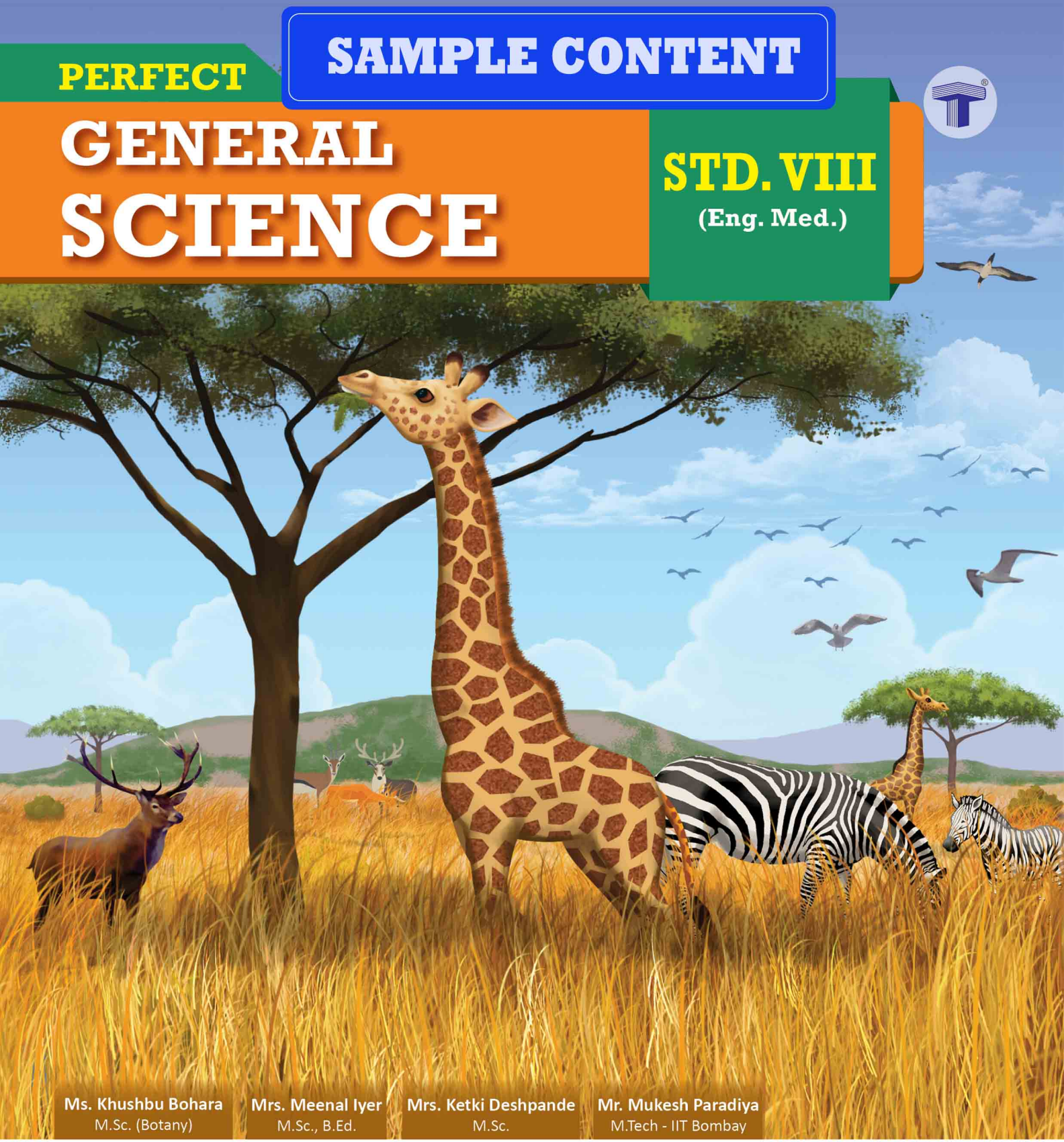
PERFECT

SAMPLE CONTENT

GENERAL SCIENCE

STD. VIII

(Eng. Med.)



Ms. Khushbu Bohara
M.Sc. (Botany)

Mrs. Meenal Iyer
M.Sc., B.Ed.

Mrs. Ketki Deshpande
M.Sc.

Mr. Mukesh Paradiya
M.Tech - IIT Bombay

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PERFECT

General Science

STD. VIII (English Medium)

Salient Features

- Helps to Build Powerful Concepts
- Concise Theory in the form of charts, tables and illustration to revise important concepts in the chapters
- Complete coverage of Textual Exercise, Textual activities, projects and Textual sections such as '*Use your brain power'*, '*can you tell* ?', '*Let's try*' etc
- Variety of additional Questions for thorough practice
- Activity Based Question to widen the knowledge spectrum
- Glossary for meaning of difficult terms
- Important inclusions: *Reading between the lines, Gyan Guru (GG), Caution*
- QR Code to access the Solutions of Numerical Exercise

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PREFACE

PERFECT General Science: Std. VIII has been prepared as per the new 'Continuous Comprehensive Evaluation' (CCE) pattern which is more child-centric. Aligning with the objectives of CCE pattern, we have designed the book to emphasize active-learning and to make the process of learning enjoyable and interesting.

Every chapter in the book begins with a **'Synopsis'** which presents brisk overview of the chapter in the form of a memory map and key pointers. **'Important formulae'** and **'Values to remember'** from the chapter are put together after synopsis wherever applicable. It is followed by '**Summative Assessment'** which is segregated into four sections, viz., **'Textbook Exercise**', **'Intext Questions', 'Let's Practise!'** and **'Oral Test'**. For the chapters having numericals in them, an exclusive **'Numerical Section'** is added after '*Intext Questions'*.
Section *'Textbook Exercise'* covers all the questions given in textbook at the end of the chapter serially. '*Intext Questions*' provide answers to all the textual sections such as *'Can you tell?'*, *'Use your brain power!'*, *'Try this'*, etc. covered in a chapter. *'Let's Practise!*' contains additional questions of diverse types to pave the way for a robust concept building. 'Numerical Section' encompasses solved examples given in textbook as well as additional problems with precise solutions. It also contains '**Illustrative Example'**, a unique feature specially created and embedded in 'Numerical Section'. '**Oral Test'** includes short orally answerable questions.
The chapter ends with '**Formative Assessment'** specially catering to Textual activities, projects as well as supplementary activity based questions that explain certain concepts to students through the medium of an activity and fun. Attractive pictorial illustrations are included throughout the chapter to facilitate understanding of concepts.
Glossary is added at the end of the book.
The features; **Gyan Guru (GG)**, **Reading between the lines** and **Caution** of the book upgrade this book as an ideal knowledge hub for students.

With absolute trust in our work, we hope that our book acts as a single point of reference for students to provide the much needed answers for their textual questions as well as build up their knowledge quotient in the process.

- Publisher
  Edition: Fourth

The journey to create a complete book is strewn with triumphs, failures and near misses. If you think we've nearly missed something or want to applaud us for our triumphs, we'd love to hear from you.

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KEY FEATURES

Reading between the lines provides elaboration of concept which is essential for complete understanding of the concept. *This feature helps students to understand the underlying concept behind an answer.*

GG - Gyan Guru pops up throughout the book and draws a student's attention to important bits of knowledge. When a concept is accompanied by a relatable example, it helps students understand the concept clearly. *This is our initiative that helps to link learning to the life.*

Illustrative examples involve step-wise detailed guidelines to solve a problem.
This is our attempt to helps students develop an insight towards cracking the problem.

Numerical Section includes numericals segregated according to different types.
This prepares students with the numeric aspect of the subject and promote problem solving abilities in students.

Numerical Exercise includes additional problems related to the chapter. *This provides additional practice to students to gauge their numeric preparation.*

QR code provides access to Solutions to Numerical Exercise. *This enables students gauge their proficiency with numericals.*

Caution helps students to be watchful against commonly made mistakes.*This feature makes student a vigilant learner.*

Marking scheme involves allotment of marks to a question wherever possible in accordance with the new marking scheme.
This helps students understand, how a particular question is answered in exams with respect to the marks allotted to the question.

Oral Test includes short orally answerable questions.
This stimulates the students to think and arrive at an answer based on their understanding of the concepts covered in the chapter in a quick pace manner.

Open Ended Questions indicates students get the freedom to answer the question (with the help of their observation) on their own.*These questions are specially included since they aid to build the students observation skill and reasoning ability.*

Glossary contains the meanings of the challenging terms from the book. *This feature eases difficulty in compression of complicated words.*

CONTENTS

Note: i. Textual exercise questions are represented by * mark.

ii. Textual solved examples are represented by + mark.

iii. ^{G}symbol after a word in the chapter indicates that the meaning of the word is provided in the glossary section.

3 Force and Pressure

Synopsis

Force
- SI unit – N (newton); CGS unit – dyne

Non contact force
- Acts without direct contact of objects

Contact force
- Acts through direct contact of the objects

Balanced force
- Causes no change of state of rest or motion

Unbalanced force
- Causes change of speed or direction of motion or both

Newton's first law of motion – Inertia
- **Inertia of rest:** The object at rest cannot change its state of rest.
- **Inertia of motion:** The object in motion cannot change its state of motion.
- **Directional inertia:** The object moving in a certain direction cannot change its direction of motion.

Pressure
- Force acting perpendicular on the unit surface area of object.
- Pressure (P) = $\frac{\text{Force}}{\text{Area}}$
- S.I. unit: N/m^2 or Pascal (Pa); CGS unit: $dyne/cm^2$

Exerted by

Solids
- Varies inversely with surface area of contact

Liquids
- For point inside the liquid it changes with,
  i. Depth
  ii. Density of liquid

Gases
- Collisions of gas molecules with walls of container exert pressure

Atmospheric pressure
- 101×10^3 Pa at sea level
- Decreases with altitude

Buoyant force (B)
The upward force exerted by fluids

Depends on
- Volume of the object
- Density of the liquid

For B < W, (W = weight of the body), body sinks

For B = W, body floats inside the liquid

For B > W, body floats on surface

Archimedes' principle
- When an object is partially or fully immersed in a fluid, a force of buoyancy acts on it in upward direction
- Weight of fluid equal to weight of the object is displaced
- Used in construction of ships and submarines

Density
- Density = $\frac{\text{Mass}}{\text{Volume}}$
- S.I. unit: kg/m^3

Relative density / Specific gravity
- Relative density = $\frac{\text{Density of substance}}{\text{Density of water}}$

Important Formulae

1. Pressure = $\frac{\text{Force or weight}}{\text{Area on which force is applied}}$
2. Density = $\frac{\text{Mass}}{\text{Volume}}$
3. $\frac{\text{Relative density}}{\text{(Specific gravity)}} = \frac{\text{Density of substance}}{\text{Density of water}}$

- **Values to Remember**

1. Density of water = 10^3 kg/m^3 = 1 g/cc

Summative Assessment

Textbook Exercise

Write proper word in the blank space.

*1. The SI unit of force is _____.
(dyne, newton, joule)

*2. The air pressure on our body is equal to _____ pressure.
(atmospheric, sea bottom, space)

*3. For a given object, the buoyant force in liquids of different _____ is _____
(the same, density, different, area)

*4. The SI unit of pressure is _____
(N/m^3, N/m^2, kg/m^2, Pa/m^2)

Ans:

1. newton
2. atmospheric
3. density, different
4. N/m^2

*Make a match

	A group		B group
i.	Fluid	a.	Higher pressure
ii.	Blunt knife	b.	Atmospheric pressure
iii.	Sharp needle	c.	Specific gravity
iv.	Relative density	d.	Lower pressure
v.	hecto-pascal	e.	Same pressure in all directions

Ans: (i – e), (ii – d), (iii – a), (iv – c), (v – b)

Answer the following questions in brief

***1. A plastic cube is released in water will it sink or come to the surface of water?**
[1 Mark]

Ans: A plastic cube released in water will come to the surface of water.

Reading between the lines

Density of plastic is less than that of water. Hence, the buoyant force exerted by water on the plastic cube will be more than the weight of the plastic cube. Hence, the plastic cube will come to the surface.

***2. Why do the load carrying heavy vehicles have large number of wheels?** *[HOTS]* **[2 Marks]**

Ans:

i. Pressure exerted by a force depends on the area on which it acts.

ii. When number of wheels are more, the pressure gets equally distributed among the wheels and amount of pressure on a single wheel is reduced. This prevents the bursting of tyres due to large pressure.

Hence, the load carrying heavy vehicles have large number of wheels.

***3. How much pressure do we carry on our heads? Why don't we feel it? [2 Marks]**

Ans:

i. The atmospheric pressure of 101 × 10^3 Pa is exerted on our body at sea level.

ii. The cavities in our body are filled with air while, veins and arteries are filled with blood.

iii. The pressure of the blood and the other fluids present in our body balances this atmospheric pressure. Hence, we do not feel it.

Why does it happen?

***1. A ship dips to a larger depth in fresh water as compared to marine water. [2 Marks]**

Ans:

i. The buoyant force on a body immersed in a liquid is directly proportional to the density of the liquid in which it is immersed.

ii. The density of fresh water is less than that of marine water. Thus, the buoyant force exerted by fresh water is smaller than the buoyant force exerted by marine water.

Hence, a ship dips to a larger depth in fresh water as compared to marine water.

***2. Fruits can easily be cut with a sharp knife.** **[2 Marks]**

Ans:

i. Pressure exerted by a force is inversely proportional to the area on which it acts.

ii. The area of the edge of a sharp knife is small.

iii. As a result, small force on the knife produces large pressure at the point of contact.

iv. If the knife is blunt, the surface area in contact is large. In this case, more force is required to produce the same pressure.

Hence, it is easy to cut vegetables, fruits with a sharp knife.

***3. The wall of a dam is broad at its base.** **[2 Marks]**

Ans:

i. Pressure increases as the depth of the liquid increases. Therefore, pressure is greatest at the base of the dam.

ii. To withstand the pressure, the thickness of wall is increased and base is made broad. As a result, area of contact increases and pressure exerted by the water on walls of the dam is minimised.

Hence, the wall of a dam is broad at its base.

***4. If a stationary bus suddenly speeds up passengers are thrown in the backward direction.** **[2 Marks]**

Ans:

i. When the bus is at rest, the passengers inside the bus are also at rest.

ii. As the bus is put in motion, the portion of the passenger's body which is in contact with the bus acquires velocity, but the upper part of the body tries to remain at rest.

iii. As a result, passengers experience inertia of rest, and get a backward jerk, when the bus suddenly speeds up.

Complete the following tables

***1.**

No.	Mass (kg)	Volume (m^3)	Density (kg/m^3)
i.	350	175	_____
ii.	_____	190	4

Ans:

No.	Mass (kg)	Volume (m^3)	Density (kg/m^3)
i.	350	175	**2**
ii.	**760**	190	4

Solution: Density (d) = $\frac{\text{Mass(M)}}{\text{Volume(V)}}$

i. $d = \frac{350}{175} = \mathbf{2\ kg/m^3}$

ii. From formula, $M = d \times V = 4 \times 190 = \mathbf{760\ kg}$

***2.**

No.	Density of metal (kg/m^3)	Density of water (kg/m^3)	Relative Density
i.	_____	10^3	5
ii.	8.5×10^3	10^3	_____

Ans:

No.	Density of metal (kg/m^3)	Density of water (kg/m^3)	Relative Density
i.	$\mathbf{5 \times 10^3\ kg/m^3}$	10^3	5
ii.	8.5×10^3	10^3	**8.5**

Solution: Relative density = $\frac{\text{Density of metal}}{\text{Density of water}}$

i. From formula,

$$\text{Density of metal} = \text{Relative density of metal} \times \text{Density of water}$$

$$= 5 \times 10^3 = \mathbf{5 \times 10^3\ kg/m^3}$$

ii. Relative density = $\frac{8.5 \times 10^3}{10^3} = \mathbf{8.5}$

***3.**

No.	Weight (N)	Area (m^2)	Pressure (Nm^{-2})
i.	_____	0.04	20000
ii.	1500	500	_____

Ans:

No.	Weight (N)	Area (m^2)	Pressure (Nm^{-2})
i.	**800**	0.04	20000
ii.	1500	500	**3**

Solution: Pressure (P) = $\frac{\text{Weight (W)}}{\text{Area (A)}}$

i. From formula, $W = P \times A = 20000 \times 0.04$

$= \mathbf{800\ N}$

ii. $P = \frac{1500}{500} = \mathbf{3\ Nm^{-2}}$

Solve the following problems

***1. The density of a metal is 10.8×10^3 kg/m^3. Find the relative density of the metal. (Take: Density of water = 10^3 kg/m^3)** **[2 Marks]**

Solution:

Given: Density of metal = 10.8×10^3 kg/m^3, Density of water = 10^3 kg/m^3

To find: Relative density of the metal

Formula: Relative density = $\frac{\text{Density of metal}}{\text{Density of water}}$

Calculation: From formula,

Relative density = $\frac{10.8 \times 10^3}{10^3}$ = **10.8**

Ans: The relative density of the metal is **10.8.**

CAUTION

Relative density is a unitless quantity.

***2. Volume of an object is 20 cm^3 and the mass is 50 g. Density of water is 1 gcm^{-3}. Will the object float on water or sink in water?** **[2 Marks]**

Solution:

Volume of an object (V) = 20 cm^3

Mass of an object (M) = 50 g

Density of water = 1 g cm^{-3}

Now,

Density of an object = $\frac{\text{mass of an object}}{\text{Volume of an object}}$

$\therefore$ Density of an object = $\frac{50}{20}$ = 2.5 g/cm^3

Density of an object is greater than density of water i.e., 2.5 gcm^{-3} > 1 g cm^{-3}

Object will **sink** in water.

***3. The volume of a plastic covered sealed box is 350 cm^3 and the box has a mass 500 g. Will the box float on water or sink in water? What will be the mass of water displaced by the box?** **[3 Marks]**

Solution:

Volume of a plastic covered sealed box (V) = 350 cm^3

Mass of a box (M) = 500 g

Now,

Density of box = $\frac{\text{mass of a box}}{\text{volume of a box}} = \frac{500}{350}$

= 1.43 g/cm^3

As density of box is greater than density of water (= 1 g/cm^3), **box will sink in water.**

According to Archimedes' principle, when box is dipped in water, water of volume equal to the volume of the box i.e., 350 cm^3 will be displaced.

We know, Density = $\frac{\text{Mass}}{\text{Volume}}$

$\therefore$ Mass of water displaced = Density × volume of water displaced = 1× 350 = 350 g

$\therefore$ The mass of water displaced by the box is **350 g.**

Intext Questions

1. In the figure shown, a car moves in forward direction when a man applies force from behind. A reluctant dog is being pulled by his master and a boy playing football is kicking the ball away. What do you observe from these? *(Textbook page no. 14)*

Ans:

i. When a man applies a force on a car from behind, the force applied by man is a contact force which results into displacement of the car in the forward direction.

ii. When master pulls his reluctant dog, then force is applied by contact between the hands of master and the leash of the dog.

iii. When a boy kicks the ball, there is contact between the feet and the ball, which results into forward motion of the ball.

2. When big grain storage container is required to slide on the ground, it becomes easier if two persons push it rather than one person. When the force is applied by both in the same direction, the movement is easy. You may have experienced this. What do we understand from this example? *(Textbook page no. 15)*

Ans:

i. From the above example we understand that, if several forces are applied on an object in the same direction, a force equal to their addition acts on that object.

ii. We also understand that a force is expressed in both magnitude as well as direction. Hence, force is a vector quantity.

3. Are force and pressure related to each other? *(Textbook page no. 16)*

Ans: Yes, force and pressure are related to each other by the formula,

$$\text{Pressure} = \frac{\text{Force}}{\text{Area on which force is applied}}$$

i.e. as force acting on given area increases pressure also increases.

4. How is pressure created in a closed container? *(Textbook page no. 18)*

Ans: Molecules of the gas present in a closed container are always in state of random motion. These molecules collide with the walls of the container and the pressure is created.

5. An iron nail sinks in water, but why does the massive steel ship float on it? *(Textbook page no. 19)*

Ans:

i. The density of an iron nail is more than that of the water it is dipped in. Thus, the buoyant force acting on the nail is small. However, the weight of the iron nail is greater than the buoyant force. Thus, iron nail sink in water.

ii. The design of a steel ship is such that the effective density of the ship as a whole is less than that of water. Thus, the buoyant force acting on the ship is greater than the weight of the steel ship. This makes the steel ship to float on water.

6. It becomes easier to swim in sea water than in fresh water. Lemon sinks in a glass filled with water but it floats when we stir in two spoons of salt in the water. What is understood from these examples? *(Textbook page no. 19)*

Ans:

i. The density of sea water is more than the density of fresh water due to salts dissolved in sea. This increases the buoyant force acting on the person swimming in the sea water and makes it easier for the person to swim.

ii. In case of lemon, the salty water exerts larger buoyant force and at some point it exceeds the gravitational force which causes the lemon to float.

iii. Hence, from these examples we understand that the buoyant force depends on the density of the liquid.

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The Dead Sea's unusually high salt concentration means that you can easily float in the Dead Sea due to natural buoyancy.

Can you recall? *(Textbook page no. 14)*

1. What is a force?

Ans: The push or pull of an object is called force. It can change the shape and state of rest or of uniform motion of a body.

Use your brain power!

1. Make a list of some examples in which contact and non contact forces are applied. Write the types of force. *(Textbook page no. 15) (Open Ended Question)*

Ans: Examples of contact forces:

	Example	Type of force
i.	Walking on road	Frictional force, muscular force
ii.	Lifting dumbbells	Muscular force
iii.	Pulling a trolley	Frictional force, muscular force

Examples of non-contact forces:

	Example	Type of force
i.	Attraction of two magnets	Magnetic force
ii.	Fruits falling on the ground from trees	Gravitational force
iii.	Standing hair while wearing woollen clothes during winter	Electrostatic force

[Note:** Students are expected to give some more examples of contact and non contact forces based on their personal experiences.**]

2. You have learnt about static electricity in the previous standard. Electrostatic force is a non contact force. To verify this, which experiment will you perform? *(Textbook page no. 15) (Open Ended Question)*

Ans: To verify the electrostatic force as a non contact force, following experiment can be performed:

i. When a comb is rubbed against hair and brought near small pieces of paper kept on a table, they get attracted to the comb.

ii. This is because, the comb has an electrostatic charge and there is an induced opposite charge on the pieces of paper which causes the pieces to stick to the comb.

iii. In this experiment comb and the paper pieces are not in contact with each other. Hence, it verifies that electrostatic force is non contact force.

[Note:** Students are expected to make note of some more experiments on their own.**]

3. It is easy to cut vegetables, fruits with a sharp knife. A blunt knife does not work here. Why does this happen?

(Textbook page no. 17)

Ans: *Refer Q. 2 (Textbook exercise: Why does it happen?)*

4. You must have seen a vegetable vendor carrying a basket on her head. She keeps a twisted piece of cloth on the head, below the basket. How does it help?

[HOTS] (Textbook page no. 17)

Ans:

i. When a vegetable vendor keeps the twisted piece of cloth, the area of contact between the head and the basket is increased.

ii. This reduces the pressure due to the weight of the vegetable basket and makes it easier to bear the load of the basket.

5. We cannot stand at one place for a long time. How can we sleep on a place for 8 and odd hours? *(Textbook page no. 17)*

Ans:

i. The pressure due to the weight of our body increases when we stand on our feet due to decrease in surface area.

ii. When we lie horizontally, the surface area in contact with the ground is more. So, the pressure due to the weight of our body is reduced making it easier to bear the weight.

Hence, we cannot stand at one place for a long time but we can sleep on a place for 8 and odd hours.

6. For skiing on ice, why are long flat ski used? *(Textbook page no. 17)*

Ans:

i. When the bottom surface of ski is made long and flat, the surface area in contact with the ice is increased. So, the pressure exerted on the ice due to weight of the person is reduced.

ii. Due to this the feet or ski do not easily penetrate into the ice and it becomes easy to ski.

7. At the sea level the atmospheric pressure 101×10^3 Pa is acting on a table top of size 1 m^2. Under such a heavy pressure, why doesn't the table top crumble[G] down?

(Textbook page no. 19)

Ans:

i. When atmosphere exerts pressure on a table top, it applies equal pressure from all directions.

ii. Due to this, all the forces acting on the table balance each other and the table doesn't crumble down.

8. While pulling a bucket from a well, the bucket full of water immersed fully in water appears to weigh less than when it has been pulled out of water. Why?

(Textbook page no. 19)

Ans:

i. A bucket immersed fully in a well experiences the buoyant force exerted by water. This buoyant force reduces the weight of the bucket effectively.

ii. When the bucket is pulled up outside the water, the buoyant force exerted by water vanishes.

iii. The forces acting on the bucket are the gravitational force acting in downward direction and buoyant force exerted by air. However, air being less dense than water, the buoyant force exerted by air is negligible.

Hence, the bucket full of water appears lighter under water than when pulled out of water.

9. Explain the observations in the experiment explained in Try this (Textbook page no. 20) according to the Archimedes' principle.

(Textbook page no. 20)

Ans: From the experiment explained in Try this (Textbook page no. 20) it is observed that the length of the rubber band decreases as the stone is dipped in water due to an upward force (buoyant force) exerted by the water on the stone. According to Archimedes' principle, this force is equal to the weight of the water displaced by the stone.

Do you know? *(Textbook page no. 20)*

1. How is it decided that the object left in liquid will get sink in the liquid, will float on the surface, or will float inside the liquid? Which forces are unbalanced in the above cases?

Ans:

i. If the buoyant force is less than the weight of the object, the object sinks.

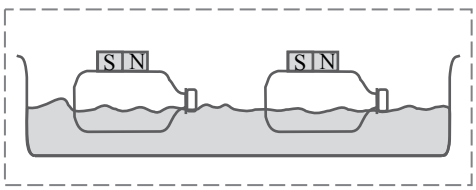
ii. If buoyant force exceeds the weight of the object, the object floats.

iii. If the buoyant force is equal to the weight of the object, the object floats inside the liquid.

iv. In the first two cases the weight of the object and buoyant force are unbalanced whereas, in third case both the forces are balanced.

Try this

1. Take two plastic bottles with rectangular shape. Close their openings by fitting the lids tightly. Keep two small bar magnets on them and fix them neatly using a sticking tape as shown in figure. Fill a big plastic tray with water and leave the two bottles floating with magnets at the top.
Take one bottle near the other. If the north pole of the magnet is near the south pole of the other magnet, the bottles will head towards each other, because unlike poles attract each other. Observe what will happen when the directions of the bottles are changed. *(Textbook page no. 15)*

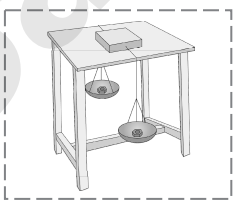


Ans:

i. It is observed that, when the direction of any one bottle is changed, same poles of both the magnets face each other and the bottles head away from each other towards the edge of the tray. This is because like poles repel each other.

ii. If the directions of both the bottles are changed simultaneously, there will not be any change in the previous condition.

2. Take a cardboard box, tie thick string to its two sides and keep it on a smooth table as shown in figure. Take the strings on both sides of the table. Tie weighing pans to the two ends. Keep equal masses in both the pans. The box does not move on the table. If more mass is kept in one of the pans than in the other, the box starts moving in the direction of that pan. *(Textbook page no. 15)*



(Students are expected to perform this activity on their own)

3.

i. Activity 1: Take a postcard and keep it on a glass. Keep a 5 Rupee coin on it. Now skilfully push the card. The coin straight away falls in the glass. Have you ever done this? *(Textbook page no. 16)*

(Students are expected to perform this activity on their own and answer the question based on their personal experience.)

ii. Activity 2: Hang a half a kg mass from a stand, with a string 1. Tie another string 2 to the mass and keep it hanging. Now pull the string 2 with a jerk. Now pull the string 2 slowly. The string 1 breaks and the mass falls down. *(Textbook page no. 16)*

(Students are expected to perform this activity on their own.)

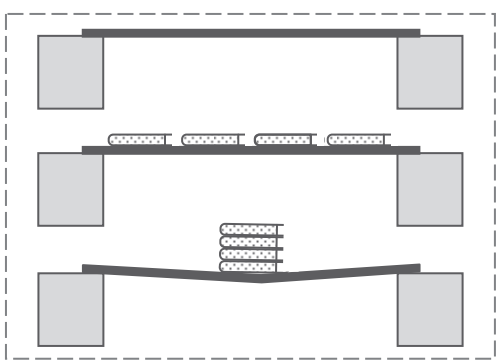
iii. Activity 3: Take some sharp pointed nails and push them into a wooden plank by hammering on their heads. Now take a nail and hold it with its head on the plank and hammer it down from the pointed end. When pressing the drawing pins into a drawing board, they get into the board easily. By applying a force using the thumb one can push the pins into the board. On the contrary, while pressing ordinary pins with a thumb, the thumb may get hurt. What does this simple experiment tell? *(Textbook page no. 16)*

Ans:

a. The nails or pins easily get penetrated into a wooden plank or drawing board due to their pointed ends. As the area of pointed end is small, application of even a small amount of force exerts large pressure on it and the end gets penetrated into the surface easily.

b. If we try to press ordinary pin with a thumb, due to its large surface area, the force needed to penetrate the pin into board is also large. Hence, the pin does not easily penetrate in the board and our thumb may get hurt in the process.

4. Do the activity as depicted in figure. What is seen? *(Textbook page no. 17)*



Ans:

i. The plank placed between two blocks is seen to be almost unaffected when four books are placed separately on it. However, the plank is seen bent in the middle when the books are piled up on it.

ii. This is because the pressure exerted by the books on the plank is maximum when the books are piled up over each other due to reduced area of contact between books and plank.

(Students are expected to perform the above activity on their own.)

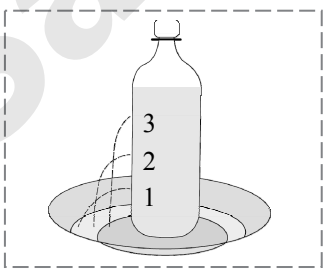
5.

i. Activity 1: Take a plastic bottle. Take a 10 cm long piece of a glass tube on which a rubber balloon can be fitted. Warm up one end of the glass tube and gently push in the bottle at about 5 cm from the bottom. To avoid water leakage, apply molten wax on the side of the glass tube. Now fill water slowly in the bottle and see how the balloon inflates[G]. What is observed?

(Textbook page no. 17)

Ans: From the above experiment it is observed that, apart from the bottom, water also applies pressure on the sides of the bottle

ii. Activity 2: Take a plastic bottle. Pierce it with a thick needle at the points 1, 2, 3 as shown in the figure. Fill water in the bottle upto full height. As shown in the figure, water jets will be seen emerging and projecting out. The water jet emerging from the hole at the top will fall closest to the bottle. The jet from the lowest hole falls farthest from the bottle. Also, jets coming out from the two holes at the same level fall at the same distance from the bottle. What is understood from this?*(Textbook page no. 18)*



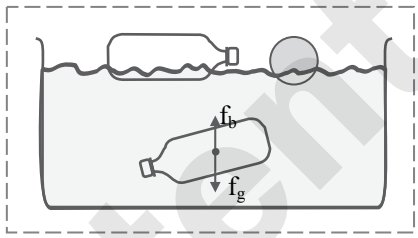
Ans:

i. From the above experiment we can conclude that the fluid pressure depends upon the depth of fluid from the surface.

ii. The fluid pressure remains same at a particular level and it increases as the depth of the fluid increases.

6. Take a plastic bottle and fix the lid tightly. Now place it in water and see. It will float on water. Try and push it into the water. Even when pushed, it continues to float. This experiment can also be done with a plastic hollow ball.

Now fill the bottle with water to the fullest capacity and close the lid, and release in water. The bottle will float inside the water. Why does this happen? *(Textbook page no. 19)*



Ans:

i. The density of the water is greater than that of an empty plastic bottle dipped in it. Thus, the buoyant force (f_b) acting on the empty bottle is large. Hence, the empty plastic bottle floats on water.

iii. However, when the plastic bottle is filled with water, the net weight (f_g) of the bottle exceeds the buoyant force and the bottle starts to sink. At a point, the force of gravity causing the bottle to sink is balanced by the buoyant force causing the bottle to float inside the water.

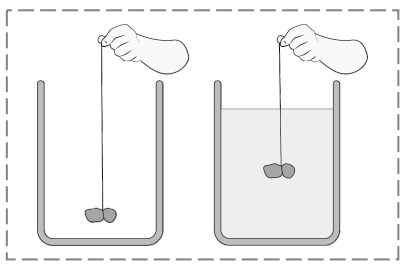
7. Take a piece of thin aluminium sheet and dip it in water in a bucket. What do you observe? Now shape the same piece of aluminium into a small boat and place it on the surface of water. It floats, isn't it? *(Textbook page no. 19)*

Ans:

i. When a piece of thin aluminium sheet is dipped in water, it sinks in the water.

ii. When the aluminium sheet is shaped into a small boat and placed on the surface of water, it floats on it.

8. Take a long rubber band and cut it at one point. At one of its ends tie a clean washed stone or a 50 g weight as shown in figure.



Now hold the other end of the rubber band and make a mark there. Keep the stone hanging in air and measure the length of the rubber band from the stone to the mark made earlier. Now take water in a pot and hold the rubber band at such a height that the stone sinks in it. Again measure the length of the rubber band up to the mark.

i. What is observed?

ii. What could be the reason for a shorter length of the rubber band in water?

(Textbook page no. 20)

Ans:

i. It is observed that, while dipping the stone in water, length of the stretched rubber band reduces slowly and is minimum when the stone sinks completely in water.

ii. When the stone is sunk in water, a buoyant force acts on it in the upward direction. As the weight of the stone acts in downward direction, the effective force in the downward direction is reduced. That is why the length of the rubber band is shorter when the stone is completely immersed in the water as compared to its length when stone is held in empty pot.

Numerical Section

Type I: Pressure

Formula: Pressure = $\frac{\text{Force or weight}}{\text{Area on which force is applied}}$

1. A force of 1000 N is applied over an area 50 cm × 20 cm. What is the pressure acting on the area? [2 Marks]

Solution:

Given: Force (F) = 1000 N, Area (A) = 50 cm × 20 cm = 0.5 m × 0.2 m = 0.1 m^2

To find: Pressure (P)

Formula: Pressure (P) = $\frac{\text{Force (F)}}{\text{Area (A)}}$

Calculation: From formula,

$$P = \frac{1000}{0.1} = 10000 = \mathbf{10^4\ N/m^2}$$

Ans: The pressure acting on the area is $\mathbf{10^4\ N/m^2}$.

+2. The area of the tip of a screw is 0.5 mm^2 and its weight is 0.5 N. Calculate the pressure (in Pa) exerted by the screw on a wooden plank. *(Textbook page no. 21)* **[2 Marks]**

Solution:

Given: Area (A) = 0.5 mm^2 = 0.5 × 10^{-6} m^2, Weight of the screw (W) = 0.5 N

To find: Pressure (P)

Formula: Pressure (P) = $\frac{\text{Weight (W)}}{\text{Area (A)}}$

Calculation: From formula,

$$P = \frac{0.5}{0.5\times10^{-6}} = \mathbf{10^6\ Pa}$$

Ans: The pressure exerted by screw on the wooden plank is $\mathbf{10^6\ Pa}$.

+3. The area of the bottom of a tiffin box is 0.25 m^2 and weight is 50 N, Calculate the pressure exerted by the box on the shelf. *(Textbook page no. 21)* **[2 Marks]**

Solution:

Given: Area (A) = 0.25 m^2, Weight of the box (W) = 50 N

To find: Pressure (P)

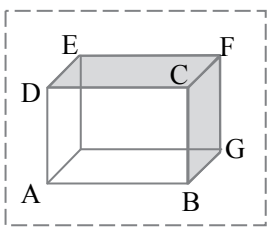
Formula: Pressure (P) = $\frac{\text{Weight (W)}}{\text{Area (A)}}$

Calculation: From formula,

$$P = \frac{50}{0.25} = \mathbf{200\ N/m^2}$$

Ans: The pressure exerted by the box on the shelf is $\mathbf{200\ N/m^2}$.

+4. Mass of a block of metal is 10 kg and its dimensions are length 50 cm, breadth 10 cm, height 20 cm as shown in figure. If the metal block is placed on the table, find out on which of the surfaces ABCD, CDEF and BCFG will the pressure exerted on the table be maximum. *(Textbook page no. 21)* **[3 Marks]**



Solution:

Given: Mass of the block (M) = 10 kg, Length (*l*) = 50 cm, Breadth (b) = 10 cm, Height (h) = 20 cm

To find: Surface of metal block exerting maximum pressure.

Formula: Pressure (P) = $\frac{\text{Weight (W)}}{\text{Area (A)}}$

Calculation: Weight of the block

= mg = 10 × 9.8 = 98 N

i. For the surface ABCD,

Area = length (l) × height (h)

= 50 cm × 20 cm = 1000 cm^2 = 0.1 m^2

Using formula,

Pressure (P_1) = $\frac{98}{0.1}$ = **980 Pa**

ii. For the surface CDEF,

Area = length (l) × breadth (b)

= 50 cm × 10 cm = 500 cm^2 = 0.05 m^2

Using formula,

Pressure (P_2) = $\frac{9800}{5}$ = **1960 Pa**

iii. For the surface BCFG,

Area = height (h) × breadth (b)

= 20 cm × 10 cm = 200 cm^2

= 0.02 m^2

Using formula,

Pressure (P_3) = $\frac{98}{0.02}$ = **4900 Pa**

Comparing, we get, $\mathbf{P_1 < P_2 < P_3}$

Ans: Surface **BCFG** exerts maximum pressure on the table.

Type II: Density

Formulae:

i. Density = $\frac{\text{Mass}}{\text{Volume}}$

ii Relative density (Specific gravity) = $\frac{\text{Density of substance}}{\text{Density of water}}$

Illustrative Example:

+ A piece of marble tile weights 100 g in air. If its density is 2.5 g/cc, what will be its weight in water?

Analyse

Step 1: Read the problem and make a list of what is given or can be inferred from the problem.

From the information given, we come to know,

Weight (mass) of marble tile in air (W_1) = 100 g,

Density of marble tile (d) = 2.5 g/cc

Step 2: Make a note of all the quantities which are required to be found.

Weight (mass) of marble tile in water (W_2).

Solve

Step 3: Based on the information provided and the quantity to be found, find out the concept to be applied to solve.

In the given case, the question is based on Archimedes' principle.

'When an object is partially or fully immersed in a fluid a force of buoyancy acts on it in the upward direction. This force is equal to the weight of the fluid displaced by the object.'

As per the principle, the volume of the tile (V_1) will be equal to the volume of water displaced by the marble tile (V_2). The loss in weight of the tile will be equal to the mass of water displaced.

Volume of marble tile (V_1) = $\frac{\text{Mass}}{\text{Density}}$

Step 4: Substitute known values into the formula and use appropriate mathematical steps to solve for the unknown quantity.

Volume of marble tile (V_1) = $\frac{100}{2.5}$ = 40 cc

Volume displaced by the marble tile (V_2) = 40 cc

∴ Mass of water displaced = Density of water × volume of water displaced = 1 × 40 = 40 g

∴ The loss in weight of the tile (W_2)= W_1 – 40 = 100 – 40 = **60 g**

Step 5: Check the final answer in terms of its magnitude, sign and unit.

5. A body of volume 100 cm^3 is immersed completely in water. Find the weight of the water displaced by the body.
(g = 9.8 m/s^2, density of water = 10^3 kg/m^3) **[2 Marks]**

Solution:

Given: Volume (V) = 100 cm^3 = 100×10^{-6} m^3 = 10^{-4} m^3
Density of water = 10^3 kg/m^3, g = 9.8 m/s^2

To find: Weight of the displaced water (W)

Formulae: i. $\text{Density} = \frac{\text{Mass}}{\text{Volume}}$

ii. $W = mg$

Calculation: From formula (i),
Mass = Volume × Density
∴ Mass of the water displaced (m) = $10^{-4} \times 10^3 = 0.1$ kg
From formula (ii),
∴ Weight of the water displaced = $mg = 0.1 \times 9.8 =$ **0.98 N**

Ans: The weight of the water displaced by the body is **0.98 N**.

+6. Calculate the relative density of iron if the density of water is 10^3 kg/m^3 and the density of iron is 7.85×10^3 kg/m^3.
(Textbook page no. 21) **[2 Marks]**

Solution:

Given: Density of water = 10^3 kg/m^3,
Density of iron = 7.85×10^3 kg/m^3

To find: Relative density of iron

Formula: $\text{Relative density} = \frac{\text{Density of iron}}{\text{Density of water}}$

Calculation: From formula,

$$\text{Relative density} = \frac{7.85 \times 10^3}{10^3}$$
$$= \mathbf{7.85}$$

Ans: The relative density of iron is **7.85.**

7. Specific gravity of platinum is 20.4. The density of water is 10^3 kg/m^3. What is the density of platinum? **[1 Mark]**

Solution:

$$\text{Relative density (Specific gravity)} = \frac{\text{Density of platinum}}{\text{Density of water}}$$

From formula,

$$\text{Density of platinum} = \text{Specific gravity of platinum} \times \text{Density of water}$$
$$= \mathbf{20.4 \times 10^3\ kg/m^3}$$

Ans: The density of platinum is **20.4×10^3 kg/m^3**.

Let's Practise!

Choose the correct alternative **[1 Mark each]**

1. When a wooden block is pushed, the force acting on it is .....
(A) electric (B) unbalanced
(C) balanced (D) nuclear

2. A person slips over banana peel or mud, due to .....
(A) decrease in frictional force
(B) increase in frictional force.
(C) increase in gravitational force.
(D) decrease in gravitational force.

3. A person gets a forward jerk when a car stops suddenly due to .....
(A) inertia of direction
(B) inertia of motion
(C) the velocity of car
(D) weight of the person

4. As we go higher, atmospheric pressure .....
(A) increases
(B) decreases
(C) remains same
(D) initially decreases and then increases

5. The buoyant force is greater if volume of object submerged in liquid is .....
(A) smaller (B) equal
(C) larger (D) half

6. When a body is fully immersed in a liquid, the apparent weight loss is equal to the ..... of the liquid displaced by it.
(A) mass (B) weight
(C) volume (D) density

7. The buoyant force is ..... if density of liquid is .....
(A) greater, lesser (B) zero, lesser
(C) lesser, greater (D) lesser, lesser

Ans:
1. (B) 2. (A) 3. (B)
4. (B) 5. (C) 6. (B)
7. (D)

Fill in the blanks **[1 Mark each]**

1. When comb gets rubbed against hair, it develops an _____ charge on it.

2. All objects in motion have _____ force acting on it in opposite direction.

3. _____ forces do not change the state of rest or of motion of an object.

4. If two forces are applied on one object in _____ direction to each other, a force equal to their difference acts on the object.

5. The buoyant force is greater if volume of the object is _____.

6. A solid is completely immersed in a liquid. The force exerted by the liquid on the solid will be in vertically _____ direction.

7. An object will float on a liquid surface, if the density of the object is _____ than the density of the liquid.

8. The SI unit of density of a substance is _____.

Ans:

1.	electrostatic	2.	frictional
3.	Balanced	4.	opposite
5.	greater	6.	upward
7.	less	8.	kg/m^3

True or False? If False, write the correct sentence [1 Mark each]

1. When a body is at rest, there is no force acting on it.

2. If several forces are applied on an object in the same direction, a force equal to their addition acts on the object.

3. When an electrical rotating fan is switched off it continues to rotate for some time due to inertia of motion.

4. The effect of force depends on volume of the substance.

Ans:

1. **False:** When a body is at rest there are balanced forces acting on it.
2. **True**
3. **True**
4. **False:** The effect of force depends on the area on which it acts.

Odd one out [1 Mark each]

1. Electrostatic force, frictional force, gravitational force, magnetic force.

2. N/m^2, kg/m^3, bar, pascal.

3. Density, relative density, pressure, volume.

Ans:

1. Frictional force
   Reason: Frictional force is a contact force while others are non- contact force.

2. kg/m^3
   Reason: kg/m^3 is the unit of density while rest are the units of pressure.

3. Relative density
   Reason: Relative density has no unit whereas density, pressure and volume have units.

Complete the analogy [1 Mark each]

1. Force/Area : Pressure :: Mass/Volume : _____.

2. Rotating wheels of a car throwing mud tangentially : Inertia of direction :: Person getting a backward jerk when a car suddenly starts : _____.

3. 101×10^3 Pa : 10^3 mbar :: 10^2 Pa : _____.

Ans:

1. Density
   Force per unit area gives the magnitude of pressure acting on the area. Similarly, mass per unit volume gives the density of the substance.

2. Inertia of rest
   Rotating wheels of a car throwing mud tangentially is due to inertia of direction while a person getting a backward jerk when a car suddenly starts is due to inertia of rest

3. 1 mbar
   101×10^3 Pa is equivalent to 10^3 mbar. Similarly, 10^2 Pa is equivalent to 1 mbar.

Name the following [1 Mark each]

1. The tendency of a body to resist change in a state of rest or state of motion.

2. Force exerted on a unit surface area by weight of air above it.

3. The upward force exerted by a fluid (liquid or gas) on an object completely or partially immersed in it.

4. Another term for relative density of a substance.

Ans:

1.	Inertia.	2.	Atmospheric pressure.
3.	Buoyant force.	4.	Specific gravity

Define [1 Mark each]

1. Contact force

Ans: A force which acts through a direct contact of the objects is called contact force.

2. Non contact force

Ans: A force which acts between two objects even if two objects are not in contact is called non-contact force.

3. Pressure

Ans: The force exerted perpendicularly on a unit surface area is called pressure.

4. Density of a substance

Ans: Density of a substance is the ratio of mass of the substance to its volume.

5. Specific gravity or relative density of a substance

Ans: Specific gravity or relative density of a substance is the ratio of its density to that of water.

Answer in one sentence [1 Mark each]

1. What is the net effect of balanced forces on a body? Why?

Ans: There is no net effect of balanced forces on a body because balanced forces have equal magnitude and they act in the opposite direction.

2. What happens to the pressure exerted on a given area if the force applied is doubled?

Ans: When the force applied on given area is doubled, the pressure is also doubled.

3. How can you increase the buoyant force acting on a body?

Ans: The buoyant force acting on a body can be increased by choosing a liquid of higher density or by choosing object of greater volume.

4. Lactometer[G] and hydrometer[G] are based on which principle?

Ans: Lactometer and hydrometer are based on Archimedes' principle.

5. State a point of difference between density and relative density?

Ans: Density has unit (SI unit: kg/m^3) while relative density has no unit.

How are we different? [2 Marks each]

1. Balanced and unbalanced force.

Ans:

	Balanced force	Unbalanced force
i.	These forces do not change the state of rest or motion of a body.	These forces change the state of rest or motion of a body.
ii.	The net force acting on the body is zero.	The net force acting on the body is always non-zero.
	Example: Pulling a wooden block from two opposite sides with equal force.	**Example:** Pushing a wooden block in the forward direction from one side.

2. Inertia of motion and inertia of rest.

Ans:

	Inertia of motion	Inertia of rest
i.	The inherent property of a body due to which it cannot change its state of motion is called inertia of motion.	The inherent property of a body due to which it cannot change its state of rest is called inertia of rest.
ii.	Due to inertia of motion, passengers get a forward jerk when a moving bus stops suddenly.	Due to inertia of rest, passengers get a backward jerk when bus at rest starts moving suddenly.

3. Inertia of motion and directional inertia.

Ans:

	Inertia of motion	Directional inertia
i.	The inherent property of a body due to which it cannot change its state of motion is called inertia of motion.	The inherent property of a body due to which it cannot change its direction of motion is called directional inertia.
ii.	Due to inertia of motion, a rotating electric fan continues to rotate for some time even after it is switched off.	Due to inertia of direction, sparks fly off tangentially from the grinding stone while sharpening a knife.

4. Density and relative density.

Ans:

	Density	Relative density
i.	Density of a substance is the ratio of its mass to its volume.	Relative density of a substance is the ratio of its density to that of water.
ii.	The SI unit of density is kg/m^3.	It has no unit.

Answer the following

1. What does Newton's first law explain? [2 Marks]

Ans:

i. Newton's first law of motion states that, when no force acts on an object, the object remains stationary.

ii. Also, an object in motion continues to move with the same speed and direction when no force is acting on the object.

2. What will happen if there is no frictional force present on earth? [2 Marks]

Ans:

i. If there is no frictional force present on the earth, then the moving object will remain in continuous motion.

ii. Frictional force helps us in day to day life in many ways for example, walking or running. In absence of frictional force we will not be able to walk or run.

3. Explain inertia of rest with examples. [2 Marks]

Ans: Inertia of rest:

The inherent property of a body due to which it cannot change its state of rest is called inertia of rest.

Examples:

i. When we dust a carpet, by lifting it, the carpet is set into motion and dust remains in its state of rest. Thus, the carpet is cleaned.

ii. When a bus starts suddenly, passengers receive a backward jerk.

iii. A fruit falls down from a tree when the branch is shaken. This is because the branch is set into motion but the fruit stays in the state of rest.

4. What is inertia of motion? Give some examples to support your answer. [2 Marks]

Ans: Inertia of motion:

The inherent property of a body due to which it cannot change its state of motion is called inertia of motion.

Examples:

i. When a rotating fan is switched off, it continues to rotate for some time.

ii. A person falls when he jumps from a moving bus.

iii. Passengers in a bus get a jerk in the forward direction when the bus stops suddenly.

5. Explain the term inertia of direction (directional inertia) with suitable examples. [2 Marks]

Ans: Inertia of direction: The inherent property of a body due to which it cannot change its direction of motion is called inertia of direction (directional inertia).

Examples:

i. While sharpening a knife, sparks fly off tangentially from the grinding stone.

ii. When a vehicle in motion along a straight line suddenly turns, the passengers sitting in it are thrown opposite to the direction of turning.

6. Give conversion between different units of pressure. [2 Marks]

Ans: 1 atmosphere = 101×10^3 Pa = 1 bar = 10^3 mbar

Also, 1 mbar = 10^2 Pa = 1 hectopascal

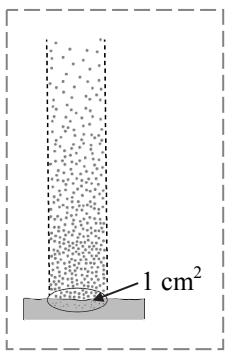
7. Explain with a neat diagram, how is atmospheric pressure created. Does it depend on height above sea level? [3 Marks]

Ans:

i. The force exerted on unit surface area by the weight of air above it is called atmospheric pressure.

ii. Atmospheric pressure is the result of collision of air molecules with any surface.

iii. Consider an infinitely long cylinder of cross sectional area equal to 1 cm 2 filled with air is standing on the ground. The weight of the air molecules present above any point in this cylinder is directed towards the centre of the earth. This weight contributes to the pressure exerted at that point.



iv. The atmospheric pressure at a place depends on its height above the sea level.

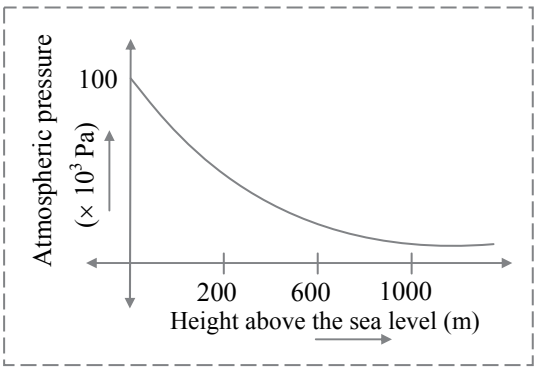
v. When we go higher above the sea level, as the number of air molecules present in air decreases (as shown in figure), the air becomes thinner and the atmospheric pressure also decreases.

8. Explain with the help of graph, the variation of atmospheric pressure with height. [2 Marks]

Ans:

i. Atmospheric pressure decreases as the height increases from the surface of the earth.

ii. At sea level the atmospheric pressure is around 101×10^3 Pa, but as we go above sea level the pressure decreases as shown in the figure.



GG - Gyan Guru

Generally, high atmospheric pressure corresponds to fair weather whereas; low atmospheric pressure corresponds to stormy weather.

9. What is buoyant force? How does it act on a body which is immersed in a liquid? [2 Marks]

Ans:

i. The upward force exerted by a fluid (liquid or gas) on an object completely or partially immersed in it is called the buoyant force.

ii. When a body is completely or partially immersed in a liquid, the molecules of the liquid beneath the body exert the buoyant force on the body.

iii. The force exerted by the liquid is perpendicular to the surface of the body.

10. State the factors on which the buoyant force acting on an object depends. [2 Marks]

Ans: The buoyant force acting on an object depends on the following factors:

i. Volume of object: The buoyant force is greater if the volume of object submerged in fluid (liquid or gas) is larger.

ii. Density of liquid: The buoyant force is greater if density of fluid (liquid or gas) is greater.

11. State few applications of Archimedes' principle. [2 Marks]

Ans:

i. Archimedes' principle is used in designing ships and submarines.

ii. Instruments like hydrometer and lactometer work on Archimedes' principle.

iii. Density of a body (that floats or sinks in liquid) can be determined by Archimedes' principle.

Give reasons [2 Marks each]

1. It is advised to tie any luggage kept on the roof of the bus with a rope.

Ans:

i. The luggage kept on top of the bus will be at rest when the bus is at rest. If the bus suddenly starts moving, the luggage moves backward due to inertia of rest.

ii. Similarly, when a moving bus suddenly stops, the luggage over it moves in the forward direction due to inertia of motion.

iii. In the same manner if a bus takes a turn, then luggage over it moves in the opposite direction due to inertia of direction.

Hence, it is advised to tie any luggage kept on the roof of the bus with a rope to prevent it from falling.

2. A carpet is lifted up to remove dust from it.

Ans:

i. When we dust a carpet, by lifting it, the carpet is set into motion. While the dust remains in its state of rest due to inertia of rest.

ii. As a result dust particles get separated from carpet and carpet becomes clean.

Hence, a carpet is lifted up to remove dust from it.

3. A camel's feet do not penetrate into the sand.

Ans:

i. The bottom surfaces of a camel's feet are broad due to natural adaptation.

ii. The surface area in contact with the ground is more. So, the pressure on the sand due to the camel's weight is reduced as it is exerted on a large area.

Hence, a camel's feet do not penetrate into the sand making it easier to walk.

4. Some people feel their ears popping at the top of a mountain. *[HOTS]*

Ans:

i. Atmospheric pressure decreases with increase in height above the sea level.

ii. At the top of the mountain, the air pressure inside the ear will be higher as compared to the atmospheric pressure.

iii. This difference in air pressure inside the ear and outside atmospheric pressure causes the ear to pop.

Hence, some people feel their ears popping at the top of the mountain.

5. Some people feel breathless as they climb higher and higher on a mountain.

Ans:

i. At higher altitudes, air becomes thinner and hence atmospheric pressure decreases.

ii. Low atmospheric pressure makes it difficult to breath.

Hence, some people feel breathless as they climb higher and higher on a mountain.

6. A piece of wood sinks more in kerosene than in water.

Ans:

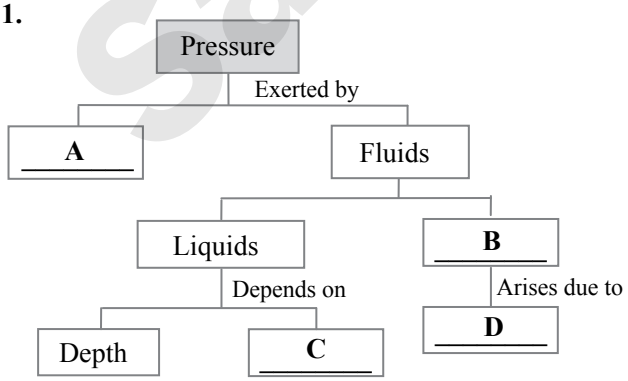
i. The buoyant force on a body immersed in a liquid is directly proportional to the density of the liquid in which it is immersed.

ii. As the density of kerosene is less than that of water, the buoyant force acting on the wooden piece placed in kerosene is smaller than that acting on the piece placed in water.

Hence, the piece of wood sinks more in kerosene than in water.

Complete the given flowchart [2 Marks]

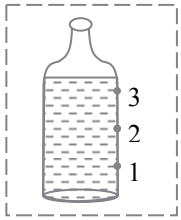
1.



Ans: A = Solids, B = Gases, C = Density of liquid, D = Collisions

Questions based on diagrams [2 Marks]

1. In the given diagram, explain at which point pressure due to liquid will be minimum and maximum?



Ans:

i. Pressure increases as the depth of the liquid increases from its surface.

ii. As the depth of point 3 is minimum from the surface of the liquid, the liquid will exert minimum pressure.

iii. Similarly, the depth of the point 1 being maximum from the surface of the liquid, the liquid will exert maximum pressure.

Questions based on paragraph

1. A boy pushed his toy car on a table. The car moved ahead and stopped after travelling a certain distance. But when he kept on pushing his car, the car started moving with a uniform velocity. The boy later decided to do some adventurous activity while playing with his car, so he launched his toy car from a platform to a bucket filled with water and as soon as the car landed inside the bucket, the water from the bucket splashed out and the boy enjoyed his new game.

i. Why did the toy car stop after travelling a certain distance?

ii. Which type of force was applied by the boy when he kept on pushing the car?

iii. What is the reason for splashing of water out from the bucket?

Ans:

i. The toy car stopped because of the force of friction between the ground surface and the car in motion.

ii. The type of force applied by the boy was unbalanced contact force.

iii. The reason behind splashing of water out of the bucket can be explained by Archimedes' principle. According to Archimedes' principle when an object is partially or fully immersed in a fluid, a force of buoyancy acts on it in the upward direction. This force is equal to the weight of the fluid displaced by the object.

Numerical Exercise

1. A force of 3000 N is applied over an area 80 cm × 20 cm. What is the pressure acting on the area? [2 M] **[Ans: 1.875×10^4 N/m^2]**

2. Calculate pressure exerted by a screw on a wooden plank if the area of the screw is 0.24 mm^2 and its weight is 4 N. [2 M] **[Ans: 1.67×10^6 N/m^2]**

3. Relative density of a substance is 67.8 and the density of water is 10^3 kg/m^3. Calculate the density of substance. [1 M] **[Ans: 67.8×10^3 kg/m^3]**

4. Volume of an object is 30 cm^3 and the mass is 60 g. Density of water is 1 gcm^{-3}. Will the object float on water or sink in water? [2 M] **[Ans: Sink]**

5. A metal box weights 0.54 kg in air. If its density is 2.7 g/cc, what will be its weight in water? [2 M] **[Ans: 0.34 kg]**

*Download the solutions of the Numerical Exercise by scanning the given **Q.R. Code.***

Oral Test

1. What is the SI unit of pressure?
Ans: N/m^2 or pascal

2. Name the property responsible for the forward jerk experienced when a moving bus is suddenly stopped.
Ans: Inertia of motion

3. State whether the forces are contact or non-contact forces in the following examples:
i. When brakes applied to a car, it stops after some time.
ii. A fruit when ripen falls from the tree onto the ground.
Ans:
i. Contact force (Frictional force)
ii. Non-contact force (Gravitational force)

4. Name the device which works on the Archimedes' principle and is used to measure density of a liquid.
Ans: Hydrometer

5. If the absolute density of gold is 19.32 g/cm^3 and density of water is 1 g/cm^3. What is the specific gravity of the gold?
Ans: 19.32

Formative Assessment

Activities / Project

***1. Video record all the experiments (Try it) in this chapter with the help of mobile phone and send to others.**
(Students are expected to perform experiments as given in the textbook and share the recorded videos of the experiments with their friends.)

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- Geography
- Mathematics (Part - I)
- Mathematics (Part - II)
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- गणित (भाग - II)
- विज्ञान आणि तंत्रज्ञान

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