Class IX Session 2025-26
Subject - Science
Sample Question Paper - 6

Time Allowed: 3 hours **Maximum Marks: 80**

General Instructions:

1. This question paper consists of 39 questions in 3 sections. Section A is Biology, Section B is Chemistry and Section C is Physics.
2. All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.

Section A

1. Which of the following process is shown in the given image? **[1]**

a) Waste assimilation
b) Irrigation
c) Organic farming
d) Composting

2. A prokaryotic cell does not possess: **[1]**

a) nuclear membrane
b) cell wall
c) both cell membrane and nuclear membrane
d) cell membrane

3. Match the following with the correct response **[1]**

(a) Aerenchyma	(i) Permanent tissue
(b) Parenchyma	(ii) Thin-walled packing cells
(c) Chlorenchyma	(iii) Buoyancy
(d) Cork	(iv) Photosynthesis

a) (a) - (i), (b) - (iii), (c) - (ii), (d) - (iv)
b) (a) - (ii), (b) - (iv), (c) - (i), (d) - (iii)
c) (a) - (iii), (b) - (ii), (c) - (iv), (d) - (i)
d) (a) - (iv), (b) - (i), (c) - (iii), (d) - (ii)

4. Identify the correct statement**:** **[1]**

A. The double membrane is present in the nucleus.
B. A liver cell carries about 500-1000 mitochondria.
C. Wood contains the largest amount of cellulose.
D. All the statements are correct.

a) (A) b) (B)

c) (D) d) (C)

5. **Assertion (A):** Proper cleaning for cows and buffaloes is required. **[1]**

Reason (R): Proper cleaning maintains the health of animals and also helps in clean milk production.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

6. **Assertion (A):** The inner lining of the intestine has tall epithelial cells. **[1]**

Reason (R): Columnar epithelium facilitates absorption and secretion.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

7. Living cells were discovered by **[1]**

a) A.V. Leeuwenhoek

b) Robert Hooke

c) Robert Brown

d) R. Virchow

8. Which muscles act involuntarily? **[1]**

i. Striated muscles

ii. Smooth muscles

iii. Cardiac muscles

iv. Skeletal muslces

a) (i) and (iv)

b) (i) and (ii)

c) (ii) and (iii)

d) (iii) and (iv)

9. To solve the food problem of the country, which among the following is necessary? **[1]**

a) Increased production and storage of food grains

b) People should have money to purchase the grains

c) Easy access of people to the food grain

d) All of these

10. Discuss various methods for weed control. **[2]**

11. What is ATP? Write its full form. **[2]**

OR

What is the importance of nucleus?

12. i. How is the epidermis of the plants living in very dry habitats adapted? **[2]**

ii. Write functions of guard cells of stomata in the leaf.

iii. Epidermal cells help in the absorption of water and nutrients from soil. How?

13. Observe the given below image of the tissue and answer the following questions: **[3]**

i. Identify the type of tissue shown in the given image.

ii. Where is it found?

iii. Why this tissue acts as an insulator?

[3]

14.

a. Label X and Y

b. What is the function of X?

c. What is the composition of Y?

d. Identify the above diagram and what is its common name?

15. **Read the following text carefully and answer the questions that follow:** **[4]**

Poultry is the rearing of domesticated fowl (chicken), ducks, geese, turkey and some varieties of pigeon for their meat and eggs. Poultry birds are of two types that is broilers and layers. One is specialized meat-producing poultry birds while other is egg-laying poultry birds. The tremendous rise in the availability of poultry products is called Silver Revolution.

i. What is the meaning of layers regarding poultry? (1)

ii. There are different breeds of hens, so give some information about broiler. (1)

iii. We know that different types of revolution regarding animal husbandry. So, what is the silver revolution explain? (2)

OR

There are different breeds of poultry birds, mention two examples of indigenous and exotic breeds of poultry birds. (2)

16. Why are mitochondria called powerhouse of the cell? Give three similarities and one difference between mitochondria and plastid. **[5]**

OR

Briefly describe striated and smooth muscles with their functions.

Section B

17. **Assertion (A):** Liquids diffuse easily as compared to gases. **[1]**

Reason (R): Intermolecular forces are lesser in gas.

a) Both A and R are true and R is the correct explanation of A.

b) Both A and R are true but R is not the correct explanation of A.

c) A is true but R is false.

d) A is false but R is true.

18. Atomicity of Chlorine and Argon is: **[1]**

a) Monoatomic and diatomic respectively

b) Diatomic and monoatomic respectively.

c) Monoatomic and monoatomic respectively.
d) Diatomic and diatomic respectively.

19. Match the following with the correct response. **[1]**

(a) Colloidal solution	(i) The maximum amount of solute in a given solvent
(b) Suspension	(ii) Particle size between 1nm-100mn
(c) Saturated solution	(iii) Particle size is less than 1nm
(d) Solution	(iv) Particles of one substance dispersed not dissolved

a) (a) - (i), (b) - (iii), (c) - (ii), (d) - (iv)
b) (a) - (ii), (b) - (iv), (c) - (i), (d) - (iii)
c) (a) - (iii), (b) - (ii), (c) - (iv), (d) - (i)
d) (a) - (iv), (b) - (i), (c) - (iii), (d) - (ii)

20. **Assertion (A):** For noble gases, valency is zero. **[1]**
Reason (R): Noble gases have 8 valence electrons.

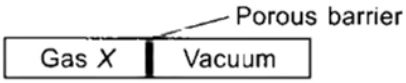
a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

21. Which of the following elements are present in Quick lime? **[1]**

A. Calcium, Oxygen
B. Sodium, Hydrogen, Oxygen
C. Calcium, Bromine
D. Calcium chloride

a) (C)
b) (B)
c) (D)
d) (A)

22. The given apparatus is used to study the diffusion of a number of gases at the same temperature and pressure. **[1]**



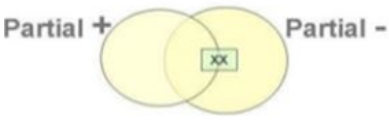
Which of the following pairs of gases would diffuse into the vacuum at the same speed?
[Given : Atomic mass of H = 1 u, C = 12 u, N = 14 u, S = 32 u, O = 16 u]

a) NH_3 and N_2
b) NH_3 and H_2
c) CO and N_2
d) CO and SO_2

23. A student added only two drops of iodine to a rice extract in test tube 'A'. Another student added a little rice extract to iodine solution in test tube 'B'. They would then observe: **[1]**

a) a change of colour to blue-black in test tube 'B' but not in test tube 'A'
b) a change of colour to blue-black in both tubes 'A' and 'B'
c) no change of colour in any test tube
d) a change of colour to blue-black in test tube 'A' but not in test tube 'B'

24. **[1]**



The bond displace in this figure is _____.

a) polar covalent bonds
b) covalent bond
c) hydrogen bond
d) ionic bond

25. What is a colloid? What are the various properties of colloids? **[2]**

26. Carbon dioxide produced by action of dilute hydrochloric acid on potassium hydrogen carbonate is moist whereas that produced by heating potassium hydrogen carbonate is dry. What would be the difference in the composition of carbon dioxide in the two cases? State the associated law. **[3]**

OR

Dalton's atomic theory is contradicted by the formula of sucrose $C_{12}H_{22}O_{11}$. Justify the statement.

27. Distinguish between : Evaporation and boiling **[3]**

28. **Read the following text carefully and answer the questions that follow:** **[4]**

In nature, a number of atoms of some elements have been identified, which have the same atomic number but different mass numbers. Many elements consist of a mixture of isotopes. Each isotope of an element is a pure substance. Chlorine occurs in nature in two isotopic forms. While hydrogen occurs in three isotopic forms. Isotopic have various applications such as an isotope of uranium is used as a fuel in nuclear reactors. The mass of an atom of any natural element is taken as the average mass of all the naturally occurring atoms of that element. Atoms of different elements with different atomic numbers, which have the same mass number, are known as isobars.

i. What is the isotope of cobalt that is used for treatment of cancer? (1)
ii. The isotope deuterium of hydrogen has (1)
iii. Why chemical properties of all the isotopes of an element identical? (2)

OR

Hydrogen exists in three isotopic forms, ${}_1H^1$, ${}_1H^2$, ${}_1H^3$ known as protium, deuterium and tritium. Why are all the isotopes neutral in nature? (2)

29. i. What factors affect the solubility of solvent and solute? **[5]**
ii. State the differences between compounds and mixtures

OR

Iron filings and sulphur were mixed together and divided into two parts, A and B. Part A was heated strongly while part B was not heated. Dilute hydrochloric acid was added to both the parts and evolution of gas was seen in both the cases. How will you identify the gases evolved?

Section C

30. A plate, a ball and child all have the same mass. The one having more inertia is the **[1]**

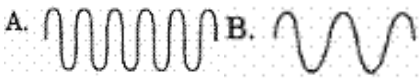
a) child
b) ball
c) All have equal inertia
d) plate

31. **Assertion (A):** A crane P lifts a car upto a certain height in 1 min. Another crane Q lifts the same car upto the same height in 2 min. Then crane P consumes two times more fuel than crane Q. **[1]**

Reason (R): Crane P supplies two times more power than crane Q.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

32. The pitch of the two signals A and B shown below are P_A and P_B respectively. Then **[1]**



a) $P_A = P_B$ b) $P_A = 2P_B$

c) $P_A < P_B$ d) $P_A > P_B$

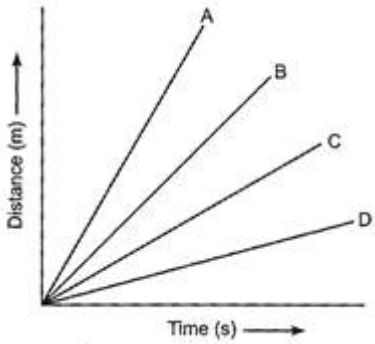
33. Gravitational force on the surface of the moon is only $\frac{1}{6}$ as strong as gravitational force on the earth. What is the weight in newtons of a 10 kg object on the moon and on the earth? **[2]**

34. Why do you fall in the forward direction when a moving bus brakes to a stop and fall backward when it accelerates from rest? **[2]**

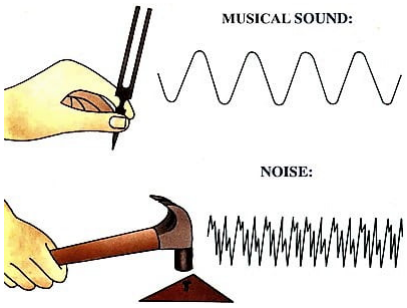
OR

Describe in brief an activity to illustrate the property of inertia of rest.

35. Four cars A, B, C and D are moving on a leveled road. Their distance versus time graphs are shown in figure. Which car is the slowest. **[3]**



36. Observe the following diagram and answer the following questions: **[3]**

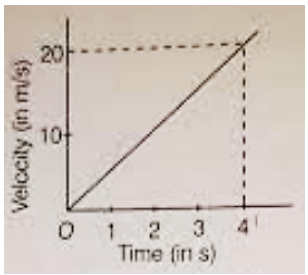


i. What is the difference between longitudinal and transverse wave?

ii. Mention the three characteristics of sound.

iii. What is the crest and trough?

37. The velocity-time graph of a ball moving on the surface of the floor is as shown in the figure. Calculate the force acting on the ball, if mass of the ball is 100 g. **[3]**



38. **Read the following text carefully and answer the questions that follow:** **[4]**

There are four basic forces in nature. These forces are gravitational forces, electromagnetic forces, strong nuclear forces and weak forces. Out of the these four forces, gravitational force is the weakest force and attractive in nature. Gravitational force between two objects is proportional to their masses and inversely

proportional to the square of the distance of separation between the objects. The gravitational force between two objects A and B of masses m_1 and m_2 and separated by a distance r is F.

i. Is the value of g remains the same at all the places on the earths surface? (1)
ii. The force of attraction between two bodies at a certain separation is 10N. What will be the force of attraction between them if the separation between them is reduced to half? (1)
iii. What happens to the force between two objects, if the masses of both objects are doubled? (2)

OR

What are the SI units of the gravitational constant G and the acceleration due to gravity g? (2)

39. Briefly describing the gravitational potential energy, deduce an expression for the gravitational potential energy of a body of mass m placed at a height h, above the ground. **[5]**

OR

Give one example of each of the following situations:

i. Uniformly accelerated motion.
ii. Motion with uniform retardation.
iii. Accelerated motion with uniform magnitude of velocity.
iv. Motion in a direction with acceleration in perpendicular direction.
v. Motion in which v-t graph is a horizontal line parallel to X-axis.

Solution

Section A

1. **(d)** Composting
   Explanation:
   The given image shows the process of composting in which farm waste material like livestock excreta (cow dung etc.), vegetable waste, animal refuse, domestic waste, sewage waste, straw, eradicated weeds, etc. are decomposed in pits.

2. **(a)** nuclear membrane
   Explanation:
   Prokaryotes do have their genomic DNA concentrated and localized to a small area within the cell (nucleoid region). So it's not entirely accurate to say that prokaryotes don't have a nucleus.

3. **(c)** (a) - (iii), (b) - (ii), (c) - (iv), (d) - (i)
   Explanation:
   - Aerenchyma provides buoyancy.
   - Parenchyma cells are thin-walled.
   - Chlorenchyma is responsible for photosynthesis in green plants.
   - Cork is a permanent tissue.

4. **(c)** (D)
   Explanation:
   The nucleus is a double membranous structure. It is surrounded by a double membrane - the inner nuclear membrane and the outer nuclear membrane. A liver cell contains about 500-1000 mitochondria. A large amount of cellulose is present in the wood of a plant.

5. **(a)** Both A and R are true and R is the correct explanation of A.
   Explanation:
   Animals like cows and buffaloes require proper and regular cleaning to remove dirt and loose hair present on their body. This helps in maintaining the health of the animal and also helps in obtaining clean milk from them.

6. **(a)** Both A and R are true and R is the correct explanation of A.
   Explanation:
   Where absorption and secretion occur, such as in the inner lining of the intestine, tall epithelial cells or columnar epithelium is present. This epithelium facilitates movement or diffusion across the epithelial barrier.

7. **(a)** A.V. Leeuwenhoek
   Explanation:
   A.V. Leeuwenhoek in 1674 with the improved microscope, discovered free-living cells of algae Spirogyra in pond water for the first time.

8. **(c)** (ii) and (iii)
   Explanation:
   The muscles which are not under the control of our will, are called involuntary muscles. Smooth (unstriated) muscles and cardiac muscles are involuntary muscles.

9. **(d)** All of these

Explanation:

To solve the food problem of the country, the following is necessary

i. Increased production and storage of food grains.
ii. Easy access of people to the food grain.
iii. People should have money to purchase grains.

10. Various modes of weed control are:
    a. Mechanical removal.
    b. Prevention method: Proper seed bed preparation to avoid weed growth.
    c. Timely sowing of crop to avoid the growth of weed.
    d. Inter-cropping and crop rotation also help in weed control.
11. Energy rich molecules are called ATP. ATP is called energy currency of the cell. ATP stands for Adenosine Triphosphate

OR

Significance of nucleus are –

(a) It control all the activities of the cell
(b) It helps in cell division
(c) It transfer genetic information from one generation to another

12. i. The epidermis of the plants living in very dry habitats has a thick waxy coating of waterproof cutin over it. This prevents the loss of water.
    ii. They help in exchange of gases with atmosphere, due to opening and closing of stomatal pore.
    iii. Epidermal cells in roots bear long hair-like outgrowth i.e. root hairs that greatly increase the total absorptive surface area and help in increased absorption of water and nutrients from soil.
13. i. The given image shows adipose connective tissue.
    ii. Adipose connective tissue is found below the skin and between internal organs.
    iii. The cells of adipose connective tissue are filled with fat globules. So the storage of fats let it act as an insulator.
14. a. X- crista Y- matrix.
    b. A crista is a fold in the inner membrane of a mitochondrion. Function of X is to increase surface area of inner membrane for ATP Synthesis.
    c. Composition of Y. It contains the mitochondrial DNA in a structure called a nucleoid. It contains ribosomes that produce proteins used by the mitochondrion. It contains granules of ions that appear to be involved in the ionic balance of the mitochondrion.
    d. Mitochondrion (Cut lengthwise). Common Name. Powerhouse of cell.
15. i. Egg-laying poultry birds are called **layers.**
    ii. The specialized meat-producing poultry birds are called **broilers.** Broilers are quick growing birds which are raised for 6-8 weeks. Their food is rich in vitamin A and K.
    iii. The tremendous rise in the availability of poultry products is called Silver Revolution.

    OR

    Following are the example of poultry birds

    Indigenous breed: Assel and Kadaknath.

    Exotic breed: Rhode island red and Light Sussex.
16. Mitochondria are often associated with cellular respiration and energy generation of the cell. The energy required for various chemical activities is released by the mitochondria in the form of ATP molecules. For this reason, mitochondria are known as the powerhouse of the cell.

    Three similarities between mitochondria and plastids are as follows:

    i. Both have their own DNA and ribosomes.
    ii. External structures of mitochondria and plastids are similar.
    iii. Both have more than one membrane layer.

    One major difference between mitochondria and plastids is that mitochondria are present in both plant and animal cells, whereas plastids are present only in plant cells.

OR

The cells of striated muscle fibres are long or elongated, non-tapering and cylindrical and unbranched. These cells have a number of nuclei. These muscle fibres show alternate dark and light bands or striations (under the microscope) and hence, they are called

striated muscles. Striated muscles occur in muscles of limbs, body wall, face, neck, etc.

Functions of striated muscles are as follows:
(i) Striated muscles are powerful and undergo rapid contraction. They are also called skeletal muscles.
(ii) Striated muscles provide the force for locomotion and all other voluntary movements of the body. Hence, they are also called voluntary muscles.
On the other hand, some muscles do not bear any bands, stripes or striations across them (under the microscope) and hence, they are called smooth or unstriated muscles. The cells of these muscle fibres are uninucleate. Smooth muscles occur as bundles or sheets of elongated fusiform or spindle-shaped cells or fibre. They are held together by loose connective tissues. These muscles are found in the walls of internal organs such as the alimentary canal, stomach, intestine, ureters, bronchi, iris of the eye, ducts of glands and blood vessels.

Functions of unstriated or smooth muscles are as follows:
(i) Smooth muscles do not work according to our will, so they are also called involuntary muscles. Movement of food in the alimentary canal or the contraction and relaxation of blood vessels are involuntary movements.
(ii) Smooth muscles contract slowly but can remain contracted for a long period of time. The ingested food passes to the next step of digestion in the alimentary canal due to this characteristic.

Section B

17.

(d) A is false but R is true.
Explanation:
Gases diffuse easily than liquid as gases have lesser intermolecular forces of attraction. Thus the particles of gases are not attracted towards each other and thus it can easily diffuse

18.

(b) Diatomic and monoatomic respectively.
Explanation:
Atomicity is the total number of atoms present in one molecule of an element or a compound. Chlorine molecule (Cl_2) is diatomic i.e. a molecule of chlorine contains 2 atoms of chlorine. Argon is an inert gas and an atom of Argon is capable of independent existence. Hence, Argon is monoatomic (Word "mono" refers to the single atom).

19.

(b) (a) - (ii), (b) - (iv), (c) - (i), (d) - (iii)
Explanation:
- The particle size in the colloidal solution lies in the range of 1nm to 100nm.
- The suspension is a mixture in which a substance will not dissolve in another and quickly separated if left out to stand.
- A solution having a maximum amount of solute dissolved in 1 litre of solvent at a particular temperature is a saturated solution.
- The solution is a homogeneous mixture of two or more substances in which substance dissolved (solute) insolvent has a particle size of less than 10^{-9} m or 1 nm.

20. **(a)** Both A and R are true and R is the correct explanation of A.
Explanation:
Both A and R are true and R is the correct explanation of A.

21.

(d) (A)
Explanation:
The chemical formula of the Quick lime is CaO. So, Calcium (Ca) and Oxygen (O) elements are present in Quick lime.

22.

(c) CO and N_2

Explanation:
Rate of diffusion depends upon the molecular mass of gases. CO and N_2 have the same molecular mass hence, both will diffuse at the same rate.

23.
(b) a change of colour to blue-black in both tubes 'A' and 'B'
Explanation:
Iodine + Starch Solution $\rightarrow$ Blue-black colour
Starch act as an indicator of the presence of iodine.

24. **(a)** polar covalent bonds
Explanation:
Polar covalent bonds form when one atom wants an electron more strongly than the other but are still willing to share, so the shared electrons spend more time around one atom than the other.

25. Colloids are heterogeneous mixtures in which the particle size is so small that the particles cannot be seen by naked eyes. The suspended particles form the dispersed phase of the colloid. The solvent in which the colloidal particles are suspended forms the continuous phase or the dispersing medium of the colloid. E.g. Milk.
The properties of a colloid are as follows:-
(1) A colloid is heterogeneous in nature but appears homogeneous.
(2) The size of colloidal particles is too small to be seen individually by naked eyes. The size of the particles is between 10^{-7} cm to 10^{-5} cm. They can easily pass through a filter paper.
(3) The particles of a colloidal solution scatter a beam of light passing through it and make its path visible.
(4) The particles of a colloidal solution do not settle down under the effect of gravity when the solution is left undisturbed for some time. They are quite stable.

26. The composition of CO_2 in both the cases would be same, i.e., the carbon and oxygen will combine in the same ratio 1:2. The law associated is law of constant proportion.

OR

Dalton's atomic theory states that atoms of different elements combine together in simple whole number ratio. In the formula of $C_{12}H_{22}O_{11}$, the carbon, hydrogen and oxygen combine in whole number ratio but the ratio is not simple.

27.

Sr.No.	Evaporation	Boiling
1.	Evaporation is the process of conversion of liquid to vapour which occur at much slower rate.	Boiling is the process of conversion of liquid to vapour which occur at much faster rate.
2.	It takes place at all temperature.	It takes place at a fixed temperature.
3.	It takes place only from the surface of the liquid.It is a surface phenomenon.	It takes place from all parts of the liquid. It is a bulk phenomenon.

28. i. ^{60}Co isotope is used in the treatment of cancer.
ii. One proton and one neutron
iii. Since, properties of elements are determined by no of protons in nucleus isotopes have same number protons therefore chemical properties of all the elements of isotope are identical.
OR
All the isotopes have one electron and one proton, hence they are neutral.

29. i. a. **Temperature:** For the majority of solutions of solid-in-liquid and liquid-in-liquid types, solubility increases with temperature. However, for solutions of gases-in-water type, solubility decreases with increase in temperature.

b. **Pressure:** It is applicable to gas-in-liquid solutions. An increase in pressure increases the solubility of a gas. For example, aerated drinks contain carbon dioxide gas under pressure.
c. **Mechanical Stirring:** Mechanical stirring increases solubility. For example, sugar dissolves faster on stirring with a spoon.
d. **Size of Solute Particles:** Smaller the particle size of solute, greater is the solubility. For example, it is easier to dissolve powdered sugar than granules of sugar.

ii. **Compounds**

a. Compounds are pure substances.
b. They are made up of two or more elements combined chemically.
c. The constituents of a compound are present in a fixed ratio.
d. Compounds have fixed properties. For example, a particular compound will have fixed temperatures at which it melts and boils.
e. A compound can have properties different from its constituents, as a new substance is formed when the constituents are chemically combined.
f. The constituents of a compound can be separated only by chemical methods.

Mixtures

a. Mixtures are impure substances.
b. They are made up of two or more substances mixed physically.
c. The constituents of a mixture are present in varying ratios.
d. Mixtures do not have fixed properties. Their properties depend on the nature of their components and the ratios in which they are combined.
e. In mixtures, no new substance is formed. The properties of a mixture are the same as the properties of its constituents.
f. The constituents of a mixture can be separated easily by physical methods.

OR

Part A: $Fe + S \xrightarrow{\Delta} FeS$

$FeS + 2HCL(dil.) \rightarrow FeCl_2 + H_2S \uparrow$

Here H_2S gas is produced, which is identified by its characteristic smell of rotten eggs.

Part B: $Fe + S \rightarrow mixture$

$Fe + S + 2HCL(dil.) \rightarrow FeCl_2 + H_2 \uparrow$

Here H_2 gas is produced. Hydrogen gas is tested by bringing a burning matchstick near the mouth of the test tube. It burns with a pop sound and water is formed.

Section C

30.

(c) All have equal inertia

Explanation:

Inertia is directly proportional to mass, hence all the above given objects will have equal inertia.

31. **(a)** Both A and R are true and R is the correct explanation of A.

Explanation:

Since, power is inversely proportional to time, crane P supplies more power.

32.

(d) $P_A > P_B$

Explanation:

The sensation of a frequency is commonly referred to as the pitch of a sound. A high pitch sound corresponds to a high frequency sound wave and a low pitch sound corresponds to a low frequency sound wave.

33. Given the weight of an object of the moon is one sixth weight of an object of the Earth.Also Weight = Mass x Acceleration

Value of gravity on earth =$9.8 m/s^2$

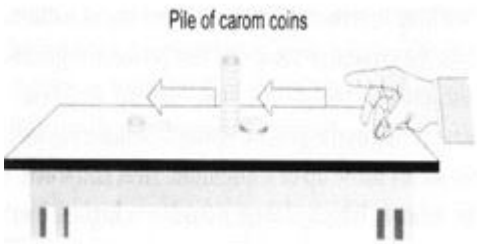
value of gravity on moon = 1/6th of earth = 9.8/6 = 1.63 m/s^2

weight of object on moon = $m \times 1.63$ = 10×1.63= 16.3 N

weight of object on earth = $m \times 9.8$ = 10×9.8 = 98 N

34. The bus and the persons in it are in the state of motion and at rest with respect to each other before the application of the brakes. When the brakes are suddenly applied, the bus comes to the state of rest, but the passengers tend to continue in the state of motion because of inertia of motion. Therefore, they fall in forward direction. Conversely, when the bus is in the state of rest, the passengers in it have inertia of rest. When the bus accelerates suddenly, the passengers tend to continue in their state of rest and hence are left behind, relative to the position of bus. Therefore, they fall in the backward direction.

OR



a. Make a pile of similar carrom coins on a table, as shown in the figure.
b. Attempt a sharp horizontal hit at the bottom of the pile using another carrom coin or the striker. If the hit is strong enough, the bottom coin moves out quickly. Once the lowest coin is removed, the inertia of the other coins makes them 'fall' vertically on the table.
c. The remaining coins due to the inertia of rest try to remain at rest but fall down due to gravity.

35. Speed = Slope of distance - time graph. The smaller the slope, the smaller is the speed.

36. i. The difference between the longitudinal wave and the transverse wave is as follows:

Longitudinal wave	Transverse wave
It needs medium for propagation	It may or may not needs a medium for propagation.
Particles of the medium move in a direction parallel to the direction of the propagation of disturbance ex-sound wave	Particles of the medium move in the perpendicular direction of the propagation of disturbance. Ex-light wave

ii. The three characteristics of sound waves are
a. loudness
b. pitch
c. quality/timbre

iii. The peak is called the crest and valley is called the trough in the given diagram.

37. The velocity-time graph shows that the velocity of the ball at t = 0 is zero. So, the initial velocity of the ball, u = 0.
Velocity of the ball at t = 4 s is 20 m/s
i.e. final velocity, v = 20 m/s; time, t = 4 s
∴ Acceleration of the ball,
$a = \frac{v-u}{t} = \frac{20m/s-0}{4s} = 5m/s^2$
Also, mass of the ball
$a = 100g \Rightarrow \frac{100}{1000}kg = \frac{1}{10}kg$
∴ Force acting on the ball,
F = ma
F= $\frac{1}{10}kg \times 5m/s^2$
= 0.5 kg-m/s^2 = 0.5 N [∵ 1 kg-m/s^2 = 1 N]

38. i. No, the value of g is different at different places on the surface of the earth. The acceleration due to gravity is smaller at the equator than at the poles. This is because g is inversely proportional to the radius and the radius of the earth is smaller at the poles and larger at the equator.
ii. $F_g = G \cdot \frac{m_1 \times m_2}{r^2} =$ 10 N
where, F = Gravitational force
m_1, m_2 = Masses of two bodies
r = Distance
G = Gravitational constant = 6.673×10^{-11} Nm^2kg^{-2}
From the above equation, we can conclude that if distance between the object is reduced to half then force would become four times.

$F'_g = G \cdot \frac{m_1 \times m_2}{r^2/4}$

Therefore, $F'_g = 4 \times F_g$

So, new force = 40 N

iii. According to the laws of gravitation,

$F = G\frac{m_1 m_2}{r^2}$

Where m_1 and m_2 are the masses of the objects.

r = the distance between the two masses.

The gravitational force of attraction is directly proportional to the product of masses.

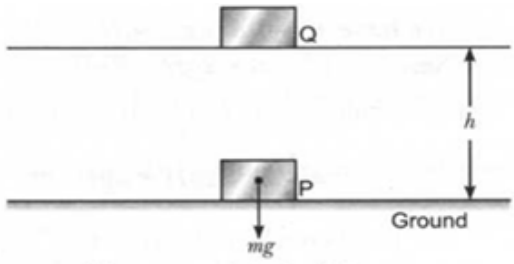
If the masses of both the objects are doubled then the force between them becomes four times.

Hence, if the masses of both objects is doubled the force of attraction will become 4 times of its original value.

OR

The SI unit of the gravitational constant G is Newton-meter squared per kilogram squared (Nm^2/kg^2), and the SI unit of the acceleration due to gravity g is meters per second squared (m/s^2).

39. When an object is raised through a certain height above the ground, its energy increases. This is because the work is done on it, against gravity. The energy present in such an object is called gravitational potential energy. Thus, the gravitational potential energy of an object at a point above the ground is defined as the work done in raising it from the ground to that point against gravity. Consider a body of mass m lying at point P on the Earth's surface, where its potential energy is taken as zero.



As the weight, mg acts vertically downwards, so to lift the body to another position Q at a height h, we have to apply a minimum force which is equal to mg in the upward direction. Thus, work is done on the body against the force of gravity.

We know that,

Work is done, W = Fs ..... (i)

As F = mg and s = h

Putting these values in equation (i), we get

W= mg $\times$ h = mgh

This work done on the body is equal to the gain in energy of the body. This is the potential energy of the body.

Therefore, Potential energy PE = mgh

OR

i. Object dropped down from a height towards the surface of the earth.
ii. Object thrown up with a velocity, retards uniformly.
iii. Uniform circular motion, say planetary motion.
iv. A bullet fired horizontally from a rifle, has acceleration in downward direction (due to gravity).
v. A car moving with uniform velocity along a straight line.