NCERT Science Question Paper (Class-9)

Chapter 1 Matter In Our Surroundings

Question 1. Which of the following are matter? Chair, air, love, smell, hate, almonds, thought, cold, colddrink, smell of perfume.

Question 2. Give reasons for the following observation: The smell of hot sizzling food reaches you several metres away, but to get the smell from cold food you have to go close.

Question 3. A diver is able to cut through water in a swimming pool. Which property of matter does this observation show?

Question 4. What are the characteristics of the particles of matter?

Question 5. The mass per unit volume of a substance is called density. (density = mass/volume). Arrange the following in order of increasing density – air, exhaust from chimneys, honey, water, chalk, cotton and iron.

Question 6. (a) Tabulate the differences in the characterisitcs of states of matter. (b) Comment upon the following: rigidity, compressibility, fluidity, filling a gas container, shape, kinetic energy and density.

Question 7. Give reasons

(a) A gas fills completely the vessel in which it is kept.

(b) A gas exerts pressure on the walls of the container. (c) A wooden table should be called a solid.

(d) We can easily move our hand in air but to do the same through a solid block of wood we need a karate expert.

Question 8. Liquids generally have lower density as compared to solids. But you must have observed that ice floats on water. Find out why.

Question 9. Convert the following temperature to celsius scale: a. 300 K b. 573 K.

Question 10. What is the physical state of water at: a. 250⁰C b. 100⁰C ? 3. For any substance, why does the temperature remain constant during the change of state? 4. Suggest a method to liquefy atmospheric gases.

Question 11. Why does a desert cooler cool better on a hot dry day?

Question 12. How does the water kept in an earthen pot (matka) become cool during summer?

Question 13. Why does our palm feel cold when we put some acetone or petrol or perfume on it? 4. Why are we able to sip hot tea or milk faster from a saucer rather than a cup?

Question 14. What type of clothes should we wear in summer?

Question 15 1. Convert the following temperatures to the Celsius scale.

(a) 300 K

(b) 573 K.

Question 16. Convert the following temperatures to the Kelvin scale.

(a) 25°C

(b) 373°C.

Question 17. Give reason for the following observations.

(a) Naphthalene balls disappear with time without leaving any solid.

(b) We can get the smell of perfume sitting several metres away.

Question 18. Arrange the following substances in increasing order of forces of attraction between the particles— water, sugar, oxygen.

Question 19. What is the physical state of water at—

(a) 25°C

(b) 0°C

(c) 100°C ?

Question 20. Give two reasons to justify—

(a) water at room temperature is a liquid.

(b) an iron almirah is a solid at room temperature.

Question 21. Why is ice at 273 K more effective in cooling than water at the same temperature?

Question 22. What produces more severe burns, boiling water or steam?

Question 23. Name A,B,C,D,E and F in the following diagram showing change in its state

Chapter 2 Is Matter Around Us Pure

Question 1. What is meant by a pure substance?

Question 2. List the points of differences between homogeneous and heterogeneous mixtures.

Question 3. Differentiate between homogeneous and heterogeneous mixtures with examples.

Question 4. How are sol solution and suspension different from each other?

Question 5. To make a saturated solution 36 g of sodium chloride is dissolved in 100 g of water at 293 K. Find its concentration at this temperature.

Question 6. How will you separate a mixture containing kerosene and petrol (difference in their boiling points is more than 25⁰C) which are miscible with each other?

Question 7. Name the technique to separate

(i) butter from curd

(ii) salt from sea-water

(iii) camphor from salt.

Question 8. What type of mixtures are separated by the technique of crystallisation?

Question 9. Classify the following as chemical or physical changes:

- cutting of trees

- melting of butter in a pan

- rusting of almirah

- boiling of water to form steam

- passing of electric current through water and the water breaking down into hydrogen and oxygen gases

- dissolving common salt in water

- making a fruit salad with raw fruits and

- burning of paper and wood.

Question 10. Try segregating the things around you as pure substances or mixtures. NCERT Solutions Intext Questions Page no.

Question 11. Which separation techniques will you apply for the separation of the following?

(a) Sodium chloride from its solution in water.

(b) Ammonium chloride from a mixture containing sodium chloride and ammonium chloride.

(c) Small pieces of metal in the engine oil of a car.

(d) Different pigments from an extract of flower petals.

(e) Butter from curd.

(f) Oil from water.

(g) Tea leaves from tea.

(h) Iron pins from sand.

(i) Wheat grains from husk.

(j) Fine mud particles suspended in water.

Question 12. Write the steps you would use for making tea. Use the words solution, solvent, solute, dissolve, soluble, insoluble, filtrate and residue.

Question 13. Pragya tested the solubility of three different substances at different temperatures and collected the data as given below (results are given in the following table, as grams of substance dissolved in 100 grams of water to form a saturated solution) .

(a) What mass of potassium nitrate would be needed to produce a saturated solution of potassium nitrate in 50 grams of water at 313 K?

(b) Pragya makes a saturated solution of potassium chloride in water at 353 K and leaves the solution to cool at room temperature. What would she observe as the solution cools? Explain.

(c) Find the solubility of each salt at 293 K. Which salt has the highest solubility at this temperature?

(d) What is the effect of change of temperature on the solubility of a salt?

Question 14. Explain the following giving examples.

(a) saturated solution

(b) pure substance

(c) colloid

(d) suspension

Question 15. Classify each of the following as a homogeneous or heterogeneous mixture. soda water, wood, air, soil, vinegar, filtered tea.

Question 16. How would you confirm that a colourless liquid given to you is pure water?

Question 17. Which of the following materials fall in the category of a "pure substance"?

(a) Ice

(b) Milk

(c) Iron

(d) Hydrochloric acid

(e) Calcium oxide

(f) Mercury

(g) Brick

(h) Wood

(i) Air.

Question 18. Identify the solutions among the following mixtures.

(a) Soil

(b) Sea water

(c) Air

(d) Coal

(e) Soda water.

Question 19. Which of the following will show "Tyndall effect"?

(a) Salt solution

(b) Milk

(c) Copper sulphate solution

(d) Starch solution.

Question 20. Classify the following into elements, compounds and mixtures.

(a) Sodium

(b) Soil

(c) Sugar solution

(d) Silver

(e) Calcium carbonate

(f) Tin

(g) Silicon

(h) Coal

(i) Air

(j) Soap

(k) Methane

(l) Carbon dioxide

(m) Blood

Question 21. Which of the following are chemical changes?

(a) Growth of a plant

(b) Rusting of iron

(c) Mixing of iron filings and sand

(d) Cooking of food

(e) Digestion of food

(f) Freezing of water

(g) Burning of a candle.

Chapter 3 Atoms and Molecules

Quetion 1. In a reaction, 5.3 g of sodium carbonate reacted with 6 g of ethanoic acid. The products were 2.2 g of carbon = dioxide, 0.9 g water and 8.2 g of sodium ethanoate. Show that theseobservations are in agreement with the law of conservation of mass. sodium carbonate + ethanoic acid → sodium ethanoate + carbon dioxide + water

Quetion 2. Hydrogen and oxygen combine in the ratio of 1:8 by mass to form water. What mass of oxygen gas would be required to react completely with 3 g of hydrogen gas?

Quetion 3. Which postulate of Dalton's atomic theory is the result of the law of conservation of mass?

Quetion 4. Which postulate of Dalton's atomic theory can explain the law of definite proportions?

Quetion 5. Define the atomic mass unit.

Quetion 6. Why is it not possible to see an atom with naked eyes?

Quetion 7.Following formulae:
(i) $Al_2(SO_4)_3$
(ii) $CaCl_2$
(iii) K_2SO_4
(iv) KNO_3
(v) $CaCO_3$.

Question 8. What is meant by the term chemical formula?

Question 9. How many atoms are present in a
(i) H_2S molecule and
(ii) PO_4^{3-} ion?

Question 10. Write down the formulae of
(i) sodium oxide
(ii) aluminium chloride

(iii) sodium suphide

(iv) magnesium hydroxide

Question 11. Write down the names of compounds represented by the

Question 12. Calculate the molecular masses of H2, O2, Cl2, CO2, CH4, C2H6, C2H4, NH3, CH3OH.

Question 13. Calculate the formula unit masses of ZnO, Na2O, K2CO3, given atomic masses of Zn = 65 u, Na = 23 u, K = 39 u, C = 12 u, and O = 16 u.

Question 14. If one mole of carbon atoms weighs 12 gram, what is the mass (in gram) of 1 atom of carbon?

Question 15. Which has more number of atoms, 100 grams of sodium or 100 grams of iron (given, atomic mass of Na = 23 u, Fe = 56 u)?

Question 16. A 0.24 g sample of compound of oxygen and boron was found by analysis to contain 0.096 g of boron and 0.144 g of oxygen. Calculate the percentage composition of the compound by weight.

Question 17 . When 3.0 g of carbon is burnt in 8.00 g oxygen, 11.00 g of carbon dioxide is produced. What mass of carbon dioxide will be formed when 3.00 g of carbon is burnt in 50.00 g of oxygen? Which law of chemical combination will govern your answer?

Question 18. What are polyatomic ions? Give examples.

Question 19 Write the chemical formulae of the following.

(a) Magnesium chloride

(b) Calcium oxide

(c) Copper nitrate

(d) Aluminium chloride

(e) Calcium carbonate.

Question 20. Give the names of the elements present in the following compounds.

(a) Quick lime

(b) Hydrogen bromide

(c) Baking powder

(d) Potassium sulphate.

Question 21. Calculate the molar mass of the following substances.

(a) Ethyne, C2H2

(b) Sulphur molecule, S8

(c) Phosphorus molecule, P4 (Atomic mass of phosphorus = 31)

(d) Hydrochloric acid, HCl

(e) Nitric acid, HN O3

Question 22. What is the mass of—

(a) 1 mole of nitrogen atoms?

(b) 4 moles of aluminium atoms (Atomic mass of aluminium = 27)?

(c) 10 moles of sodium sulphite (Na2SO3)?

Question 23. Convert into mole.

(a) 12 g of oxygen gas

(b) 20 g of water

(c) 22 g of carbon dioxide.

Question 24. What is the mass of:

(a) 0.2 mole of oxygen atoms?

(b) 0.5 mole of water molecules?

Question 25. Calculate the number of molecules of sulphur (S8) present in 16 g of solid sulphur.

Question 26. Calculate the number of aluminium ions present in 0.051 g of aluminium oxide. (Hint: The mass of an ion is the same as that of an atom of the same element. Atomic mass of Al = 27 u)

Chapter 4 Structure of The Atom

Question 1. What are canal rays?

Question 2. If an atom contains one electron and one proton, will it carry any charge or not?

Question 3. On the basis of Thomson's model of an atom, explain how the atom is neutral as a whole.

Question 4. On the basis of Rutherford's model of an atom, which subatomic particle is present in the nucleus of an atom?

Question 5. Draw a sketch of Bohr's model of an atom with three shells.

Question 6. What do you think would be the observation if the α-particle scattering experiment is carried out using a foil of a metal other than gold?

Question 7. Write the distribution of electrons in carbon and sodium atoms.

Question 8. If K and L shells of an atom are full, then what would be the total number of electrons in the atom?

Question 9. How will you find the valency of chlorine, sulphur and magnesium?

Question 10. For the symbol H,D and T tabulate three sub-atomic particles found in each of them.

Question 12. Write the electronic configuration of any one pair of isotopes and isobars.

Question 13. Compare the properties of electrons, protons and neutrons.

Question 14. What are the limitations of J.J. Thomson's model of the atom?

Question 15. What are the limitations of Rutherford's model of the atom?

Question 16. Describe Bohr's model of the atom.

Question 17. Compare all the proposed models of an atom given in this chapter.

Question 18. Summarise the rules for writing of distribution of electrons in various shells for the first eighteen elements.

Question 19. Define valency by taking examples of silicon and oxygen.

Question 20. Explain with examples

(i) Atomic number

(ii) Mass number

(iii) Isotopes

(iv) Isobars. Give any two uses of isotopes.

Question 21. Na+ has completely filled K and L shells. Explain.

Question 22. If bromine atom is available in the form of, say, two isotopes 79 35 Br (49.7%) and 81 35 Br (50.3%), calculate the average atomic mass of bromine atom.

Question 23. The average atomic mass of a sample of an element X is 16.2 u. What are the percentages of isotopes 16 8 X and 18 8 X in the sample?

Question 24. If Z = 3, what would be the valency of the element? Also, name the element.

Question 25. Composition of the nuclei of two atomic species X and Y are given as under X Y Protons = 6 6 Neutrons = 6 8 Give the mass numbers of X and Y. What is the relation between the two species?

Question 26. For the following statements, write T for True and F for False.

(a) J.J. Thomson proposed that the nucleus of an atom contains only nucleons.

(b) A neutron is formed by an electron and a proton combining together. Therefore, it is neutral.

(c) The mass of an electron is about 1 2000 times that of proton.

(d) An isotope of iodine is used for making tincture iodine, which is used as a medicine. Put tick () against correct choice and cross (×) against wrong choice in questions 15, 16 and 17

Question 27. Rutherford's alpha-particle scattering experiment was responsible for the discovery of

(a) Atomic Nucleus

(b) Electron

(c) Proton

(d) Neutron

Question 28. Isotopes of an element have

(a) the same physical properties

(b) different chemical properties

(c) different number of neutrons

(d) different atomic numbers.

Question 29. Number of valence electrons in Cl– ion are:

(a) 16

(b) 8

(c) 17

(d) 18

Question 30. Which one of the following is a correct electronic configuration of sodium?

(a) 2,8

(b) 8,2,1

(c) 2,1,8

(d) 2,8,1.

Question 31. Complete the following table.

Chapter 5 The Fundamental Unit of Life

Question 1. Who discovered cells, and how?

Question 2. Why is the cell called the structural and functional unit of life?

Question 3. How do substances like CO_2 and water move in and out of the cell? Discuss.

Question 4. Why is the plasma membrane called a selectively permeable membrane?

Question 5. Fill in the gaps in the following table illustrating differences between prokaryotic and eukaryotic cells.

Question 6. Can you name the two organelles we have studied that contain their own genetic

material?

Question 7. If the organisation of a cell is destroyed due to some physical or chemical influence, what will happen?

Question 8. Why are lysosomes known as suicide bags?

Question 9. Where are proteins synthesised inside the cell?

Question 10. Make a comparison and write down ways in which plant cells are different from animal cells.

Question 12. How is a prokaryotic cell different from a eukaryotic cell?

Question 13. What would happen if the plasma membrane ruptures or breaks down?

Question 14. What would happen to the life of a cell if there was no Golgi apparatus?

Question 15. Which organelle is known as the powerhouse of the cell? Why?

Question 16. Where do the lipids and proteins constituting the cell membrane get synthesised?

Question 17. How does an Amoeba obtain its food?

Question 18. What is osmosis?

Question 19. Carry out the following osmosis experiment: Take four peeled potato halves and scoos each one out to make potato cups. One of these potato cups should be made from a boiled potato. Put each potato cup in a trough containing water. Now,
(a) Keep cup A empty
(b) Put one teaspoon sugar in cup B
(c) Put one teaspoon salt in cup C
(d) Put one teaspoon sugar in the boiled potato cup D.

Keep these for two hours. Then observe the four potato cups and answer the following:
(i) Explain why water gathers in the hollowed portion of B and C.

(ii) Why is potato A necessary for this experiment?

(iii) Explain why water does not gather in the hollowed out portions of A and D.

Chapter 7 Diversity In Living Organisms

Question 1. Why do we classify organisms?

Question 2. Give three examples of the range of variations that you see in lifeforms around you

Question 3. Which do you think is a more basic characteristic for classifying organisms?

(a) The place where they live.

(b) The kind of cells they are made of. Why?

Question 4. What is the primary characteristic on which the first division of organisms is made?

Question 5. On what bases are plants and animals put into different categories?

Question 6. Which organisms are called primitive and how are they different from the so-called advanced organisms?

Question 7. Will advanced organisms be the same as complex organisms? Why?

Question 8. What is the criterion for classification of organisms as belonging to kingdom Monera or Protista?

Question 9. In which kingdom will you place an organism which is singlecelled, eukaryotic and photosynthetic?

Question 10. In the hierarchy of classification, which grouping will have the smallest number of organisms with a maximum of characteristics in common and which will have the largest number of organisms?

Question 11. Which division among plants has the simplest organisms?

Question 12. How are pteridophytes different from the phanerogams?

Question 13. How do gymnosperms and angiosperms differ from each other?

Question 14. How do poriferan animals differ from coelenterate animals?

Question 15. How do annelid animals differ from arthropods?

Question 16. What are the differences between amphibians and reptiles?

Question 17. What are the differences between animals belonging to the Aves group and those in the mammalia group?

Question 18. What are the advantages of classifying organisms?

Question 19. How would you choose between two characteristics to be used for developing a hierarchy in classification?

Question 20. Explain the basis for grouping organisms into five kingdoms.

Question 21. What are the major divisions in the Plantae? What is the basis for these divisions?

Question 22. How are the criteria for deciding divisions in plants different from the criteria for deciding the subgroups among animals?

Question 23. Explain how animals in Vertebrata are classified into further subgroups.

Chapter 8 Motion

Question 1. An object has moved through a distance. Can it have zero displacement? If yes, support your answer with an example.

Question 2. A farmer moves along the boundary of a square field of side 10 m in 40 s. What will be the magnitude of displacement of the farmer at the end of 2 minutes 20 seconds?

Question 3. Which of the following is true for displacement?

(a) It cannot be zero.

(b) Its magnitude is greater than the distance travelled by the object.

Question 4. Distinguish between speed and velocity.

Question 5. Under what condition(s) is the magnitude of average velocity of an object equal to its average speed?

Question 6. What does the odometer of an automobile measure?

Question 7. What does the path of an object look like when it is in uniform motion?

Question 5. During an experiment, a signal from a spaceship reached the ground station in five minutes. What was the distance of the spaceship from the ground station? The signal travels at the speed of

Question 8. When will you say a body is in
(i) uniform acceleration?
(ii) nonuniform acceleration?

Question 9. A bus decreases its speed from 80 km h–1 to 60 km h–1 in 5 s. Find the acceleration of the bus.

Question 10. A train starting from a railway station and moving with uniform acceleration attains a speed 40 km h–1 in 10 minutes. Find its acceleration.

Question 11. What is the nature of the distance-time graphs for uniform and non-uniform motion of an object?

Question 12. What can you say about the motion of an object whose distance-time graph is a straight line parallel to the time axis?

Question 13. What can you say about the motion of an object if its speedtime graph is a straight line parallel to the time axis?

Question 14. What is the quantity which is measured by the area occupied below the velocity-time

graph?

Question 15. A bus starting from rest moves with a uniform acceleration of 0.1 m s-2 for 2 minutes. Find
(a) The speed acquired,
(b) The distance travelled

Question 16. A train is travelling at a speed of 90 km h–1. Brakes are applied so as to produce a uniform acceleration of – 0.5 m s-2. Find how far the train will go before it is brought to rest.

Question 17. A trolley, while going down an inclined plane, has an acceleration of 2 cm s-2. What will be its velocity 3 s after the start?

Question 18. A racing car has a uniform acceleration of 4 m s-2. What distance will it cover in 10 s after start?

Question 19. A stone is thrown in a vertically upward direction with a velocity of 5 m s-1. If the acceleration of the stone during its motion is 10 m s–2 in the downward direction, what will be the height attained by the stone and how much time will it take to reach there?

Question 20. An athlete completes one round of a circular track of diameter 200 m in 40 s. What will be the distance covered and the displacement at the end of 2 minutes 20 s?

Question 21. Joseph jogs from one end A to the other end B of a straight 300 m road in 2 minutes 50 seconds and then turns around and jogs 100 m back to point C in another 1 minute. What are Joseph's average speeds and velocities in jogging
(a) from A to B and
(b) from A to C?

Question 22. Abdul, while driving to school, computes the average speed for his trip to be 20 km h–1. On his return trip along the same route, there is less traffic and the average speed is 40 km h–1. What is the average speed for Abdul's trip?

Question 23. A motorboat starting from rest on a lake accelerates in a straight line at a constant rate of 3.0 m s–2 for 8.0 s. How far does the boat travel during this time?

Question 24. A driver of a car travelling at 52 km h–1 applies the brakes and accelerates uniformly in the opposite direction. The car stops in 5 s. Another driver going at 3 km h–1 in another car applies his brakes slowly and stops in 10 s. On the same graph paper, plot the speed versus time graphs for the two cars. Which of the two cars travelled farther after the brakes were applied?

Chapter 9 Force and Laws of Motion

Question 1. Which of the following has more inertia:

(a) a rubber ball and a stone of the same size?

(b) a bicycle and a train?

(c) a fiverupees coin and a one-rupee coin?

Question 2. In the following example, try to identify the number of times the velocity of the ball changes: "A football player kicks a football to another player of his team who kicks the football towards the goal. The goalkeeper of the opposite team collects the football and kicks it towards a player of his own team". Also identify the agent supplying the force in each case.

Question 3. Explain why some of the leaves may get detached from a tree if we vigorously shake its branch.

Question 4. Why do you fall in the forward direction when a moving bus brakes to a stop and fall backwards when it accelerates from rest?

Question 4. If action is always equal to the reaction, explain how a horse can pull a cart.

Question 5. Explain, why is it difficult for a fireman to hold a hose, which ejects large amounts of water at a high velocity.

Question 6. From a rifle of mass 4 kg, a bullet of mass 50 g is fired with an initial velocity of 35 m s–1. Calculate the initial recoil velocity of the rifle.

Question 7. Two objects of masses 100 g and 200 g are moving along the same line and direction with velocities of 2 m s–1 and 1 m s–1, respectively. They collide and after the collision, the first object moves at a velocity of 1.67 m s–1. Determine the velocity of the second object.

Question 8. An object experiences a net zero external unbalanced force. Is it possible for the object to be travelling with a non-zero velocity? If yes, state the conditions that must be placed on the magnitude and direction of the velocity. If no, provide a reason.

Question 9. When a carpet is beaten with a stick, dust comes out of it. Explain.

Question 10. Why is it advised to tie any luggage kept on the roof of a bus with a rope?

Question 11. A batsman hits a cricket ball which then rolls on a level ground. After covering a short distance, the ball comes to rest. The ball slows to a stop because
(a) the batsman did not hit the ball hard enough.
(b) velocity is proportional to the force exerted on the ball.
(c) there is a force on the ball opposing the motion.
(d) there is no unbalanced force on the ball, so the ball would want to come to rest.

Question 12. A truck starts from rest and rolls down a hill with a constant acceleration. It travels a distance of 400 m in 20 s. Find its acceleration. Find the force acting on it if its mass is 7 metric tonnes (Hint: 1 metric tonne = 1000 kg.)

Question 13. A stone of 1 kg is thrown with a velocity of 20 m s–1 across the frozen surface of a lake and comes to rest after travelling a distance of 50 m. What is the force of friction between the stone and the ice?

Question 14. A 8000 kg engine pulls a train of 5 wagons, each of 2000 kg, along a horizontal track. If the engine exerts a force of 40000 N and the track offers a friction force of 5000 N, then calculate:
(a) the net accelerating force
(b) the acceleration of the train
(c) the force of wagon 1 on wagon 2.

Question 15. An automobile vehicle has a mass of 1500 kg. What must be the force between the vehicle and road if the vehicle is to be stopped with a negative acceleration of 1.7 m s–2?

Question 16. What is the momentum of an object of mass m, moving with a velocity v?
(a) (mv)2
(b) mv2

(c) ½ mv2

(d) mv

Question 17. Using a horizontal force of 200 N, we intend to move a wooden cabinet across a floor at a constant velocity. What is the friction force that will be exerted on the cabinet?

Question 18. Two objects, each of mass 1.5 kg, are moving in the same straight line but in opposite directions. The velocity of each

Chapter 10 Gravitation

Question 1. State the universal law of gravitation.

Question 2. Write the formula to find the magnitude of the gravitational force between the earth and an object on the surface of the earth.

Question 3. What do you mean by free fall?

Question 4. What do you mean by acceleration due to gravity?

Question 5. What are the differences between the mass of an object and its weight?

Question 6. Why is the weight of an object on the moon 1 6 th its weight on the earth?

Question 7. Why is it difficult to hold a school bag having a strap made of a thin and strong string?

Question 8. What do you mean by buoyancy?

Question 9. Why does an object float or sink when placed on the surface of water?

Question 10. You find your mass to be 42 kg on a weighing machine. Is your mass more or less than 42 kg?

Question 11. You have a bag of cotton and an iron bar, each indicating a mass of 100 kg when measured on a weighing machine. In reality, one is heavier than other. Can you say which one is

heavier and why?

Question 12. How does the force of gravitation between two objects change when the distance between them is reduced to half ?

Question 13. Gravitational force acts on all objects in proportion to their masses. Why then, a heavy object does not fall faster than a light object?

Question 14. What is the magnitude of the gravitational force between the earth and a 1 kg object on its surface? (Mass of the earth is 6 × 1024 kg and radius of the earth is 6.4 × 106 m.)

Question 15. The earth and the moon are attracted to each other by gravitational force. Does the earth attract the moon with a force that is greater or smaller or the same as the force with which the moon attracts the earth? Why?

Question 16. If the moon attracts the earth, why does the earth not move towards the moon?

Question 17. What happens to the force between two objects, if
(i) the mass of one object is doubled?
(ii) the distance between the objects is doubled and tripled?
(iii) the masses of both objects are doubled?

Question 18. What is the importance of universal law of gravitation?

Question 19. What is the acceleration of free fall?

Question 20. What do we call the gravitational force between the earth and an object?

Question 21. Amit buys few grams of gold at the poles as per the instruction of one of his friends. He hands over the same when he meets him at the equator. Will the friend agree with the weight of gold bought? If not, why? [Hint: The value of g is greater at the poles than at the equator.]

Question 22. Why will a sheet of paper fall slower than one that is crumpled into a ball?

Question 23. Gravitational force on the surface of the moon is only 1 6 as strong as gravitational force on the earth. What is the weight in newtons of a 10 kg object on the moon and on the earth?

Question 24. A ball is thrown vertically upwards with a velocity of 49 m/s. Calculate

(i) the maximum height to which it rises,

(ii) the total time it takes to return to the surface of the earth.

Question 25. A stone is released from the top of a tower of height 19.6 m. Calculate its final velocity.

Question 26. A stone is thrown vertically upward with an initial velocity of 40 m/s. Taking g = 10 m/s2, find the maximum height reached by the stone. What is the net displacement and the total distance covered by the stone?

Question 27. Calculate the force of gravitation between the earth and the Sun, given that the mass of the earth = 6 × 1024 kg and of the Sun = 2 × 1030 kg. The average distance between the two is 1.5 × 1011 m.

Question 28. A stone is allowed to fall from the top of a tower 100 m high and at the same time another stone is projected vertically upwards from the ground with a velocity of 25 m/s. Calculate when and where the two stones will meet.

Question 29. A ball thrown up vertically returns to the thrower after 6 s. Find

(a) the velocity with which it was thrown up,

(b) the maximum height it reaches, and

(c) its position after 4 s.

Question 30. In what direction does the buoyant force on an object immersed in a liquid act?

Question 31. Why does a block of plastic released under water come up to the surface of water?

Question 32. The volume of 50 g of a substance is 20 cm3. If the density of water is 1 g cm–3, will the substance float or sink?

Question 33. The volume of a 500 g sealed packet is 350 cm3. Will the packet float or sink in water if the density of water is 1 g cm–3? What will be the mass of the water displaced by this packet?

Chapter 11 Work And Energy

Question 1. A force of 7 N acts on an object. The displacement is, say 8 m, in the direction of the force (Fig. 11.3). Let us take it that the force acts on the object through the displacement. What is the work done in this case?

Question 1. When do we say that work is done?

Question 2. Write an expression for the work done when a force is acting on an object in the direction of its displacement.

Question 3. Define 1 J of work.

Question 4. A pair of bullocks exerts a force of 140 N on a plough. The field being ploughed is 15 m long. How much work is done in ploughing the length of the field?

Question 1. What is the kinetic energy of an object?

Question 2. Write an expression for the kinetic energy of an object.

Question 3. The kinetic energy of an object of mass, m moving with a velocity of 5 m s−1 is 25 J. What will be its kinetic energy when its velocity is doubled? What will be its kinetic energy when its velocity is increased three times?

Question 1. What is power?

Question 2. Define 1 watt of power.

Question 3. A lamp consumes 1000 J of electrical energy in 10 s. What is its power?

Question 4. Define average power.

Question 1. Look at the activities listed below. Reason out whether or not work is done in the light of your understanding of the term 'work'.
- Suma is swimming in a pond.

- A donkey is carrying a load on its back.

- A wind-mill is lifting water from a well.

- A green plant is carrying out photosynthesis

- An engine is pulling a train.

- Food grains are getting dried in the sun.

- A sailboat is moving due to wind energy.

Question 2. An object thrown at a certain angle to the ground moves in a curved path and falls back to the ground. The initial and the final points of the path of the object lie on the same horizontal line. What is the work done by the force of gravity on the object?

Question 3. A battery lights a bulb. Describe the energy changes involved in the process.

Question 4. Certain force acting on a 20 kg mass changes its velocity from 5 m s–1 to 2 m s–1. Calculate the work done by the force.

Question 5. A mass of 10 kg is at a point A on a table. It is moved to a point B. If the line joining A and B is horizontal, what is the work done on the object by the gravitational force? Explain your answer.

Question 6. The potential energy of a freely falling object decreases progressively. Does this violate the law of conservation of energy? Why?

Question 7. What are the various energy transformations that occur when you are riding a bicycle?

Question 8. Does the transfer of energy take place when you push a huge rock with all your might and fail to move it? Where is the energy you spend going?

Question 9. A certain household has consumed 250 units of energy during a month. How much energy is this in joules?

Question 10. An object of mass 40 kg is raised to a height of 5 m above the ground. What is its potential energy? If the object is allowed to fall, find its kinetic energy when it is half-way down.

Question 11. What is the work done by the force of gravity on a satellite moving round the earth? Justify your answer.

Question 12. Can there be displacement of an object in the absence of any force acting on it? Think. Discuss this question with your friends and teacher.

Question 13. A person holds a bundle of hay over his head for 30 minutes and gets tired. Has he done some work or not? Justify your answer.

Question 14. An electric heater is rated 1500 W. How much energy does it use in 10 hours?

Question 15. Illustrate the law of conservation of energy by discussing the energy changes which occur when we draw a pendulum bob to one side and allow it to oscillate. Why does the bob eventually come to rest? What happens to its energy eventually? Is it a violation of the law of conservation of energy?

Question 16. An object of mass, m is moving with a constant velocity, v. How much work should be done on the object in order to bring the object to rest?

Question 17. Calculate the work required to be done to stop a car of 1500 kg moving at a velocity of 60 km/h?

Question 18. In each of the following a force, F is acting on an object of mass, m. The direction of displacement is from west to east shown by the longer arrow. Observe the diagrams carefully and state whether the work done by the force is negative, positive or zero.

Question 19. Soni says that the acceleration in an object could be zero even when several forces are acting on it. Do you agree with her? Why?

Question 20. Find the energy in kW h consumed in 10 hours by four devices of power 500 W each.
Question 21. A freely falling object eventually stops on reaching the ground. What happenes to its kinetic energy?

Chapter 12 Sound

Question 1. Explain how sound is produced by your school bell.

Question 2. Why are sound waves called mechanical waves?

Question 3. Suppose you and your friend are on the moon. Will you be able to hear any sound produced by your friend?

Question 4. Which wave property determines (a) loudness, (b) pitch?

Question 5. Guess which sound has a higher pitch: guitar or car horn?

Question 6. What are wavelength, frequency, time period and amplitude of a sound wave?

Question 7. How are the wavelength and frequency of a sound wave related to its speed?

Question 8. Calculate the wavelength of a sound wave whose frequency is 220 Hz and speed is 440 m/s in a given medium.

Question 9. A person is listening to a tone of 500 Hz sitting at a distance of 450 m from the source of the sound. What is the time interval between successive compressions from the source?

Question 10. In which of the three media, air, water or iron, does sound travel the fastest at a particular temperature?

Question 11. An echo returned in 3 s. What is the distance of the reflecting surface from the source, given that the speed of sound is 342 m s–1?

Question 12. Why are the ceilings of concert halls curved?

Question 13. What is the audible range of the average human ear?

Question 14. What is the range of frequencies associated with (a) Infrasound? (b) Ultrasound?

Question 15. A submarine emits a sonar pulse, which returns from an underwater cliff in 1.02 s. If the speed of sound in salt water is 1531 m/s, how far away is the cliff?

Question 16. What is sound and how is it produced?

Question 17. Describe with the help of a diagram, how compressions and rarefactions are produced in air near a source of sound.

Question 18. Cite an experiment to show that sound needs a material medium for its propagation.

Question 19. Why is sound wave called a longitudinal wave?

Question 20. Which characteristic of the sound helps you to identify your friend by his voice while sitting with others in a dark room?

Question 21. Flash and thunder are produced simultaneously. But thunder is heard a few seconds after the flash is seen, why?

Question 22. A person has a hearing range from 20 Hz to 20 kHz. What are the typical wavelengths of sound waves in air corresponding to these two frequencies? Take the speed of sound in air as 344 m s–1.

Question 23. Two children are at opposite ends of an aluminium rod. One strikes the end of the rod with a stone. Find the ratio of times taken by the sound wave in air and in aluminium to reach the second child.

Question 24. The frequency of a source of sound is 100 Hz. How many times does it vibrate in a minute?

Question 25. Does sound follow the same laws of reflection as light does? Explain.

Question 26. When a sound is reflected from a distant object, an echo is produced. Let the distance between the reflecting surface and the source of sound production remains the same. Do you hear echo sound on a hotter day?

Question 27. Give two practical applications of reflection of sound waves.

Question 28. A stone is dropped from the top of a tower 500 m high into a pond of water at the base of the tower. When is the splash heard at the top? Given, g = 10 m s–2 and speed of sound = 340 m s–1.

Question 29. A sound wave travels at a speed of 339 m s–1. If its wavelength is 1.5 cm, what is the frequency of the wave? Will it be audible?

Question 30. What is reverberation? How can it be reduced?

Question 31. What is loudness of sound? What factors does it depend on?

Question 32. Explain how bats use ultrasound to catch a prey.

Question 33. How is ultrasound used for cleaning?

Question 34. Explain the working and application of a sonar.

Question 35. A sonar device on a submarine sends out a signal and receives an echo 5 s later. Calculate the speed of sound in water if the distance of the object from the submarine is 3625 m.

Question 36. Explain how defects in a metal block can be detected using ultrasound.

Question 37. Explain how the human ear works.

Chapter 13 Why Do We Fall Ill

Question 1. State any two conditions essential for good health.

Question 2. State any two conditions essential for being free of disease.

Question 3. Are the answers to the above questions necessarily the same or different? Why?

Question 4. List any three reasons why you would think that you are sick and ought to see a doctor. If only one of these symptoms were present, would you still go to the doctor? Why or why not?

Question 5. In which of the following case do you think the long-term effects on your health are likely to be most unpleasant?

- if you get jaundice,

- if you get lice,

- if you get acne. Why?

Question 6. Why are we normally advised to take bland and nourishing food when we are sick?

Question 7. What are the different means by which infectious diseases are spread?

Question 8. What precautions can you take in your school to reduce the incidence of infectious diseases?

Question 9. What is immunisation?

Question 10. What are the immunisation programmes available at the nearest health centre in your locality?

Question 11. How many times did you fall ill in the last one year? What were the illnesses?
(a) Think of one change you could make in your habits in order to avoid any of/most of the above illnesses.
(b) Think of one change you would wish for in your surroundings in order to avoid any of/most of the above illnesses.

Question 12. A doctor/nurse/health-worker is exposed to more sick people than others in the community. Find out how she/he avoids getting sick herself/himself.

Question 13. Conduct a survey in your neighbourhood to find out what the three most common diseases are. Suggest three steps that could be taken by your local authorities to bring down the incidence of these diseases.

Question 14. A baby is not able to tell her/his caretakers that she/he is sick. What would help us to find out
(a) that the baby is sick?
(b) what is the sickness?

Question 15. Under which of the following conditions is a person most likely to fall sick?

(a) when she is recovering from malaria.

(b) when she has recovered from malaria and is taking care of someone suffering from chicken-pox.

(c) when she is on a four-day fast after recovering from malaria and is taking care of someone suffering from chicken-pox. Why?

Question 16. Under which of the following conditions are you most likely to fall sick?

(a) when you are taking examinations.

(b) when you have travelled by bus and train for two days.

(c) when your friend is suffering from measles. Why?

Chapter 14 Natural Resources

Question 1. How is our atmosphere different from the atmospheres on Venus and Mars?

Question 2. How does the atmosphere act as a blanket?

Question 3. What causes winds?

Question 4. How are clouds formed?

Question 5. List any three human activities that you think would lead to air pollution.

Question 6. Why do organisms need water?

Question 7. What is the major source of fresh water in the city/town/village where you live?

Question 8. Do you know of any activity which may be polluting this water source?

Question 9. How is soil formed?

Question 10. What is soil erosion?

Question 11. What are the methods of preventing or reducing soil erosion?

Question 12. What are the different states in which water is found during the water cycle?

Question 13. Name two biologically important compounds that contain both oxygen and nitrogen.

Question 14. List any three human activities which would lead to an increase in the carbon dioxide content of air.

Question 15. What is the greenhouse effect?

Question 16. What are the two forms of oxygen found in the atmosphere?

Chapter 15 Improvement In Food Resources

Question 1. What do we get from cereals, pulses, fruits and vegetables?

Question 2. How do biotic and abiotic factors affect crop production?

Question 3. What are the desirable agronomic characteristics for crop improvements?

Question 4. What are macro-nutrients and why are they called macronutrients?

Question 5. How do plants get nutrients?

Question 6. Compare the use of manure and fertilizers in maintaining soil fertility.

Question 7. Which of the following conditions will give the most benefits? Why?
(a) Farmers use high-quality seeds, do not adopt irrigation or use fertilizers.
(b) Farmers use ordinary seeds, adopt irrigation and use fertilizer.
(c) Farmers use quality seeds, adopt irrigation, use fertilizer and use crop protection measures.

Question 8. Why should preventive measures and biological control methods be preferred for protecting crops?

Question 9. What factors may be responsible for losses of grains during storage?

Question 10. Which method is commonly used for improving cattle breeds and why?

Question 11. What management practices are common in dairy and poultry farming?

Question 12. What are the differences between broilers and layers and in their management?

Question 13. Discuss the implications of the following statement: "It is interesting to note that poultry is India's most efficient converter of low fibre food stuff (which is unfit for human consumption) into highly nutritious animal protein food."

Question 14. How are fish obtained?

Question15. What are the advantages of composite fish culture?

Question 16. What are the desirable characters of bee varieties suitable for honey production?

Question 17. What is pasturage and how is it related to honey production?

Question 18. Explain any one method of crop production which ensures high yield.

Question 19. Why are manure and fertilizers used in fields?

Question 20. What are the advantages of inter-cropping and crop rotation?

Question 21. What is genetic manipulation? How is it useful in agricultural practices?

Question 22. How do storage grain losses occur?

Question 23. How do good animal husbandry practices benefit farmers?

Question 24. What are the benefits of cattle farming?

Question 25. For increasing production, what is common in poultry, fisheries and bee-keeping?

Question 26. How do you differentiate between capture fishing, mariculture and aquaculture?