MATTER

Q.1 Name the three states of matter.

Ans. These are solid, liquid and gas.

Q2 A substance has no mass. Can we regard it as matter?

Ans. No, substance having no mass cannot be regarded as matter because matter has a definite mass.

Q.3 Name the physical state of matter which can be easily compressed.

Ans. Gas. This is because gases can be easily compressed.

Q.4 How do solids, liquids and gases differ in shape and volume?

Ans. Solids have a definite shape and a fixed volume; liquids have a definite Volume but no fixed shape while gases neither have a definite volume nor a definite shape.

Q.5 When a crystal of copper sulphate is placed at the bottom of a beaker containing water, the colour of water slowly becomes blue, why?

Ans. The crystal breaks into fine particles which diffuse into water, and hence the colour of water slowly becomes blue.

Q.6 Do we represent the temperature on Kelvin scale by the letter 'k' or 'K' ?

Ans. The temperature on Kelvin scale is represented by the letter K (capital letter).

Q.7 The boiling point of ethyl alcohol is 78^0C. What is the corresponding Temperature on kelvin scale?

Ans. Temperature on kelvin scale = 78 + 273 = 351 K

Q.8 Can Kelvin scale have negative temperatures ?

Ans. No, because on the Kelvin scale the lowest theoretical temperature which can be obtained i.e. i.e., - 273^0C, is taken as 0 K.:

Q.9 Out of water and alcohol, which is more volatile?

Ans. The boiling point of alcohol (78 C or 351 K) is lower than that of water (100 ^{0}C or 373 K), therefore, alcohol is more volatile than water.

Q.10 What is the SI unit of pressure? How is it related to pressure in atmospheres?

Ans. The S I unit of pressure is Pascal (Pa). 1 atm = 1.013 x 105 Pa.

Q.11 What is SI unit of density ?

Ans Kg. m $^{-3}$ (kilogram per cubic metre).

Q.12 Name a suitable technique to separate sand from ammonium chloride.

Ans. Sublimation.

Q.13 Is dry ice the same thing as ordinary ice?

Ans. No, dry ice is solid carbon dioxide while ordinary ice is solid water.

Q.14 What is a lattice?

Ans. The highly ordered arrangement of constituent particles of a solid is called a lattice.

Q.15 What does BEC stand for?

Ans. BEC stands for Bose-Einstein condensate.

Q.16 What is the freezing point of water ?

Ans. Water freezes at 0 ^{0}C or 273K.

Q.17 Why are gases highly compressible?

Ans. Because the interparticle empty spaces in case of gases are very large. When a gas is compressed, these spaces decrease. The particles or molecules of gas come closer.

Q.18 When a solid starts melting, its temperature does not rise till whole of it has melted. Explain.

Ans. The heat energy which is now being supplied is used up to bring a change in physical state only. It is known as latent heat of fusion.

Q.l9 Write full form of (i) Q C.N.G. (ii) L.P.G.

Ans. (i) Compressed natural gas (ii) Liquefied petroleum gas.

Q.20 The heat contained in steam is more than that of the boiling water. Explain.

Ans. When boiling water changes into steam, it absorbs a certain amount of heat energy. This shows that the heat contained in steam is more than that of boiling water.

Q.21. Which of the following are matter? Chair, air, love, smell, hate, almonds, thought, cold, cold drink, smell of perfume.

Ans. The following items are matter :
Chair, air, smell, almonds, cold drink and smell of a perfume

Q.22 What happens to the heat energy supplied to a solid once it starts melting?

Ans. The heat energy is supplied as latent heat of fusion. There is no change in the temperature tiil the entire solid has melted.

Q.23 Why does a gas exert pressure?

Ans. Pressure of the gas is because of the hits that the molecules or particles of the gas record on the walls of the container in which the gas is kept.

Q.24. What is a pure substance? Give its one characteristic.

Ans. A pure substance is the one which cannot be separated into smaller parts by any physical methods. It may be either a pure element (e.g. sodium) or a pure compound (e.g. calcium carbonate).

Q.25 Melting points of three solids X, Y and Z are 298 K, 314 K and 398 K respectively. Arrange these in increasing order of inter particle forces of attraction.

Ans. We know that greater the melting point temperature of a solid, more is the magnitude of interparticle forces. The arrangement in the increasing order of inter particle forces of attraction correct is X < Y < Z.

Q.26 Why does our palm feel cold when we put some acetone or petrol or perfume on it?

Ans. Acetone, petrol or the solvent of the perfume have low boiling points. When these are put on the palm, they quickly evaporate. The energy needed for evaporation is taken from the palm. As a result, the palm feels cold.

Q.27 Why are we able to sip hot tea of milk faster from a saucer rather than a cup?

Or

With the help of an activity show that the rate of evoporation increases with the increase in surface area.

Ans. When hot tea or milk is taken in a saucer, the surface area of the liquid increases. As a result, evaporation occurs faster and the tea or milk becomes cooler faster than when these liquids are kept in a cup. In other words, we are able to sip hot tea or milk faster from a saucer rather than from a cup.

Q.28 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, chalk, cotton and iron.

Ans. Increasing order of density is :
Exhaust from chimneys < air < cotton < chalk < honey < iron.

Q.29 What is the difference between a gas and a vapour?

Ans. A substance is said to be a gas if its boiling point is below room temperature. For example, oxygen, nitrogen, carbon dioxide, etc.
A substance is said to be a vapour if its boiling point is above room temperature. Its normal physical state is either a solid or a liquid but gets converted into the gaseous state by absorbing energy. For example, vapours of water in air.

Q.30 Why oxygen is called a gas? Give two reasons.

Ans. (i) Oxygen neither has a fixed volume nor a fixed shape since it completely fills the vessel in which it is kept.
(ii) Oxygen exerts pressure due to the collisions of the molecules on the walls of the containing vessel.

Q.31 Why are gases so easily compressible whereas it is impossible to compress a solid or a liquid?

Ans. The spaces in between the constituent particles are the maximum in gases, intermediate in liquids and minimum in solids. Therefore, on cooling or applying. pressure, the particles of a gas move closer and hence the volume decreases. Therefore, the gases are highly compressible. However, in case of liquids and solids, the particles are already close together and hence cannot be brought further closer and hence liquids and solids are almost incompressible.

Q.32 Convert the following temperatures to the Celcius scale.I
a) 300 K (b) 573 K.

Ans. The temperature on the Kelvin scale can be converted into the Celcius scale by| subtracting 273 to the temperature on the Kelvin scale. Thus,
(a) 300 K=300 - 273 = 27^{o} C
(b) 573K = 573-273= $30\ ^{0}$ C

Q.33 Convert the following temperatures to the Kelvin scale.
(a) 25 ^{o} C (b) 373 ^{o} C.

Ans. The temperature on the Celcius scale can be converted into the Kelvin scale by adding 273 to the temperature on the Celcius scale. Thus,
(a) 25 ^{o} C = 273 + 25 = 298 K, and
(b)373 ^{o} C = 273 + 373 = 646 K

Q.34 Arrange the following substances in increasing order of forces of attraction between the particles : water, sugar and oxygen.

Ans. The forces of attraction are the strongest in solids, followed by liquids and weakest in gases. Since sugar is a solid, water a liquid and oxygen a gas, therefore arrangement in increasing order of forces of attraction between the particles is as follows:
oxygen < water < sugar.

Q.35 Solids are generally very heavy while gases are light. Explain.

Ans In the solids, the particles are very closely packed. As a result, the number of particles per unit volume is quite large. Therefore, the solids are normally quite heavy. In the gases, the particles are loosely packed. The number of particles per unit volume is comparatively small. Therefore, gases are light.

Q.36 Why is ice at 273 K more effective in cooling than water at the same temperature?

Ans. When ice at 273 K melts to form water, it absorbs heat energy from the surroundings equal to the latent heat of fusion. Thus, ice at 273 K has less heat energy than water; at 273 K and hence ice is more effective in cooling than water at the same temperature.

Q..37 What produces more severe burns, boiling water or steam?

Ans. Steam produces more severe burns than boiling water Steam is formed by absorbing heat energy from the surroundings equal to the latent heat of vaporisation. Since steam at 373 K has more heat energy equal to the latent heat of vaporisation than boiling water at 373 K, therefore, steam produces more severe bums than boiling water.

Q.38 Rubber band can change its shape, is it a solid? Justify your answer.

Ans. Yes, it can be classified as a solid. It is an elastic solid which changes its shape on stretching and regains the same when the stretching force is removed.

Q.39 List any two properties of liquids which are common to gases.

Ans. (i) Both of them donot have any definite shape. They can take up the shape the container in which these are kept.
(ii) Both of them show the property of diffusion. However, gases diffuse faster.

Q.40 Give two methods by which a gas can be converted into liquid.

Ans i) By increasing the pressure or by compressing the gas.
ii) By lowering the temperature or by cooling the gas.

Q.41 Butter is generally wrapped in wet cloth during summer if no refrigerator Is available. Explain.

Ans. In summer, the weather is a quite hot. As a result, water present in wet cloth readily evaporates. Since cooling is caused during evaporation, the temperature of butter gets lowered. This checks the rancidity of butter or it does not give any foul odour.

Q.42 (a)What is the reason for the existence of the three states of matter?
(b) What will happen when solid ammonium chloride is heated?

Ans. (a) The three states of matter differ with respect to the inter particles spaces. These are minimum in the solid state while maximum in the gaseous state.
(b) It will directly change to the vapour state without passing through the liquid state. The process is known as sublimation

Q.43 State one similarity and two differences between boiling and evaporation.

Ans Similarity : In both evaporation and boiling, liquid changes to vapour state.
Differences :

(i) Evaporation takes place from the surface while boiling occur throughout the liquid.
(ii) Liquid can evaporate at all temperatures while boiling occurs only at a fixed temperature known as the boiling point temperature.

Q.44 Prachi took 50 mL of water in two beakers at room temperature and added Sodium chloride to one beaker while sugar to the other, till no more solute would dissolve. Then she heated the contents of the beakers and added more solutes in them.

(a)Will the amount of salt and sugar that can be dissolved in water at given temperature same?

(h) What will you expect to happen if she cools the contents of the beakers? Justify your answer.

Ans. (a) No, they will be different. Actually sodium chloride (salt) is a crystalline solid while sugar is a molecular solid. They dissolve to different extent. Sodium chloride is more soluble in water compared to sugar at a given temperature.

(b)Upon cooling, solid solute will slowly start separating from the solution. In general, the solubility of a solid in a liquid increases with the rise in temperature and decreases as the temperature is lowered. The change of state can be brought about by either changing the temperature or pressure.

Q.45 How is heating of sugar different from heating of ammonium chloride?

Ans. Sugar melts upon heating whereas ammonium chloride sublimes upon heating without leaving behind any residue.

Q.46 To which physical state of matter, do the following statements apply?
a) incompressible, no fixed shape (b) incompressible, high melting point
(c) compressible, no definite volume (d) incompressible, highly fluid.

Ans. (a) Liquid state (b) Solid state (c) Gaseous state (d) Liquid state.

Q.47 The molecules of water have more energy as compared to molecules of ice at same temperature. Justify this statement.

Ans. When ice is to melt, energy is absorbed to overcome intermolecular forces of attraction. Since the intermolecular forces of attraction decrease, the kinetic energy of molecules in water is more than in ice.

Q.48 Liquids generally have lower density compared to solids. But you must have observed that ice floats over water. Give reason.

Ans. Ice being a solid is expected to have more density than water and it should not float over water. But the density of ice is actually less. This is on account of the reason that the structure of ice is porous. Therefore, for a given mass, the volume of ice is more than that of water.

Q.49 For any substance, why does the temperature remain constant during the change of state?

Ans. During the change of state of a substance at its melting point or the boiling point, temperature remains constant. This is because the heat energy supplied to the substance is used up in overcoming the forces of attraction.

Q.50 Give reasons for the following observation:
The smell of hot sizzling food reaches you several meters away, but to get smell from the cold food you have to go close.

Ans. The particles of matter possess kinetic energy and are constantly moving. At low temperatures, the kinetic energy is low and hence the particles move slowly. On increasing temperature, the kinetic energy also increases and hence the particles move faster. Now since the particles of hot vapours coming out of hot sizzling food move faster, therefore, they easily reach you even when you are several metres away. On the other hand, the particles of vapours coming out of cold food travel slowly and do not reach you. Therefore, to get the smell from cold food you have to go close to the food.

Q.51 What is dry ice? Why is it called dry ice? How is it prepared?

Ans Solid carbon dioxide is called dry ice. It is so called because when it is exposed to air, the pressure acting on it falls to about 1 atmosphere. As a result, it sublimes, i.e.,directly gets converted into solid carbon dioxide without passing through the intervening liquid state. Consequently, unlike ordinary ice, it does not wet the surface on which it is kept. That is why it is called dry ice. It is prepared by cooling carbon dioxide upde'r pressure.

Q.52 What are the characteristics of the particles of the matter?

Ans. Some important characteristics of the particles of matter are as the following:
(i) The particles of matter are always in motion.
(ii) There are attractive forces between the particles of matter.
(iii)The particles of matter have vacant spaces between them.

Q.53 Give reasons 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.

Ans. (a) Naphthalene undergoes sublimation slowly at room temperature. As a result, solid naphthalene gets converted into vapours which become a part of the air around us. Therefore, naphthalene balls disappear without leaving any solid.

(b) We get the smell of perfume sitting several metres away due to diffusion. The particles of the perfume mix with the particles of air and due to high speeds of these particles; the smell of perfume reaches us sitting several metres away.

Q.54 What is the physical state of water at

a) 25^0c b) 0^o C c) 100 ^{o}C

Ans. (a) At 25 ^{0}C, the physical state of water is liquid.

(b)At 0 ^{0}C, the physical state of water is solid (ice).

(c)At 100 ^{0}C, the physical state of water is vapour (steam).

Q.55 (a) Water at room temperature is a liquid. Give two reasons.

(b) An iron almirah is a solid at room temperature. Give two reasons.

Ans. (a) Water is a liquid because of the following two reasons:

(i) When water is kept in a glass, it takes the shape of glass. Similarly, if water is kept in a cup, it takes the shape of the cup. Now as we know that Liquids do not have a fixed shape. They take the shape of the container in which they are kept. Thus, water is a liquid.

(ii) When water is kept in a glass, or kept in a cup, its volume remains the same. Now as we know that liquids have a fixed volume. Thus, water is a liquid.

(b) An iron almirah is a solid at room temperature because of the following two reasons.

(i) Solids have a fixed shape as well as a fixed volume. Since iron almirah has a fixed shape with distinct boundaries and a fixed volume, therefore, iron almirah is a solid.

(ii) Solids are incompressible. If we apply some force within limits, the volume of the iron almirah cannot be reduced. Therefore, iron almirah is a solid since it is incompressible under moderate pressures.

Q.56 What are the factors which are responsible for bringing a change in the physical state of a substance? (b) Why does a gas fill the vessel completely in which it is kept?

Ans. (a) Temperature and pressure are the two factors which can bring about the change in physical state. But they have opposing effects. Increase in temperature pulls the constituents of a substance apart. Increase in pressure tends to bring them closer.

(b) In a gas, the interparticle spaces are very large and inter particle forces are quite weak. Therefore, the particle motion is large. As a result, a gas fills the vessel completely.

Q.57 (a) Explain why there is no rise in temperature of a substance when it Undergoes change of state although it is still being heated.
(b) Name one property which is shown by naphthalene and not by sodium chloride.

Ans. (a) Once the change in state of a substance starts (solid to liquid or liquid to gas), the temperature of the substance does not change. Actually, the heat energy now supplied does not increase the kinetic energy of the constituting particles. It is absorbed either as latent heat of fusion or as latent heat of vaporisation.
(b) Naphthalene undergoes sublimation upon heating and directly changes into vapours. Sodium chloride (common salt) does not undergo sublimation. It melts on strong heating.

Q.58 What are the uses of interconversion of matter?

Ans Following are the uses of interconversion of matter.
(i) Water is converted into steam by heating. Steam is used to run turbines and to generate electricity.
(ii) Metals are melted by heating and these molten metals can be converted into alloys and cast into machinery parts.
(iii) Water can be changed into steam as well as ice. So, in nature, ice (or snow), liquid water and water vapour are available.

Q.59 With the help of an activity show that air contains water vapours.

Ans In a tumbler made up of steel, take crushed ice. Completely dry it from outside with a towel. Allow the tumbler to stand for about ten minutes. Drops of water will be seen deposited on the outer walls of the tumbler.
Explanation : Air contains in it a very small percent of water as vapours. These pass into the atmosphere as a result of evaporation which is taking place from water present in ponds, rivers, lakes, oceans etc. When these water vapours present in air come in contact with outer surface of steel tumbler, they condense because of the presence of ice inside it. The drops of water thus formed appear on the outer walls of the tumbler.

MOTION

Q.1 An object has moved through a distance. Can it have zero displacement?

Ans. Yes, an object which has moved through a distance can have zero displacement.

Q.2 A particle is moving with constant acceleration. Will it always move in a straight line?

Ans. No, the particle will move in a straight line so long as the acceleration is in the direction of motion.

Q.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.

Ans. None of the statement (a) or (b) is true for displacement.

Q.4 What does the odometer of an automobile measure?

Ans. The odometer measures the distance travelled by an automobile.

Q.5 What does the path of an object look like when it is in uniform motion?

Ans. The path of an object will be a straight line.

Q.6 What is the nature of the distance time-graphs for uniform and non-uniform motion of an object?

Ans. The distance-time graph for uniform motion is a straight line not parallel to the time axis. The distance-time graph for non-uniform motion is not a straight line. It can be a curve or a zig-zag line not parallel to time axis.

Q.7. What can you say about the motion of an object whose distance-time graph is a straight line parallel to the time axis?

Ans. The motion of the object is stationary.

Q.8 What can you say about the motion of an object if its speed-time graph is a straight line parallel to the time axis?

Ans. The object has uniform motion.

Q.9 Can the distance travelled by a particle be zero when displacement is not zero?

Ans. No.

Q.10 Can the speed of a body be negative?

Ans. No, because the speed of a body is the ratio of distance and time and distance travelled is never negative.

Q.11 If the displacement-time graph for a particle is parallel to time axis, what is the velocity of the particle?

Ans. Zero.

Q.12 Give an example of a body which covers a certain distance, but its displacement is zero.

Ans. Earth has a zero displacement about its own axis after 24 hours, whereas it covers a very large distance.

Q.13 Can the displacement of a particle be zero when the distance travelled is not zero?

Ans. Yes.

Q.14 A body is moving with a uniform velocity of 10 ms"1. Find its velocity after 10s.

Ans. As the motion is uniform, therefore, the velocity of the body will remain same even after 10 s. Hence, the velocity of the body will be 10 ms"1.

Q.15 What is uniform motion?

Ans A motion is said to be uniform if there are equal displacements in equal intervals of time, however small these intervals may be.

Q.16 What is speed with direction called?

Ans. Velocity

Q.l7 Name the force which is responsible for change in position or state of an object.

Ans It is the unbalanced force.

Q.18 Why the motion of an athlete moving along the circular path is an accelerated motion ?

Ans. Because the speed and direction of the athlete changes continuously with time.

Q.19 When is the acceleration (i) positive (ii) negative?

Ans. (i) If the velocity of a body is increasing with respect to time then the acceleration is said to be positive.

(ii) If the velocity of a body is decreasing with respect to time, then the acceleration is said to be negative.

Q.20 What is the relation between distance and time when :

(i) body is moving with uniform velocity?

(ii) body is moving with variable velocity?

Ans. (i) The distance covered by the body is directly proportional to time.

(ii) The distance covered by the body is not directly proportional to time.

Q.21 A stone is dropped from the roof of a building. It takes 4s to reach the ground. Fine the height of the building, (g = 9.8 m/s2)

Ans.

$u = 0$

$a = g = 9.8 m/s^2$

$t = 4$ s

Using $h = ut + 1/2\ at^2$

or $h = 0 + 1/2 \times 9.8 \times 4^2$

or $h = 1/2 \times 9.8 \times 16$

or $h = 78.4m$

Q.22 Mention some uses of velocity-time graphs.

Ans. The velocity-time graphs have the following uses :

(i) It is used to determine the total distance travelled by a particle.

(ii) It is used to determine the instantaneous velocity of the particle.

(iii) It is used to determine the acceleration of the object.

Q.23 Distinguish between terms distance and displacement.

Distance	Displacement
(i) Distance is the length of the actual path traversed between its initial and final positions. (ii) It is a scalar quantity and can never be negative.	(i) Displacement is the shortest path between the initial and the final positions of the particle. (ii) It is a vector quantity and can be positive, negative or zero.

Q.24 Distinguish between terms speed and velocity.

Ans.

Speed	Velocity
(i) Speed is the rate of change of distance (ii) It is a scalar quantity and is always positive	(i) Velocity is the rate of change of displacement (ii) It is a vector quantity and can be positive , negative or zero

Q.25 By giving an example, prove that rest and motion are relative terms.

Ans. Rest and motion are, opposite to each other, yet there is a close relation between them.

For example, a person sitting in the compartment of a moving train is in a state of rest, with respect to the surroundings of compartment. Yet he is in a state of motion, if he compares himself with surroundings outside the compartment.

Q.26 What does the slope of a displacement-time graph represent? Can displacement-time sketch be parallel to the displacement axis? Give reason to your answer.

Ans. The slope of a displacement-time graph gives the velocity. The displacement-time graph can never be a straight line, parallel to the displacement axis because it would mean that the distance covered by the body in a certain direction is increasing without any increase in time i.e., the velocity of the body is infinite which is impossible.

Q.27 Ravi told his friend that his house is 1 km toward south from the main post office.

Express displacement and the distance moved by the friend from the post office when he arrives at Ravi's house. Mention the reference point chosen by you.

Ans. Let the reference point be the post office. Let this be the origin of his motion. Since the motion is along a straight line, therefore, both distance moved and displacement will be same. Thus, displacement and distance moved will be 1 kilometre.

Q.28 What is meant by free fall ? Two bodies, one of mass 1 g and other of mass 1 kg are dropped from the same height in vacuum. Compare the two time intervals in which the two bodies will hit the ground.

Ans. Whenever objects fall towards the earth under the influence of gravitational force,it is free fall. Both will hit the ground at the same time (as acceleration due to gravity is independent of mass).

Q.29 A body thrown in the vertically upward direction rises upto a height 'h' and comes back to the position of its start. Calculate (i) the total distance travelled by the body and (ii) the displacement of the body. Under what condition will the magnitude of the displacement be equal to the distance travelled by an object ?

Ans. (i) 24 (ii) 0

Magnitude of displacement can be equal to the distance traveled if the object is moving along a straight line.

Q.30 A circular track has a circumference of 1570 m with AB as one of its diameter. A scooterist moves from A to B along the circular path with a uniform speed of 5m/s. Find the

(a) distance covered by the scooterist, (b) displacement of the scootenst (Given л = 3.14), (c) time taken by the scooterist in reaching from A to B.

Ans.

Ans. Circumference = $2\pi r = 1570$ m, speed = 5m/s

(*a*) Distance covered by scooterist $= 2\pi r/2 = \pi r = \frac{1570}{2} = 785\text{m}.$

(*b*) Displacement of the scooterist $= \frac{2\pi r}{\pi} = 2r = \frac{1570}{3.14} = 500\text{m}$

(*c*) Time taken by scooterist in reaching from A to B $= t = \frac{\pi r}{v} = \frac{785}{5} = 157\text{s}$

Q.31 Define acceleration . State a relationship connecting u, v, a and t for an accelerated motion. Give an example of a motion in which acceleration is uniform.

Ans. Acceleration : It is defined as rate of change of velocity.

Relationship : v = u + at

Example : Freely falling body.

Q.32 Define average speed . An object moves with a uniform speed of 10 m/s for 5s and then with a uniform speed of 5 m/s for 10 s. Find its average speed.

Ans. Average speed of an object is obtained by dividing the total distance travelled by the total time taken

Total distance covered = (10 x 5 + 5 x 10) m = 100m; Time taken = 15s

$$\therefore \text{ Average speed} = \frac{\text{Total distance covered}}{\text{Time taken}} = \frac{100\text{m}}{15\text{s}} = 6.66\ \text{ms}^{-1}$$

Q.33. A train starting from rest attains a velocity of 72 km/h in 5 minutes. Assuming the acceleration is uniform, find (i) The acceleration (ii) The distance traveled by the train for attaining this velocity.

Ans. (*i*) $u = 0,\ v = 72\ \text{km/h} = 72 \times \frac{5}{8} = 20\text{m/s}$

$$t = 5\ \text{minutes} = 5 \times 60 = 300\text{s}$$

$$\therefore \quad a = \frac{v-u}{t} = \frac{20-0}{300} = \frac{1}{15}\ \text{m/s}^2$$

(*ii*) $2as = v^2 - u^2 \because u = 0$

$$\therefore \quad s = \frac{v^2}{2a} = \frac{20\,\text{m/s}}{2 \times \frac{1}{15}} = 3000\text{m} = 3\text{km}$$

Q34. A car accelerates from 5 m/s to 15 m/s in 10 seconds. Calculate the acceleration and, the distance covered by the car during this time interval.

Ans. Given : u = 5 m/s , v = 15 m/s , t = 10s

Acceleration of car, a = v – u / t = 15 - 5 / 10 = 1 m/s2

Distance covered by the car, s = ut + ½ at2

= 5 x 10 + 1/2 x 102 = 50 + 50 = 100m

Q35. Which of the following is moving faster? (i) A scooter moving with a speed of 300 m per minute, (ii) A car moving with a speed of 36 km per hour. Justify your answer.

Ans. (i) 300 m per minute = 300 /60 = 5 m/s ;

36 km per hour = 36 x1000 / 3600 = 10 m/s ;

Since 5 m/s < 10 m/s

Therefore, 300 m per minute < 36 km per hour. Hence, car moves faster than scooter.

Q.36. A car travels from stop A to stop B with a speed of 30 km/h and then returns back to A with a speed of 50 km/h. Find : (i) Displacement of the car. (ii) Distance traveled by the car. (iii) Average speed of the car.

Ans. (a) Net displacement = 0 as initial and final points are same.

(b) Distance travelled in each direction = d

Total distance = 2d

(c) Time while going = t_1= d/30

Time while coming back = t_2= d/50

Q 37 A ball is thrown vertically upwards with a velocity ‘u’. Calculate the velocity with which it falls to the earth again.

Ans. For a ball thrown vertically upwards : Initial velocity = u

Final velocity = v = 0

For upward motion :

$$V = u - gt$$
$$0 = u - gt$$
$$t = u/g$$

for return journey :

$$V = u + gt$$
$$u = 0$$
$$v = 0 + gt$$
$$t = v/g$$

From (1) and (2), we get

$$v = u$$

Thus, the body falls back to the earth with the same velocity with which it was thrown vertically upwards.