CLASS- VII

SUBJECT- PHYSICS

LEARN AND WRITE THE NOTES GIVEN BELOW OF

CHAPTER - 1, 3

FOR OFFICE USE

SCAN PAGES OF CHAPTER- 1

Pg -> 31, 32, 33, 34, 35, 36, 37

CHAPTER- 3

Pg -> 42, 43, 44, 45

CHAPTER 1. Measurement

Check Point 1

1. (a) 10000 (b) volume (c) measuring cylinder
2. (a) The SI unit of capacity is litre (L).
   (b) When a solid is immersed into a liquid, the volume of the liquid displaced is equal to the volume of the immersed solid.

Check Point 2

1. volumes **2.** kilogram/(metre)^3 [kg/m^3 or kg m^{-3}]
3. mass; volume **4.** 1000

Check Point 3

1. (a) speed (b) m/s
2. A boy going to his school, a girl walking in a park and a child crawling on the floor are in motion.
3. (a) A running train (b) An aeroplane in flight

TEST YOURSELF

A. 1. area **2.** capacity **3.** litre **4.** 1000 **5.** different **6.** 1000 **7.** km/h

B. 1. Volume **2.** Measuring cylinder **3.** Density **4.** Speed

C. 1. The surface occupied by an object is called its area. The SI unit of area is square metre.

2. Two multiples of SI unit of area and their values in SI are as follows:

$$1 \text{ hectare} = 100 \text{ m} \times 100 \text{ m} = 10000 \text{ m}^2$$

$$1 \text{ sq km} = 1 \text{ km} \times 1 \text{ km}$$

$$= 1000 \text{ m} \times 1000 \text{ m} = 1000000 \text{ m}^2$$

3. The space occupied by a substance is called its volume. The SI unit of volume is cubic metre.

4. Two submultiples of SI unit of volume and their numerical values in SI unit are as follows:

$$1 \text{ cu cm} = 1 \text{ cm}^3$$

$$= 1 \text{ cm} \times 1 \text{ cm} \times 1 \text{ cm}$$

$$= \frac{1}{100} \text{ m} \times \frac{1}{100} \text{ m} \times \frac{1}{100} \text{ m}$$

$$= \frac{1}{1000000} \text{ m}^3$$

$$1 \text{ cu mm} = 1 \text{ mm}^3$$
$$= 1 \text{ mm} \times 1 \text{ mm} \times 1 \text{ mm}$$
$$= \frac{1}{1000} \text{ m} \times \frac{1}{1000} \text{ m} \times \frac{1}{1000} \text{ m}$$
$$= \frac{1}{1000000000} \text{ m}^3$$

5. The mass of an object contained per unit volume is called density. The SI unit of density is kg/m^3.
6. Take two identical beakers. Fill one beaker with liquid A (say water) and the other beaker with liquid B (say kerosene) such that both liquids are up to the same level in the beakers. Now, place one beaker on left pan and other beaker on right pan of a beam balance. The beam is not horizontal but tilted downward on the side of the beaker containing water. This observation clearly shows that equal volumes of different substances have different masses.
7. Take a small piece of the given irregular solid (say a stone piece) which is heavier than water and insoluble in it. Find its mass M using a beam balance.

   Take a measuring cylinder and fill it about half with water. Note down the water level when steady. Let it be V_1. Now, gently immerse the given solid piece into water. The water level in the cylinder rises to V_2 now.

   Then, volume of the solid, $V = V_2 - V_1$

   $\therefore$ Density of the given solid, $D = \dfrac{\text{Mass, } M}{\text{Volume, } V}$
   $$= \frac{M}{V_2 - V_1}$$
8. The distance covered by an object in unit time is called speed. The SI unit of speed is m/s.

D. 1. True
2. False; The SI unit of volume is **cubic metre.**
3. False; $V = \dfrac{4}{3}\pi r^3$
4. True
5. False; Density is the **ratio** of mass and volume.
6. True
7. True
8. True

E. 1.–(b) 2.–(e) 3.–(a) 4.–(c) 5.–(d)

ie M/V

F. 1. The density is equal to the ratio of mass and volume/ The SI units of mass and volume are kg and m^3. That is why, the SI unit of density is kg/m^3.

2. The volume of a crystal of potash alum cannot be determined by immersing it into water because being soluble it will dissolve in water.

3. Since the car covers a greater distance in a given interval of time as compared to cycle, so, the speed of a car is more than the speed of a cyclist.

G. 1. The mass of an object contained per unit volume is called density.

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

2. The distance covered by an object in unit time is called speed.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

H. 1. kg/m^3; It is the SI unit of density but others are units of speed.

2. Beam balance; It is used to measure the weight of an object but others are used to measure the volume of an object.

I. 1. Here, radius of circle = 7 cm

$$\text{Area of circle} = \pi r^2$$

$$= \frac{22}{7} \times 7 \times 7 = 154 \text{ cm}^2$$

2. Here, length = 180 m, breadth = 105 m

$$\text{Area of school playground} = l \times b$$

$$= 180 \text{ m} \times 105 \text{ m}$$

$$= 18900 \text{ m}^2$$

or

$$= 1.89 \text{ hectares}$$

$$(\because 1 \text{ hectare} = 10{,}000 \text{ m}^2)$$

3. $\because$ Diameter of coin = 4.2 cm

$\therefore$ $$\text{Radius } (r) = \frac{\text{Diamter}}{2}$$

$$= \frac{4.2}{2} = 2.1$$

$\therefore$ $$\text{Area of coin} = \pi r^2$$

$$= \frac{22}{7} \times 2.1 \times 2.1$$

$$= 22 \times 0.63 = 13.86 \text{ cm}^2$$

4. Here, length = 3 m, width = 2 m, height of water = 1.2 m

Volume of water in tank = $l \times b \times h$

$= 3\text{ m} \times 2\text{ m} \times 1.2\text{ m}$

$= 7.2\text{ m}^3$

$= 7.2 \times 1000\text{ L} \quad (\because 1\text{ m}^3 = 1000\text{ L})$

or

$= 7200\text{ L}$

5. Volume of wooden log (in cylindrical form),

$V = \pi r^2 h$

$= \frac{22}{7} \times \left(\frac{42}{100}\right)^2 \times 3.6$

$= \frac{22}{7} \times 0.42 \times 0.42 \times 3.6$

$= 22 \times 0.06 \times 0.42 \times 3.6$

$= 1.996\text{ m}^3$

6. (a) Volume of spherical ball $= \frac{4}{3}\pi r^3$

$= \frac{4}{3} \times \frac{22}{7} \times 3.5 \times 3.5 \times 3.5$

$= 179.6\text{ cm}^3$

(b) Surface area of spherical ball

$= 4\pi r^2$

$= 4 \times 3.14 \times 3.5 \times 3.5$

$= 154\text{ cm}^2$

7. Here, volume of stone piece = 88.3 mL – 56.5 mL

$= 31.8\text{ mL}$

or

$= 31.8\text{ cm}^3 \quad (\because 1\text{ mL} = 1\text{ cm}^3)$

8. Here, mass of the iron piece, $M = 624$ g and volume, $V = 80\text{ cm}^3$

$\therefore$ Density of the iron piece, $D = \frac{\text{Mass, } M}{\text{Volume, } V}$

$= \frac{624\text{ g}}{80\text{ cm}^3} = 7.8\text{ g/cm}^3$

9. Here, mass of the stone piece, $M = 225$ g and volume, $V = 75\text{ cm}^3$

$\therefore$ Density of the stone piece, $D = \frac{\text{Mass, } M}{\text{Volume, } V}$

$= \frac{225\text{ g}}{75\text{ cm}^3} = 3\text{ g/cm}^3$

10. Given that density of copper, $D = 8.9\ g/cm^3$

We know that density of $1\ g/cm^3 = 1000\ kg/m^3$

$\therefore$ Density of copper in kg/m^3 is given as:

$$D = 8.9 \times 1000 = 8900\ kg/m^3$$

11. Here, mass of the object, $M = 1.35$ kg and each side of cubical object, $a = 15\ cm = 0.15\ m$

$\therefore$ Volume of the object, $V = a^3$

$$= (0.15)^3\ m^3 = 0.003375\ m^3$$

$\therefore$ $$\text{Density, } D = \frac{\text{Mass, } M}{\text{Volume, } V}$$

$$= \frac{1.35\ kg}{0.003375\ m^3} = 400\ kg/m^3$$

12. Here, radius of the spherical object, $R = 3.0$ cm

and density, $D = 7\ g/cm^3$

$\therefore$ Volume of the spherical object, $V = \frac{4}{3}\pi R^3$

$$= \frac{4}{3} \times \frac{22}{7} \times (3.0)^3$$

$$= \frac{792}{7}\ cm^3$$

$\because$ $$\text{Density, } D = \frac{\text{Mass, } M}{\text{Volume, } V}$$

$\therefore$ Mass of the spherical object, $M = D \times V$

$$= 7 \times \frac{792}{7} = 792\ g$$

or $$= \frac{792\ g}{1000} \quad (\because 1\ kg = 1000\ g)$$

$$= 0.792\ kg$$

13. Here, mass of the given wooden object, $M = 280$ kg

and density of the wood, $D = 800\ kg/m^3$

$\because$ $$\text{Density, } D = \frac{\text{Mass, } M}{\text{Volume, } V}$$

Hence, volume of the object, $V = \dfrac{\text{Mass, } M}{\text{Density, } D}$

$$= \frac{280\ kg}{800\ kg/m^3} = 0.35\ m^3$$

14. Here,

$$\text{density} = \frac{\text{Mass}}{\text{Volume}}$$

$$910 = \frac{\text{Mass}}{75 \times 60 \times 30}$$

$$\therefore \quad \text{Mass} = 910 \times 75 \times 60 \times 30$$

$$= \frac{910 \times 75 \times 1800}{100 \times 100 \times 100}$$

$$= \frac{910 \times 75 \times 18}{10000}$$

$$= \frac{1350 \times 910}{10000} = 122.8 \text{ kg}$$

15. Here, volume of the empty density bottle, $V = 25 \text{ mL} = 25 \text{ cm}^3$; mass of the empty bottle, $M_1 = 22.6$ g and mass of the empty bottle when filled with liquid, $M_2 = 43.8$ g

$\therefore$ Mass of the liquid, $M = M_2 - M_1 = (43.8 - 22.6)$ g $= 21.2$ g

$\therefore$ Density of the liquid, $D = \dfrac{\text{Mass, } M}{\text{Volume, } V}$

$$= \frac{21.2 \text{ g}}{25 \text{ cm}^3} = 0.848 \text{ g/cm}^3$$

or $= 0.848$ g/mL $\quad (\because 1 \text{ cm}^3 = 1 \text{ mL})$

16. Here, mass of the given solid, $M = 84.2$ g; Initial volume of water in cylinder, $V_1 = 36$ mL and final volume of water and solid, $V_2 = 60$ mL

$\therefore$ Volume of the solid, $V = V_2 - V_1$

$= (60 - 36) \text{ mL} = 24 \text{ mL} = 24 \text{ cm}^3$

$\therefore$ Density of the solid, $D = \dfrac{\text{Mass, } M}{\text{Volume, } V}$

$$= \frac{84.2 \text{ g}}{24 \text{ cm}^3} = 3.51 \text{ g/cm}^3$$

17. Here,

$$\text{speed} = \frac{\text{Distance}}{\text{Time}}$$

$$= \frac{24}{30} = 0.8 \text{ cm/s}$$

18. Here,

$$\text{speed} = \frac{\text{Distance}}{\text{Time}}$$

$$= \frac{100}{12} = 8.33 \text{ m/s}$$

19. Here,

20. Here,

21. Here,

22. Here,

J. 1. (a) 2. (d) 3.

Check Point 1

1. An object is sa
with time wit
2. Motion shown
multiple) mot
3. In rotatory m
point, without
Motion of a n
are examples
4. A combina
simul

19. Here, speed of the car = 36 km/h

$$= 36 \times \frac{5}{18} = 10 \text{ m/s}$$

20. Here, $\text{time} = \frac{\text{Distance}}{\text{Speed}}$

$$= \frac{2.25 \times 1000}{4.5}$$

$$= 0.5 \times 1000$$

$$= \mathbf{500\ s\ (8\ min\ 20\ s)}$$

21. Here, distance = Speed × Time

$$= 4.2 \text{ km/h} \times \frac{40}{60} \text{ h}$$

$$= 4.2 \times 0.66 \text{ km}$$

$$= 2.8 \text{ km}$$

22. Here, $\text{speed} = \frac{\text{Distance}}{\text{Time}}$

$$= \frac{\text{Circumference of park}}{\text{Time}}$$

$$= \frac{2 \times \frac{22}{7} \times 70}{3 \times 60}$$

$$= 2.44 \text{ m/s}$$

J. 1. (a) **2.** (d) **3.** (b) **4.** (d) **5.** (b) **6.** (b) **7.** (a) **8.** (b)

CHAPTER 2. Motion

Check Point 1

1. An object is said to be in a state of motion if its position changes with time with respect to its surroundings.
2. Motion shown by a car moving on a hill road is a 'complex' (or multiple) motion.
3. In rotatory motion, an object moves about a fixed axis or a fixed point, without changing its position as a whole.

   Motion of a merry-go-round and motion of a spinning *charkha* are examples of rotatory motion.
4. A combination of two or more types of motion shown by an object simultaneously is called a complex motion.

8. Here, $$\text{average speed} = \frac{\text{Total distance covered}}{\text{Total time taken}}$$

$$= \frac{24.5 + 24.5}{30 + 40} = \frac{49}{70} = 0.7 \text{ km/min}$$

K. 1. (d) 2. (a) 3. (a) 4. (b) 5. (c) 6. (b)

THINK ZONE

- No, because distance covered is the actual path length which is different as the paths taken by them may be straight or curved.
- No, speed does not depend on the direction of motion of an object.

CHAPTER 3. Energy

Check Point 1

1. (a) joule (b) Kinetic (c) potential
2. (a) The capacity of doing work is called energy.
   (b) 1 calorie = 4.186 joule (≈ 4.2 joule)

Check Point 2

1. (a) heaters (b) muscular energy (c) heat energy
2. The energy contained in the nucleus of an atom is called nuclear energy.
3. Electrical energy is the most commonly used energy in our daily life.

Check Point 3

1. (a) Energy (b) sound; electrical (c) photosynthesis
2. (a) CFLs and electric bulbs

NO, (b) Energy can neither be created nor be destroyed but it can be transformed from one form into another form.

TEST YOURSELF

A. 1. joule 2. Gravitational potential 3. kinetic 4. elastic potential 5. chemical 6. Electrical 7. nuclear 8. muscular 9. electrical; heat 10. chemical; electrical

B. 1. Kinetic energy 2. Photosynthesis 3. Sound energy 4. Nuclear energy 5. Chemical energy 6. Electrical energy

C. 1. Energy of an object is said to be one joule if it has the capacity to do one joule of work.

2. The capacity of doing work is called energy.
3. The energy possessed by a magnet is called magnetic energy.
4. The energy possessed by muscles of human or animal's body is called muscular energy.
5. Whenever energy gets converted from one form into another form, the total energy remains unchanged. The energy lost in one form exactly reappears in the other form and total energy remains unchanged.

Same as Check Pt-3 2(b)

D. 1.

Light energy	Sound energy
Light is a form of energy which enables us to see the objects all around us.	Sound is a form of energy which causes the sensation of hearing.

2.

Kinetic energy	Potential energy
The energy possessed by an object in motion is called its kinetic energy.	The energy stored in an object when it is at rest is called its potential energy.

3.

Solar energy	Nuclear energy
The energy emitted by the sun in the form of light and thermal radiations is called solar energy.	The energy contained in the nucleus of an atom is called nuclear energy.

E. 1. Energy of an object is measured by its capacity to do work. It is measured in joule.

2. Light energy and heat energy are produced in a fire. These energies come from the chemical energy stored in wood, coal, petrol, etc.
3. The process of changing energy from one form to another form is called transformation of energy, e.g., a cell phone transforms electrical energy into sound and light energy, a microphone transforms sound energy into electrical energy.
4. The energy emitted by the sun in the form of light and thermal radiations is called solar energy. Solar energy is very important as plants trap it and synthesise food for all living things. Also, solar cookers used for cooking and solar heaters used for heating water use solar energy.
5. Light is a form of energy which enables us to see the objects clearly all around us. The sun, CFLs, LED lamps, etc., are the main sources of light. Green plants also use sunlight in preparing food through photosynthesis process. Incident rays of light in photographic film cause a chemical change due to which the image is recorded on the film.

6. Energy is the ability to do work. More the work to do, more energy is required. The energy stored in your body helps you to do work. A person gets tired on doing work. Work-energy relationship states that if an object does work, then its energy decreases. On the other hand, when the work is being done on an object, the energy of the object increases.

7. The two kinds of mechanical energy are kinetic energy and potential energy.

F. 1. True
2. True
3. True
4. True
5. False; When a matchstick is rubbed against a matchbox, heat and light are produced at the expense of **chemical** energy.
6. True
7. True
8. False; **Heat** energy is produced on burning a fuel.

G. 1.–(b) 2.–(e) 3.–(a) 4.–(c) 5.–(d)

H. 1. When water falls from a height, its potential energy is converted into kinetic energy due to which it can rotate the turbine in hydel power plant.

2. Since electrical energy is used to light bulbs, to run fans, washing machines, computers, TVs, coolers, fridges, etc., it is considered the most commonly used energy in our daily life. Also, electricity can be stored and transmitted from one place to another place and can be converted into heat, light and sound energy easily.

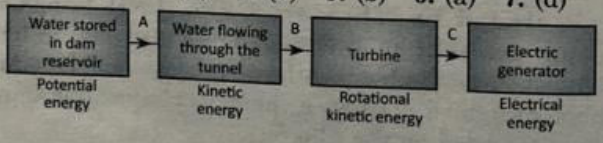
3. During interconversion of energy, energy disappeared in one form exactly reappears in the other form because as per law of conservation of energy, energy can neither be created nor be destroyed.

I. 1. **Moon;** The moon is a heavenly body while others are kinds of energy.

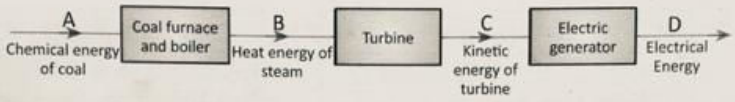
2. **Microphone;** Microphone transforms sound energy into electrical energy whereas electric bulb, tubelight, CFL lamp and LED bulb transform electrical energy into light energy.

J. 1. (a) 2. (a) 3. (d) 4. (c) 5. (b) 6. (a) 7. (d)

K. 1.



2.



THINK ZONE

- Kinetic energy.
- Kinetic energy.
- First of all the chemical energy stored in waste is transformed into heat energy which is then transformed into electrical energy.

CHAPTER 4. Light Energy

Check Point 1

1. polishing **2.** same **3.** lateral inversion **4.** virtual

Check Point 2

1. (a) black (b) green; white (c) cyan

2. (a) Milk appears white because milk reflects all the light wavelengths and absorbs none.

(b) White colour

TEST YOURSELF

A. 1. diffused **2.** A virtual **3.** laterally **4.** plane **5.** 3×10^8
6. primary **7.** yellow **8.** reflected

B. 1. Reflection of light **2.** Incident ray **3.** Angle of reflection
4. Lateral inversion **5.** Secondary colours

C. 1. Reflection of light: The phenomenon of bouncing back of light from a surface is called reflection of light.

2. Lateral inversion: Interchange of left and right sides of an object in the image formed by a plane mirror is called lateral inversion.

3. Primary colours: The colours which cannot be formed by other colours are called primary colours, i.e., red, green, blue.

4. Colour subtraction: The phenomenon due to which an opaque object selectively reflects light of few colours out of white light and absorbs light of other colours is called the colour subtraction.

D. 1.

Regular reflection	Diffused reflection
Reflection of light taking place from a smooth and polished surface is known as regular reflection.	Reflection of light taking place from an opaque, rough and uneven surface is known as diffused reflection.