CBSE
Class IX Science
Sample Paper - 10

Time: 3 hrs **Total Marks: 80**

- The question paper comprises five sections – A, B, C, D and E. You are to attempt all the sections.
- All questions are compulsory.
- Internal choice is given in sections B, C, D and E.
- Question numbers 1 and 2 in Section A are one mark questions. They are to be answered in one word or in one sentence.
- Question numbers 3 to 5 in Section B are two marks questions. These are to be answered in about 30 words each.
- Question numbers 6 to 15 in Section C are three marks questions. These are to be answered in about 50 words each.
- Question numbers 16 to 21 in Section D are five marks questions. These are to be answered in about 70 words each.
- Question numbers 22 to 27 in Section E are based on practical skills. Each question is a two marks question. These are to be answered in brief.

Section A

1. Name two nitrogen compounds obtained by industrial fixation. (1)

2. List two desirable traits for fodder crops. (1)

Section B

3. What are the different types of ions formed by iron? Give their names and valency. (2)

4. A person fires a gun and its echo is heard after 3 s. Find the distance of the gunman from the cliff which produces the echo (speed of sound is 330 m/s). (2)

5. Why striated muscles are also called voluntary and skeletal muscles? (2)

OR

Name the plant tissue found in the husk of coconut. Identify the chemical which is responsible for its stiffness.

Section C

6. State one function of the following nuclear parts: (3)
(a) Nuclear pore
(b) Nuclear membrane
(c) Chromosomes

7. List three groups of vascular plants. Out of these, which group is further classified on the basis of number of cotyledons? State two of its characteristics. (3)

OR

List two differences and one similarity between Platyhelminths and Nematodes.

8. Two cars of mass 750 kg and 1500 kg are required to be pushed by a person while the driver is accelerating the car. The force applied to both cars is the same. Find the relation between the accelerations of both cars. (3)

OR

Prove the law of conservation of momentum with a clear explanation, diagram and equation.

9. 'Water is a compound and not a mixture'. Justify this statement. (3)

10. What harm can be caused to crops if they are excessively irrigated? (3)

11. Identify the genus and species name in the scientific name of coconut, *Cocos nucifera*. How did you identify? (3)

12. (a)How many grams of chlorine are contained in one mole of chlorine?
(b)How many molecules are present in 1 g of chlorine?
(Gram atomic mass of chlorine = 35.5 g) (3)

OR

The percentage of three elements calcium, carbon and oxygen in a sample of calcium carbonate is

Calcium = 40%; Carbon = 12.0%; Oxygen = 48%

If the law of constant proportions is true, what weights of these elements will be present in 1.5 g of another sample of calcium carbonate?

13. What is buoyant force? What are the factors affecting the buoyant force? What is buoyant force also called? (3)

14. Neha and Rahul were performing an activity related to conservation of mass in their school Chemistry laboratory. They took barium chloride and sodium sulphate solutions and mixed them together. Rahul commented that since they already know the quantity of both compounds taken, they need not measure the amount of the final solution. But Neha insisted on measuring the amount of the final solution. (3)

(a) Determine the molecular mass of

- Barium chloride
- Sodium sulphate

(b) Comment on Neha's insistence on measuring the amount of the final solution.

15. Define speed. Is it a scalar quantity or vector quantity? (3)
Give reason for your choice.

Section D

16. (5)

(a) What did Bohr contribute to the atomic structure?

(b) Describe Bohr's model of an atom in detail with the help of a neat and labelled diagram.

OR

Give the atomic number of magnesium atom and magnesium ion; also diagrammatically show the electron distribution.

17. Urbanisation and industrialisation are mainly responsible for the increase in environmental pollution. Justify this statement and suggest ways and means to keep it in check. (5)

18. (5)

(i) Check the following cases and tell whether the work done is positive, negative or zero. Give reason for the same.

a) A football moving in a certain direction is hit by the player along the direction of its motion.

b) A metal bob tied to a thread is revolved continuously.

c) A moving football stops due to the frictional force of the ground.

(ii) State and explain Newton's first law of motion. Explain using one example.

19. (5)

(i) Write the second kinematical equation of motion.

(ii) An object is thrown upward to a certain height with a velocity of 3 m/s. If the time required to reach the height is 5 s, calculate the height at which it was thrown.

OR

The following is the graphical representation of cars A, B, C, D. Analyse the graph below and state which of the following statements are incorrect? If any particular statement is correct, give reason for it.

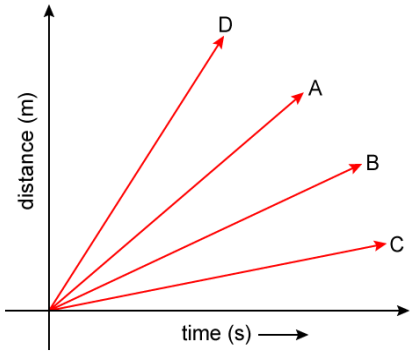
a) Speed of Car D is the highest.

b) Car A travels faster than Car B.

c) Car A travels at the same speed as Car C.

d) Speed of Car C is less.

e) Car D is the slowest.



20. How will you separate dyes in black ink using chromatography?
Explain with the help of a diagram. (5)

21. Piya's gardener was coughing continuously for the last few days and was suffering from low grade fever. He was taking home remedial treatment. One day Piya's physician visited their house. Piya got her gardener checked by the doctor. The gardener was advised to get a chest X ray and his sputum tested. (5)

(a) Name the disease the gardener might be suffering from.

(b) Name the causative organism of the disease.

(c) Give two preventive measures for the disease.

(d) Which two values were shown by Piya?

OR

(a) State the conditions essential for maintaining good health.

(b) Why is AIDS considered a syndrome and not a disease?

Section E

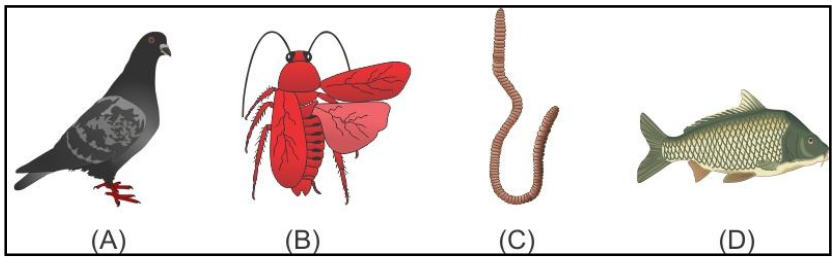
22. (2)

(a) List any one plant with a tap root system.

(b) Which type of plants have tap roots? List any two characteristics of such plants.

OR

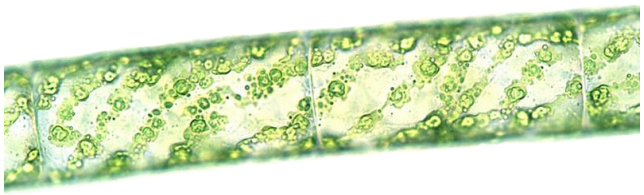
Observe the specimen samples kept in the laboratory and answer the questions that follow:



(a) Which of the above specimens have jointed appendages for locomotion?

(b) List any two features which enable us to classify earthworm as annelid.

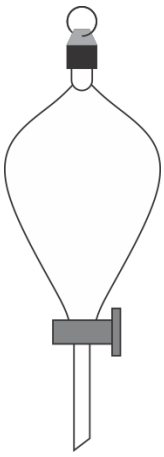
23. The teacher showed a student the given specimen. (2)



(a) Identify the specimen and the division to which it belongs.

(b) Which features will help the student in the identification of the specimen?

24. Observe the apparatus shown below and answer the following questions: (2)



(a) Name the apparatus.

(b) Write one use of the apparatus.

25. A 0.24 g sample of compound of carbon and oxygen on analysis was found to contain 0.096 g of carbon and 0.144 g of oxygen. Find the percentage composition of the compound by weight. (2)

OR

Two elements X and Y combine in the gaseous state to form XY in the ratio 1:35.5 by mass. What will be the mass of Y that combines with 2 g of X?

26. Why sound waves are called mechanical waves? Give one difference between sound waves and radio waves. What are light waves termed as? (2)

27. The weight of a metal bob in air is 100 g. The maximum loss in weight of the metal bob in a liquid is 40 g. How much must it weigh in a liquid? Also explain what you mean by maximum loss in weight. (2)

OR

(i) To move a wooden block A placed on a horizontal surface, Atul uses a spring balance and measures the minimum required force F_1. Now, he keeps one more block B over it and then measures the minimum required force as F_2. The relation between F_1 and F_2 is

A. $F_1 > F_2$

B. $F_2 > F_1$

C. $F_1 = F_2$

D. Depends on which face of block A is placed on the surface

(ii) What will happen if the blocks are interchanged?

CBSE
Class IX Science
Sample Paper – 10 Solution

Section A

1. Nitrogen compounds obtained by industrial fixation:
- Ammonia
- Urea

2. Desirable traits for fodder crops:
- Tallness
- Profuse branching

Section B

3. Iron forms two types of ions, Fe^{2+} and Fe^{3+}.

The Fe^{2+} ion is known as iron (II) ion or ferrous ion and has valency of +2. The Fe^{3+} ion is known as iron (III) ion or ferric ion and it has a valency of +3.

4. Here, the speed of sound, v = 330 m; time, t = 3 s

Because the total distance covered by sound is two times the distance between the gunman and the cliff d, we have

$$d = \frac{v \times t}{2}$$

$$= \frac{330\ m/s \times 3\ s}{2}$$

$$\therefore d = 495\ m$$

5.

(a) Striated muscles are under the control of one's own will or volition. Hence, they are called voluntary muscles.

(b) They are attached to the bones of the body. Therefore, they are mostly called skeletal muscles.

OR

The husk of coconut is made of sclerenchymatous tissue. The complex polymer lignin hardens the cell wall and is responsible for the stiffness of the sclerenchyma tissue.

Section C

6.

(a) Nuclear pore: It allows the transfer of materials from inside the nucleus to the cytoplasm.

(b) Nuclear membrane: It gives a distinct identity to the nucleus by keeping its contents inside and separate from the cytoplasm.

(c) Chromosomes: They contain DNA which carries information necessary for constructing and organising cells.

7. Pteridophyta, Gymnosperms and Angiosperms are called vascular plants.

Angiosperms are further classified into monocotyledons and dicotyledons on the basis of the number of cotyledons.

Characteristics of Angiosperms:

(a) Seeds develop inside an organ which is modified to become a fruit.

(b) Plant embryos in seeds have structures called cotyledons.

OR

Differences between Platyhelminths and Nematodes:

	Platyhelminths	**Nematodes**
Body cavity	• No true body cavity	• Pseudocoelom present
Body form	• Body is flattened	• Body is cylindrical

Similarities between Platyhelminths and Nematodes: (any one)

- Bilateral symmetry
- Triploblastic

8.

Mass of car 1 = $m_1 = 750\ kg$

Mass of car 2= $m_2 = 1500\ kg$

force for both the cars is same.

$\therefore F_1 = F_2$

The acceleration for car 1 is $a_1 = \frac{F_1}{m_1} = \frac{F_1}{750}$

The acceleration for car 2 is $a_2 = \frac{F_2}{m_2} = \frac{F_2}{1500}$

Thus the relation between a_1 and a_2 is given by,

$$\rightarrow \frac{a_1}{a_2} = \frac{\frac{F_1}{750}}{\frac{F_2}{1500}}$$

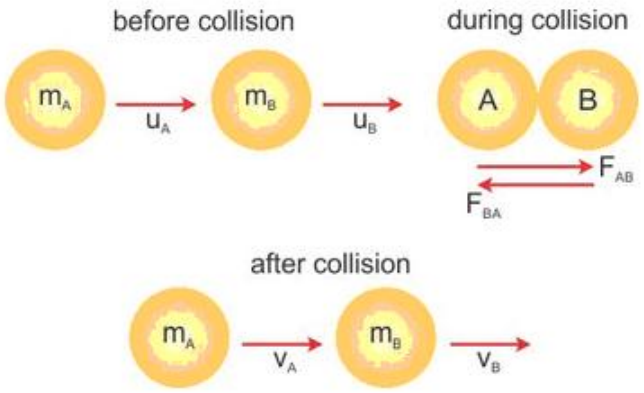
$$\therefore \frac{a_1}{a_2} = \frac{F_1}{750} \times \frac{1500}{F_2}$$

$\because F_1 = F_2$

$\Rightarrow a_1 = 2a_2$

Thus, the acceleration of car 1 is twice the acceleration of car 2.

OR



Consider two balls A and B of masses m_A and m_B, respectively, moving in the same direction along a straight line with velocities u_A and u_B. They collide for time t. After collision, their velocities become v_A and v_B.

Force exerted by A on B is

F_{AB} = Rate of change of momentum of B

$$= \frac{m(v_A - u_A)}{t}$$

Force exerted by B on A is

F_{BA} = Rate of change of momentum of A

$$= \frac{m(v_B - u_B)}{t}$$

We assume that no other external unbalanced forces are acting on the balls.

According to Newton's third law of motion, action and reaction are equal and opposite.

$$F_{AB} = -F_{BA}$$

$$\frac{m_A(v_A - u_A)}{t} = -\frac{m_B(v_B - u_B)}{t}$$

$$m_A(v_A - u_A) = -m_B(v_B - u_B)$$

$$\therefore m_A u_A + m_B u_B = m_A v_A + m_B v_B$$

Thus, total momentum before collision is equal to total momentum after collision.

9. Hydrogen and oxygen are chemically combined in the water molecule and are present in a fixed ratio of 1:8 by mass.

Properties of hydrogen and oxygen are different from those of water.

10. Harmful effects of excessive irrigation:

(a) It may lead to soil erosion.

(b) It changes the composition of soil by solubilising some of the minerals from the soil.

(c) It leads to water pollution.

11. The scientific name of coconut is *Cocos nucifera*. In this case, the genus is *Cocos* and the species is *nucifera*. According to the rules of binomial nomenclature, the scientific name of every organism consists of two terms. The first term is the genus name and it begins with a capital letter. The second term is the species name which starts with a small letter.

12. a) Gram molecular mass of chlorine = 2 × 35.5 = 71 g

One mole of chlorine will weigh mass = Gram molecular mass = 71 g

(b) Gram molecular mass of chlorine will contain = 6.022 × 1023 molecules

$$71 \text{ g of chlorine will contain } = \frac{6.022 \times 10^{23}}{71}$$

$$= 8.48 \times 10^{21} \text{ molecules of chlorine}$$

OR

$$\text{Mass of calcium in 1.2 g sample of } CaCO_3 = \frac{40 \times 1.5}{100}$$

$$= 0.6 \text{ g}$$

$$\text{Mass of carbon in 1.5 g sample of } CaCO_3 = \frac{12 \times 1.5}{100}$$

$$= 0.18 \text{ g}$$

$$\text{Mass of oxygen in 1.5 g sample of } CaCO_3 = \frac{48 \times 1.5}{100}$$

$$= 0.72 \text{ g}$$

13. The upward force acting on the object immersed in a liquid is called buoyant force.

Factors affecting buoyant force:

i) Volume of an object immersed in a liquid.

ii) Density of the liquid in which the object is immersed.

Buoyant force is also called 'upthrust'.

14.

(a) Molecular mass:

- Barium chloride
  Molecular formula = $BaCl_2$
  Atomic mass of Ba = 137, Cl = 35.5
  Molecular mass = 137 + (35.5 × 2)
  = 208 units
- Sodium sulphate
  Molecular formula = Na_2SO_4
  Atomic mass of Na = 23, S = 32, O=16
  Molecular mass = (23 × 2) + 32 + (16 × 4)
  = 142 units

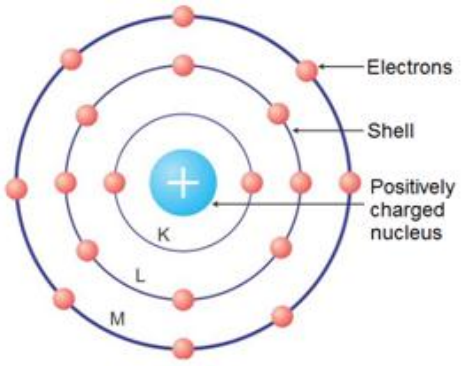
(b) Neha showed scientific approach to complete the activity.

15. Speed is defined as the distance travelled per unit time.
Speed is a scalar quantity as it only has magnitude and not direction.

Section D

16. Bohr developed the Bohr model of the atom, in which he proposed that energy levels of electrons are discrete and that the electrons revolve in stable orbits around the atomic nucleus but can jump from one energy level (or orbit) to another.
Bohr's model of an atom

- Niels Bohr revised Rutherford's atomic model and put forth the following suggestions:
- Niels Bohr proposed that the electrons possess a specific amount of energy which allows them to revolve around the nucleus.
- An atom contains discrete orbits which correspond to specific amount of energy. Hence, these orbits are also known as energy levels.
- The energy levels of an atom are represented as K, L, M, N and so on or the numbers n = 1, 2, 3, 4 and so on.



Niels Bohr's Atomic Model

- Electrons are confined to these energy levels. While revolving in these discrete orbits, the electrons do not radiate energy. Hence, these orbits are also known as stationary orbits or stationary shells. Smaller the size of the orbit, smaller is its energy.
- As we move away from the nucleus, the energy of the orbit increases progressively.
- The transfer of an electron from one orbit to another is always accompanied with absorption or emission of energy.
- When an electron jumps from a lower energy level to a higher energy level, it absorbs energy.
- When an electron returns from a higher energy level to a lower energy level, it emits energy.

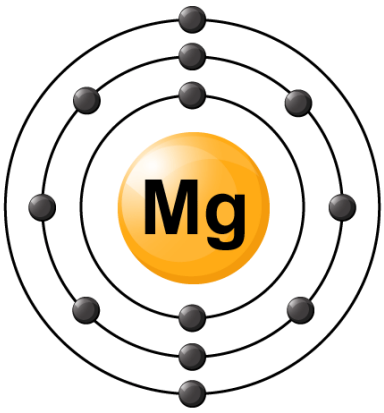
OR

The atomic number of magnesium atom is 12.

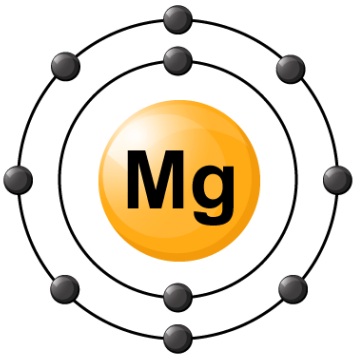
The atomic number of magnesium ion (Mg^{2+}) is 10.

Distribution of electrons:

For magnesium atom, electronic configuration: 2, 8, 2



For magnesium ion, electronic configuration: 2, 8



17. Urbanisation and industrialisation are mainly responsible for the increase in environmental pollution because

- Increased consumption of fossil fuels has increased the production of pollutants such as CO_2, SO_2 and NO_2.
- Release of CFC molecules in the atmosphere has led to the depletion of the ozone layer which results in the entry of UV rays into the Earth's atmosphere.
- Oxides of sulphur and nitrogen dissolve in rainwater and produce acid rain.

Measures to check environmental pollution:

- Reduce the consumption of fossil fuels
- Plant more trees
- Use of non-conventional sources of energy such as solar energy, wind energy and tidal energy

18.

(i) a) Case A shows the positive work done. As the ball is hit by the player in the direction of motion of a ball, it is positive work.

b) As the bob tied is revolved in a circular path, its displacement will remain zero. Thus, case B shows that no work is done.

c) Case C shows negative work. As the frictional force opposes the direction of motion of the ball, the work done is negative.

(ii) A body at rest will remain at rest or will continue to be in motion until and unless it is compelled by an external force to change its state of rest or of uniform motion.

For example, if a ball is at rest on the ground, it will remain in the same state unless a force is applied to it. Or if the ball is rolling, it continues to be in that state of motion unless an external or frictional force acts on it to put it at rest.

19.

(i) Second kinematical equation is given by

$$s = ut + \frac{1}{2}at^2$$

(ii) Initial velocity, u = 3 m/s

Time required to reach certain height is (t)= 5 s

g= 10 m/s^2

When the motion is against the gravity the kinematical equation is

$$s = ut + \frac{1}{2}gt^2$$

$$s = 3\,(5) + \frac{1}{2}\times(10)\times 5^2$$

$$s = 140 \text{ m}$$

OR

Statements (c) and (e) are incorrect.

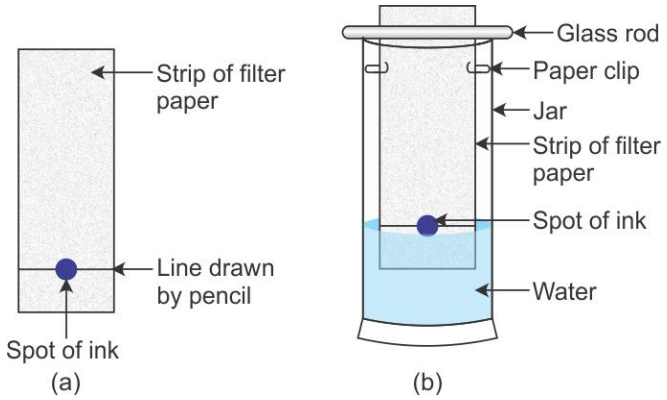
Statement (a) is correct as Car D travels more distance in less time.
Statement (b) is correct as Car A covers more distance than Car B in less time.
Statement (d) is correct as Car C covers less distance than the other cars in more time.

20. Method:

I. Take a thin strip of filter paper.
II. Using a pencil, draw a line on it approx. 3 cm above the lower edge.
III. Put a small drop of ink at the centre of the line and let it dry.
IV. Lower the filter paper into a glass jar containing water in such a way that the ink drop remains just above the water level. Leave it undisturbed.
V. Water rises in the filter paper. The ink drop separates into its constituents.

Conclusion:

Dye in black ink is a mixture of 2 or 3 colours. The coloured component which is more soluble in water rises faster, and in this way, the colours get separated.



21.

(a) Tuberculosis
(b) Bacteria (*Mycobacterium tuberculosis*)
(c) Preventive measures for tuberculosis: (any two)

- Covering of the mouth while coughing
- Isolation and proper rehabilitation of the patient
- Avoidance of overcrowding
- Provision of good ventilation
- Better nutrition

(d) Values shown by Piya:

- Awareness
- Caring nature
- Helpfulness

OR

(a) Conditions essential for maintaining good health:

- Better social environment

- Better public cleanliness
- Good economic conditions
- Social equality and harmony

(b)

- A syndrome is a group of symptoms, signs, physical and physiological disturbances that characterise a particular abnormality or condition.
- AIDS is a complex of diseases and symptoms which develop due to failure of the body to fight off even minor infections.
- HIV that causes AIDS damages the immune system of the patient by destroying T_4 helper cells or T lymphocytes.
- Since HIV reduces the natural immunity of the human body, patients suffering from AIDS become prone to many other opportunistic infections.
- As a result, even a minor cold leads to the development of pneumonia, a slight gut infection leads to severe diarrhoea and blood loss, and skin rashes develop into ulcers.
- Patients suffering from AIDS die due to secondary infection.

Section E

22.

(a) Plants like peas, Bengal gram and lentils have a tap root system.

(b) Dicot plants have a tap root system.

Characteristics of dicot plants: (any two)

- Two cotyledons
- Tap root system
- Parallel venation

OR

(a) Specimen B (cockroach) which belongs to Phylum Arthropoda has jointed appendages for locomotion.

(b) Features of earthworm:

- Metameric segmentation
- Body bilaterally symmetrical
- Presence of ring-like segments called annuli over the body surface

The above features enable us to classify earthworm as an annelid.

23.

(a) The given specimen is of *Spirogyra*. It belongs to Division Algae.

(b) Filamentous nature, presence of cytoplasmic strands and presence of pyrenoids will help the student in the identification of the specimen.

24.

(a) The given apparatus is a separating funnel.

(b) It is used to separate a mixture of immiscible liquids.

25. Mass of compound = 0.24 g

Mass of carbon = 0.096 g

Mass of oxygen = 0.144 g

$$\% \text{ of carbon} = \frac{\text{Mass of carbon}}{\text{Mass of compound}} \times 100$$

$$= \frac{0.096}{0.24} \times 100$$

$$= 40\ \%$$

$$\% \text{ of oxygen} = \frac{\text{Mass of oxygen}}{\text{Mass of compound}} \times 100$$

$$= \frac{0.144}{0.24} \times 100$$

$$= 60\ \%$$

OR

Given:

X:Y = 1:35.5

By using the laws of combination;

That is 1 g of X reacts with 35.5 g of Y to form XY.

So 2 g of X will react with

$$\frac{2 \times 35.5}{1}$$

$$= 71.0 \text{g}$$

The 71 g of Y will combines with 2 g of X.

26. Sound waves are called mechanical waves because they require a medium for their propagation. The difference between sound waves and radio waves is that radio waves can propagate through vacuum.

Light waves are also called electromagnetic waves (waves which involve electric and magnetic fields of empty space).

27. The weight of an object decreases when it is immersed in a liquid.

Weight of a bob in air = 100 g

Maximum loss in weight = 40 g

Thus, the weight of the bob when immersed in a liquid = (100 – 40) g = 60 g

Maximum loss in weight of an object takes place only when an object is fully immersed in the liquid.

OR

(i) The force with two blocks F_2 will be greater than with one block F_1,

i.e. $F_2 > F_1$.

(ii) If the blocks are interchanged, then no change will occur as the total weight remains the same, and hence, $F_2 > F_1$.