first constructed by _____ | Torricelli |

III. State true or false. If false, correct the statement.

- Force acting on a given area is called pressure Ans : True
- A moving body comes to rest due to **friction alone**. Ans : True
- A body will sink if the weight of the body is greater than the buoyant force. Ans : True
- One atmosphere is equivalent to 1,00,000 newton force acting on one square metre. Ans : True
- Rolling friction is **slightly greater** than the sliding friction. Ans : False - less
- Friction is the only reason for the loss of energy Ans : True
- Liquid pressure decreases with the decrease of depth Ans : True
- Viscosity depends on the **pressure** of a liquid Ans : False
- Frictional force

IV. Match the following.

A	Column I	Column II	Answers
1	Static friction	a Viscosity	e objects are at rest
2	Kinetic friction	b least friction	c objects are in motion
3	Rolling friction	c objects are in motion	b least friction
4	Friction between the liquid layers	d objects are sliding	a Viscosity
5	Sliding friction	e objects are at rest	d objects are sliding

B	Column I	Column II	Answers
1	Barometer	a reduce friction	b atmospheric pressure
2	Increase area of contact	b atmospheric pressure	d increase friction
3	Decreasing area of contact	c cause of friction	e decrease friction
4	Lubricants	d increase friction	a reduce friction
5	Irregular surface	e decrease friction	c cause of friction

V. Complete the analogy.

- Knot in a thread : _____ friction :: Ball bearing : _____ friction Ans : static, Rolling
- Downward force : Weight :: upward force offered by liquid : _____ Ans : Buoyancy

VI. Numerical Problem

- A stone weighs 500 N. Calculate the pressure exerted by it, if it makes contact with a surface of area 25 cm².
Solution :
 Weight of the stone = 500 N
 Area of contact = 25 cm² = 25 × 10⁻⁴ m²

$$\begin{aligned} \text{Pressure} &= \frac{\text{Force}}{\text{Area}} \\ &= \frac{500^{20}}{125 \times 10^{-4}} \\ \text{Pressure} &= 20 \times 10^4 \text{ Nm}^{-2} \text{ or } 20 \times 10^4 \text{ Pa} \end{aligned}$$

VII. Consider the statements given below and choose the correct option.

- Both assertion and reason are true and reason is the correct explanation of assertion.
- Both assertion and reason are true but reason is not the correct explanation of assertion.
- Assertion is true, but reason is false.
- Both assertion and reason are false.

1. **Assertion :** Sharp knives are used to cut the vegetables.

Reason : Sharp edges exert more pressure

Ans : a) Both assertion and reason are true and reason is the correct explanation of the assertion.

2. **Assertion :** Broad straps are used in bags

Reason : Broad straps last for long life

Ans : b) Both assertion and reason are true but the reason is not the correct explanation of the assertion.

3. **Assertion :** Water strider slides easily on the surface of water.

Reason : Water strider experiences less buoyant force.

Ans : b) Both assertion and reason are true but reason is not the correct explanation of assertion.

VIII. Answer very briefly

1. Give two examples to verify that a force changes the shape of a body.

- Sitting on the seat of a bicycle.
- Stretching of a rubber band.

2. Give two examples to verify that a force tends to change the static condition of a body.

- By pulling a door to open it.
- Oscillation of a simple pendulum which is initially at rest.

3. How do you feel when you touch a nail immediately after it is hammered into a wooden plank? why?

I can feel heat. Due to friction between hammer and a nail.

4. How does the friction arise between the surfaces of two bodies in relative motion?

Friction arises due to force produced due to the geometrical dissimilarities of the surface of the bodies.

5. Name two instruments which help to measure the pressure of a fluid.

i) Manometer ii) Pressure gauge

6. Define one atmosphere.

- The pressure exerted by the mercury column is considered as "one atmosphere".
- 1 atm = pressure exerted by the mercury column of height 76 cm in the barometer = $1.01 \times 10^5 \text{ Nm}^{-2}$.

7. **Why are heavy bags provided with broad straps?**
 - For giving a lower pressure on the shoulders.
 - Providing a larger area of contact with shoulder.

8. **How does surface tension help a plant?**
 - Water molecules rise up due to surface tension.
 - Xylem vessels help the water to rise upward due to capillary action.
 - This is caused by surface tension of water.

9. **Which has greater viscosity, oil or honey? why?**
 - Honey has greater viscosity.
 - Because viscous force and viscosity is greater in honey than oil.

IX. Answer briefly

1. **Define friction. Give two examples of the utility of friction in day to day life.**
Friction is the force that opposes the motion of an object.
Two examples :
 - i) Writing easily with a pen on paper.
 - ii) To fix a nail in the wall.

2. **Mention any three ways of minimising friction.**
 - Lubricants is used to reduce friction.
 - Reduce the forces acting on the surfaces.
 - Use ball bearings.

3. **State Pascal's law and mention its applications.**
 - Pascal's law states that the pressure applied at any point of a liquid at rest, in a closed system, will be distributed equally through all directions of the liquid.
 - In an automobile service station, the vehicles are lifted upward using hydraulic lift.

4. **Why is a ball bearing used in a cycle hub?**
 - The rolling friction is smaller than sliding friction.
 - So, sliding is replaced by rolling with the use of ball bearings to reduce friction.

X. Answer in details

1. **Friction is a necessary evil - Explain.**
Friction is necessity :
 - We can hold any object in our hand due to friction.
 - We can walk on the road because of friction.
 - Writing easily with a pen on paper is due to friction.**Friction is an evil :**
 - Friction wears out the surfaces rubbing with each other.
 - To overcome the friction, an excess amount of energy is wasted.
 - Friction produces heat, which cause physical damage to machines.
 - Friction has both advantages and disadvantages
 - So "Friction is a necessary evil"

2. **Give the different types of friction and explain each with an example.**
Types of friction :
 - (i) Static friction (ii) Kinetic friction**(i) Static friction**
 - The friction experience by the bodies, which are at rest.
 - Ex. all the objects rigidly placed to be at rest on the Earth, a knot in a thread.

(ii) Kinetic friction :

- Friction existing during the motion of bodies.
- Kinetic friction is classified into two
 - a) Sliding friction
 - b) Rolling friction.

a) Sliding friction

- When a body slides over the surface of another body, the friction acting between the surfaces in contact.
- Ex. Rubbing both hands together to create heat.

b) Rolling friction

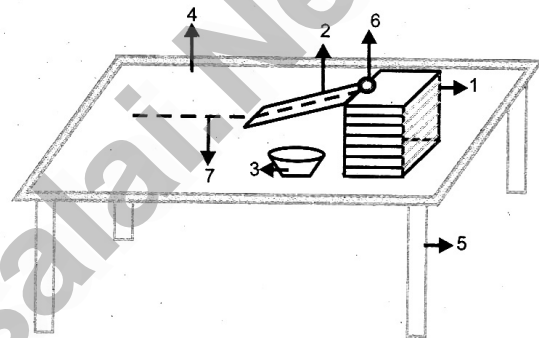
- When a body rolls over another surface, the friction acting between the surfaces in contact.
- Ex. Wheels in vehicles.

3. Describe an experiment to prove that friction depends on the nature of a surface.**Materials needed :**

Table, some note books, scale, cotton cloth, plastic paper, newspaper, writing pad, marbles etc.

Experiment :

- Arrange some note books one over the other.
- Make a slide with a wide scale. One of its ends rest on the pile of books.
- Take rectangular piece of paper near the end of the scale and the table.
- Release a glass marble from the top.
- It rolls down the scale over the piece of paper.
- Measure the distance travelled by a glass marble.
- Repeat this experiment with above mention things and note down the distance.

**Interface :**

The marble covers a lesser distance over the cotton cloth, when compared to glass plate.

Reason :

Friction increases as the roughness of the surface increases.

4. Explain how friction can be minimised.

- Lubricant is a substance which reduces the frictional force.
- It fills up the gaps in the irregular surfaces between the bodies in contact
- It provides a smooth layer
- It prevents a direct contact between their rough surfaces.
- Ball bearings replace sliding friction by rolling friction.
- Because rolling friction is smaller than the sliding friction.
- Ex. Grease, Coconut oil, graphite, castor oil etc.

5. Describe an experiment to prove that the pressure in a liquid increases with depth.**Experiment :**

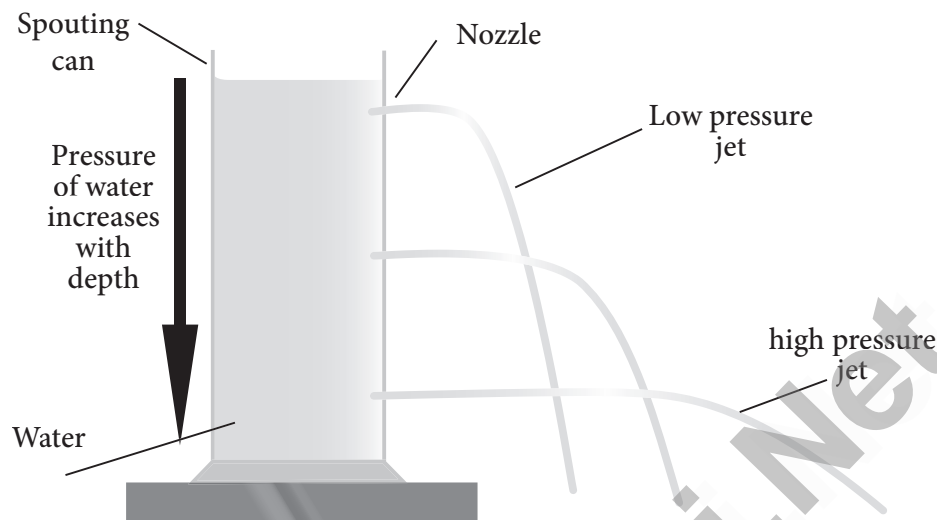
- Take a plastic bottle and put three holes on the same side with different heights.
- Pour some water into the bottle and observe the flow of water.

Inference :

- Water from the lowest hole comes out with the greater force and reaches maximum distance.
- Water from the topmost hole comes out with the least force and reaches minimum distance.

Reason :

- The pressure in a liquid varies with the depth.



XI. Higher Order Thinking Questions.

1. **Why is it not advisable to use a fountain pen while travelling in an aeroplane?**
 - Fountain pen has an ink and also air in it.
 - When pressure in the cabin is low which causes the air inside the pen to expand.
 - The expanding air will cause the ink to be pushed out.

So, it is not advisable to take a fountain pen while travelling in an aeroplane.

2. **Is there any possibility of making a special device to measure the magnitude of friction directly?**
 - A simple apparatus has been developed to measure the magnitude of friction directly.
 - It provides continuous recording to tangential force ranging from below 0.01 dyne to about 50 dynes.
 - Using these fundamental ideas there is a possibility of making a special device to measure the magnitude of friction directly.

3. **Vidhya feels that mercury is costly. So, instead of mercury she wants to use water as barometric liquid. Explain the difficulty of constructing a water barometer.**

We cannot use water as a barometric liquid.
Following are the reasons

 - Water is less dense than mercury.
 - Water has very high vapour pressure.
 - Mercury's freezing point is much lower than that of water.
 - Mercury does not evaporate like water.
 - Mercury is a shiny metal than water, so it is used to read the markings easily on the tube.

XII. Project Work (For Students)

Observe the devices, gadgets or things around you. List out the types of friction involved in each device. How would you minimise the friction? Record your observations and discuss your results with your classmates.

PART II - ADDITIONAL QUESTIONS

I. Choose the correct answer

1. ... is the force acting perpendicularly on any given surface area of a body
 a) Pressure b) Thrust c) Density d) Volume
Ans : b) Thrust

2. Even if we tilt the barometric tube at various angles, the level of mercury will
 a) Not vary b) increases c) decreases d) charge
Ans : a) Not vary

3. Rain drops are spherical in nature because of
 a) Frictional force b) Buoyant force
 c) Surface tension d) Viscous force
Ans : c) Surface tension

4. The unit for surface tension is
 a) Nm b) N⁻¹m c) N⁻¹m⁻¹ d) Nm⁻¹
Ans : d) Nm⁻¹

5. If the area of contact is greater, then the will be greater.
 a) Pressure b) Temperature c) Friction d) Force
Ans : c) Friction

II. Fill in the blanks

- | | Answers |
|--|--|
| 1. Liquids and gases together are called as _____ | Fluids |
| 2. Force is a _____ quantity | Vector |
| 3. _____ decides whether an object will sink or float | Upward force |
| 4. The S.I unit of viscous force is _____ | Kgm ⁻¹ s ⁻¹ (or) Nsm ⁻² |
| 5. _____ causes wear and tear of the surfaces in contact | Friction |

III. State true or false. If false give the correct statement

1. Frictional force acts always **along** direction of the moving body
Ans : False - Opposite
2. Friction is called as necessary evil
Ans : True
3. Force is an action of push or pull
Ans : True
4. Atmospheric pressure **increases** with the altitude from the surface of the earth
Ans : False - decreases
5. A knot in a thread is an example of **kinetic** friction
Ans : False - static

IV. Match the following

	I		II		Answers
1	Force	a	Nm ⁻²	c	Kg ms ⁻²
2	Pressure	b	1.01 x 10 ⁵ Nm ⁻²	a	Nm ⁻²
3	Surface tension	c	Kg ms ⁻²	d	Nm ⁻¹
4	Viscous force	d	Nm ⁻¹	e	Kg m ⁻¹ s ⁻¹
5	1 atm	e	Kg m ⁻¹ s ⁻¹	b	1.01 x 10 ⁵ Nm ⁻²

V. Analogy

- Road roller : **Greater area of contact**
Cycle tyre : _____ **Ans : less area of contact**
- Treaded tyres : **Increase friction**
_____ : Decrease friction **Ans : Ball bearings**

VI. Assertion and Reasoning

- If both assertion and reason are true and the reason is the correct explanation of the assertion.
 - If both assertion and reason are true but reason is not the correct explanation of the assertion.
 - If the assertion is true but the reason is false.
 - If the assertion is false, but the reason is true.
- Assertion (A)** : Pressure is a vector quantity
Reason (R) : Pressure = $\frac{\text{Force}}{\text{Area}}$ Here force is a vector quantity
Ans : d) If the assertion is false, but the reason is true
 - Assertion (A)** : Foot ball shoes are having soles with many projections
Reason (R) : Provides stronger grip with the ground
Ans : a) If both assertion and reason are true and the reason is the correct explanation of the assertion.

VII. Give very short answer

- Why sumo and kabbadi players rub their hand with mud?**
To get a better grip.
- Which scientist name is named after the unit of pressure as pascal?**
Blaise pascal.
- Name some things which exert larger pressure on a smaller area?**
Axe, nail, knife, injection needle, bullet.
- Why more number of wheels are provided for a heavy goods - carrier?**
 - Decreases the pressure.
 - Increase the area of contact.
- What makes the peel of banana to slide over the path?**
Lack of friction between the feet and the banana peels.

VIII. Give short answers

- What is called static pressure of the liquid?**
 - Liquids do not have definite shape.
 - The force acting on unit area of the surface, on which the liquid is placed.
- Why do deep sea divers wear special suits while diving?**
 - Liquid pressure increases with depth.
 - Pressure is high at the bottom of the sea.

So the deep sea divers wear special suits to protect themselves from high pressure, otherwise it crush their bodies.

3. **Why a camel can easily walk on sand?**
- Camel have large padded feet, which increase the area of contact with the sandy ground.
 - This reduces the pressure and walk easily on sand.

4. **What is known as atmospheric pressure?**
The amount of force or weight of the atmospheric air that acts downward on unit surface area of the surface of the earth.

5. **What changes happen while applying a force?**
Force is that which changes or tends to change :
- (i) the state of rest
 - (ii) the state of uniform motion of a body.
 - (iii) the direction of a moving body.
 - (iv) the shape of a body.

IX. Answer in detail

1. **Describe an experiment to show that the effect of a force depends on the magnitude of force and area.**

Experiment :

- Fix sharp pins on a wooden board in rows and columns.
- A Big blown up balloon is placed gently over the pins.
- Place a small book on the top of the balloon.

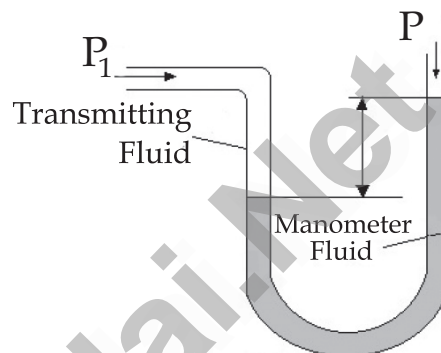
Inference :

The balloon will not burst.

Reason :

- A single pin produces a large pressure over a small area.
- Large number of pins exerts a very little pressure.
- The applied force gets distributed over a larger surface of the body.
So, the balloon will not burst.

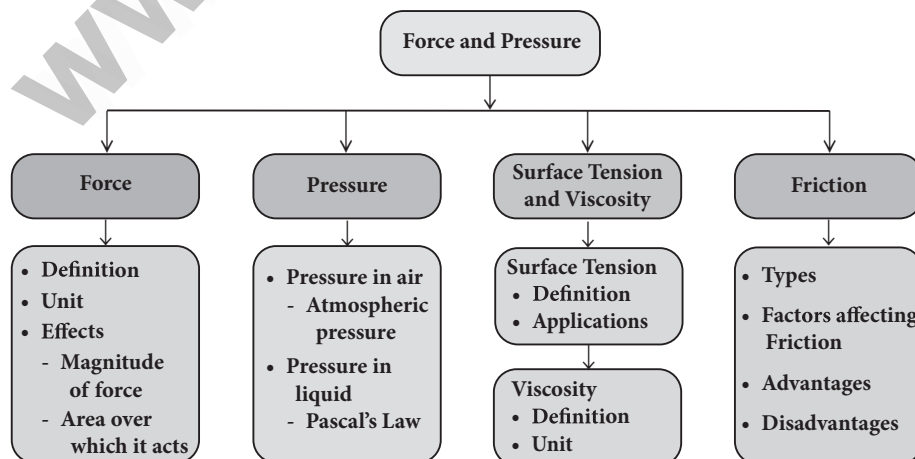
2. **Explain Manometer with the diagram.**



U-tube Manometer

- It consists of U - shaped glass tube which contains mercury.
- The level of mercury is initially at the same level.
- The gas present in the manometer event pressure.
- The mercury level moves down in one limb and rises in other limb.
- The mercury level moves down in one limb and rises in other limb.
- The difference in the liquid pressure is measured.

MIND MAP





Light

PART I - TEXTBOOK EXERCISES

I. Choose the best answer

- Which of the following has curved reflecting surface?
 - Plane mirrors
 - spherical mirrors
 - simple mirrors
 - None of the above

Ans : b) spherical mirrors
- The spherical mirror with a reflecting surface curved inward is called
 - convex mirror
 - concave mirror
 - curved mirror
 - None of the above

Ans : b) concave mirror
- The spherical mirror used as a rear view mirror in the vehicle is
 - concave mirror
 - convex mirror
 - plane mirror
 - None of the above

Ans : b) convex mirror
- The imaginary line passing through the centre of curvature and pole of a spherical mirror is called
 - centre of curvature
 - pole
 - principal axis
 - radius curvature

Ans : c) principal axis
- The distance from the pole to the focus is called
 - pole length
 - focal length
 - principal axis
 - None of the above

Ans : b) focal length
- If the image and object distance is same, then the object is placed at
 - infinity
 - at F
 - between f and p
 - at C

Ans : d) at C
- If the focal length of a spherical mirror is 10cm, what is the value of its radius of curvature?
 - 10 cm
 - 5 cm
 - 20 cm
 - 15 cm

$f = 10\text{cm}$
 $R = 2f = 2 \times 10 = 20\text{cm}$ Ans : c) 20 cm

II. Fill in the blanks

Answers

- | | |
|---|---------------------------|
| 1. The spherical mirror used in a beauty parlour as make - up mirror is ____ | Concave mirror |
| 2. Geometric centre of the spherical mirror is _____ | Pole |
| 3. Nature of the images formed by a convex mirror is _____ | smaller Virtual and erect |
| 4. The mirror used by the ophthalmologist to examine the eye is _____. | Concave mirror |
| 5. If the angle of incidence is 45° , then the angle of reflection is ____ | 45° |
| 6. If an object is placed between two mirrors which are parallel to each other, the number of images formed is _____. | infinite |

III. Match the following

I		II		Answer	
1	Convex mirror	a	Radio telescopes	b	Rear - view mirror
2	Parabolic mirror	b	Rear - view mirror	a	Radio telescopes
3	Snell's law	c	Kaleidoscope	d	$\sin i/\sin r = \mu$
4	Dispersion of light	d	$\sin i/\sin r = \mu$	e	Rainbow
5	Refractive index	e	Rainbow	c	$c/v = \mu$ (Kaleidoscope Wrong)

IV. Answer briefly

- Define focal length.**
The distance between the pole and the principal focus is called focal length (f) of a spherical mirror
Focal length (f) = $\frac{\text{Radius of curvature}}{2}$
- Give any two applications of a concave and convex mirror.**
Applications of a concave mirror :
 - Used in torches, search lights and head lights in the vehicle.
 - Used in reflecting telescopes.**Convex mirror :**
 - Used in vehicles as rear view mirrors
 - Used on roads where there are sharp curves and turns.
- State the laws of reflection.**
 - The incident ray, the reflected ray and the normal at the point of incidence, all lie in the same plane.
 - The angle of incidence and the angle of reflection are always equal
- Define the refractive index of a medium.**
The ratio of the speed of light in the air to the speed of light in that particular medium. It is also known as the absolute refractive index.
$$\mu = \frac{\text{Speed of light in air (c)}}{\text{Speed of light in the medium (v)}}$$
- State Snell's law of refraction.**
 - The incident ray, the refracted ray and the normal at the point of intersection, all lie in the same plane.
 - The ratio of the sine of the angle of incidence (i) to the sine of the angle of refraction (r) is equal to the refractive index of the medium, which is a constant .
$$\frac{\sin i}{\sin r} = \mu$$

V. Answer in detail

- Explain the images formed by a concave mirror.**
Images formed by a concave mirror.

Position of the object	Position of the image	Image size	Nature of the image
At infinity	At F	Highly diminished	Real and inverted
Beyond C	Between C and F	Diminished	Real and inverted
At C	At C	Same size as the object	Real and inverted

Between C and F	Beyond C	magnified	Real and inverted
At F	At infinity	Highly magnified	Real and inverted
Between F and P	Behind the mirror	Magnified	Virtual and inverted

2. What is reflection? Write a short note on regular and irregular reflection?

Reflection :

The bouncing back of a light ray as they fall on the smooth, shiny and polished surface is called reflection.

Regular Reflection :

- When a beam of light falls on a smooth surface, it gets reflected.
- After reflection, the reflected rays will be parallel to each other.
- The angle of incidence and the angle of reflection of each ray will be equal.
- A clear image is formed.
- It is called 'regular reflection' or 'specular reflection'.
- Ex. Reflection of light by a plane mirror and from the surface of still water.

Irregular Reflection :

- When a beam of light falls on rough or irregular surface, it is inclined at different angles.
- After reflection, the reflected rays will be at different angles.
- The angle of incidence and the angle of reflection of each ray will not be equal.
- A clear image is not formed.
- It is called as irregular reflection or diffused reflection.
- Ex : Reflection of light from a wall.

3. Explain the working of a periscope.

Principle :

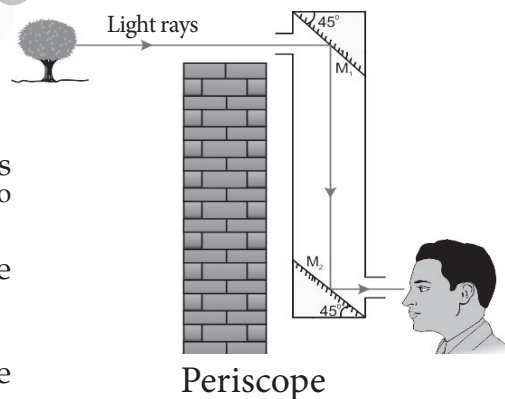
Law of reflection of light.

Construction :

It consists of a long outer case and inside this case mirrors or prisms are kept at each end, inclined at an angle of 45°

Working :

- Light coming from the distant body falls on the mirrors at the top end.
- It gets reflected vertically downward.
- It is again reflected by the second mirror kept at the bottom.
- It travel horizontally and reach the eye of the observer.
- For obtaining high resolution, instead of mirrors, optic fibre is used.
- Depending upon the usage of periscope, the distance between two mirrors can be varied.



4. What is dispersion? Explain in detail.

- Splitting of white light into its seven constituent colours on passing through a transparent medium.
- White light consists of seven colours.
- White light have different wavelength.
- They travel at different speeds in a medium.
- Refraction of a light ray in a medium depends on its speed.
- The seven colours are namely violet, Indigo, Blue, Green, yellow, Orange and Red.
- Refraction of a light ray is inversely proportional to its wavelength.
- Rainbow is an example of dispersion.
- After a rainfall, large number of droplets still remain in the air.
- When white light passes through them, it splits into seven colours.

VI. Numerical Problem

1. The radius of curvature of a spherical mirror is 25cm. Find its focal length.

Solution :

$$\begin{aligned} (R) &= 25\text{cm} \\ (F) &= \frac{R}{2} \\ &= \frac{25}{2} \\ &= 12.5 \text{ cm} \end{aligned}$$

2. If two plane mirrors are inclined to each other at an angle of 45° , find the number of images formed.

Solution :

$$\begin{aligned} \text{Angle of inclination } (\theta) &= 45^\circ \\ \text{Number of images formed} &= \frac{360^\circ}{\theta} - 1 \\ &= \frac{360^\circ}{45^\circ} - 1 \\ &= 8 - 1 \\ &= 7 \text{ images} \end{aligned}$$

3. Speed of light in air is $3 \times 10^8 \text{ ms}^{-1}$ and the refractive index of a medium is 1.5. Find the speed of light in the medium.

Solution :

$$\text{Speed of light in air } (C) = 3 \times 10^8 \text{ ms}^{-1}$$

$$\text{Refractive index } (\mu) = 1.5$$

$$\text{Refractive index } (\mu) = \frac{\text{Speed of light in air } (c)}{\text{Speed of light in the medium } (v)}$$

$$\therefore \text{Speed of light in the medium } (v) = \frac{\text{Speed of light in air } (c)}{\text{Refractive index } (\mu)}$$

$$\begin{aligned} v &= \frac{3 \times 10^8}{1.5} \\ v &= 2 \times 10^8 \text{ ms}^{-1} \end{aligned}$$

$$\therefore \text{Speed of light in the medium } V = 2 \times 10^8 \text{ ms}^{-1}$$

PART II - ADDITIONAL QUESTIONS

I. Choose the best answer

1. form the perfect image of an object

- a) Spherical mirrors b) Parabolic mirrors
c) Plane mirrors d) Cylindrical mirrors

Ans : c) Plane mirrors

2. Mirrors which magnify the object placed close to them.

- a) Convex mirror b) Concave mirror
c) Plane mirror d) ellipsoid mirror

Ans : b) Concave mirror

1. **Assertion (A)** : The pencil appears, to be bent when we see it through the glass of water.
Reason (R) : Light ray travels from a denser medium to a rarer medium, it is deviated from its straight line path.

Ans : a) If both assertion and reason are true and reason is the correct explanation of the assertion.

2. **Assertion (A)** : The formation of rainbow is an example of dispersion.
Reason (R) : Rainbow can be seen on the right side of the sun.

Ans : c) Assertion is true but the reason is false.

VI. Short answers

1. **What are curved mirrors?**
 Spherical mirrors, cylindrical mirrors, parabolic mirrors and ellipsoid mirrors.
2. **Give some uses of parabolic mirrors.**
 Parabolic mirrors are used
- to collect or project energy such as light, heat, sound and radio waves.
 - in reflecting telescopes, radio telescopes and parabolic microphones.
 - in solar cookers and solar water heaters.
3. **What are the types of images formed by spherical mirrors?**
- Two types of images are formed by spherical mirrors. They are (i) Real image (ii) Virtual image
 - Real image can be formed on a screen Virtual images cannot be formed on a screen.
4. **Name the rays which involved in reflection of light.**
 (i) Incident ray (ii) Reflected ray
5. **Why silver metal is used to make mirror?**
- Silver metal is the best reflector of light.
 - A thin layer of silver is deposited on the side of materials like plane glass sheet to make mirrors.
6. **Where the multiple reflection takes place.**
 The multiple reflections take place in show rooms and saloons.

VII. Answer in detail

1. **What are the applications of concave mirrors?**
- Used in make up or shaving to provide a magnified image.
 - Used in torches, search lights and headlights, as they direct light to a long distance.
 - Used in solar cookers to collect the light from a larger area and focus it into a small spot.
 - Used as head mirrors by doctors to examine the eye, ear and throat.
 - Used in reflecting telescopes.
2. **What are the uses of convex mirrors?**
- Provide a wider field of view as they are curved outwards.
 - Used in vehicles as rear view mirrors.
 - Used in hallways of various buildings like hospital, hotels, schools and stores.
 - Mounted on a wall or ceiling where there are sharp turns.
 - Used on roads where there are sharp curves and turns.

3. Write a note on refraction in medium and list out the refractive index of some substances.

Refraction in medium :

- Refraction of light depends on the speed of light in the medium.
- When the speed of light is more, bending is less
- When the speed of light is less, bending is more

Refractive index of some substance :

Substances	Refractive index
Air	1.0
Water	1.33
Ether	1.36
Kerosene	1.41
Ordinary glass	1.5
Quartz	1.56
Diamond	2.41

MIND MAP

