ANSWER KEY – CLASS 9 – SCIENCE – POMT – SET 1 – 2023 – 24

SECTION - A **Select and write one most appropriate option out of the four options given for each of the questions 1 – 20.**		
Q. No	Questions	Marks
1	d) Insoluble heavy impurities	1
2	c) Diffusion	1
3	d) Particles of steam at 100^0 C	1
4	d) Both a) and b)	1
5	c) 10	1
6	c) Saturated solution	1
7	c) Particles of colloid scatter a beam of light passing through it.	1
8	b) Lysosome	1
9	b) Nuclear material of the bacterial cell is not enclosed in a nuclear envelope as in the case of an animal cell.	1
10	a) Secretion of substances	1
11	b) Columnar epithelium	1
12	b) cardiac muscle	1
13	d) 180°	
14	c)Velocity = 2 ms^{-1}	1
15	b) Epithelium arranged in many layers	1
16	d) All of the above	1
Q. no 17 to 20 are Assertion - Reasoning based questions. These consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below: (a) Both A and R are true and R is the correct explanation of A (b) Both A and R are true and R is not the correct explanation of A (c) A is true but R is false (d) A is False but R is true		
17	(c) Assertion (A) is true but reason (R) is false.	1
18	(a) Both A and R are true and R is the correct explanation of A	1
19	(c) A is true but R is false.	1
20	(c) A is true but R is false.	1
SECTION – B **Q. no. 21 to 26 are very short answer questions**		
21	Concentration of solution = mass of solute /mass of solution x 100 (1/2 mark) Mass of solution = (60+240) =300g (1/2 mark) Conc: = 60/300 x 100 =20% (1 mark)	2

<table>
<tr><td>22</td><td>a)<table><tr><th>PLANT VACUOLES</th><th>ANIMAL VACUOLES</th></tr><tr><td>The size of vacuoles in plants is very large.</td><td>The size of vacuoles in animals is very small.</td></tr><tr><td>The main function of plant vacuoles is to store plant sap and maintain the turgidity and rigidity of the plant cell.</td><td>The main function of animal vacuoles is to store nutrients, ions and water.</td></tr></table>
b) Rupture or break down of plasma membrane would result in the exposure of cell component to the external environment and would ultimately result in cell death.</td><td>1

1</td></tr>
<tr><td>23</td><td>The movement of food in the alimentary canal or the contraction and relaxation of blood vessels are involuntary movements. The cells are long with pointed ends (spindle-shaped) and uninucleate (having a single nucleus).
OR
a) Simple squamous epithelial cells are extremely thin and flat and form a delicate lining. The oesophagus and the lining of the mouth are also covered with squamous epithelium.
b) Columnar (meaning ‘pillar-like’) epithelium facilitates movement across the epithelial barrier. In the respiratory tract,</td><td>2

1

1</td></tr>
<tr><td>24</td><td>a) A Newton force is defined as that force when acting on a body of mass 1 kg produces an acceleration of 1 m / s ^{2} in it.

b) Mass of body=500 g = 0.5 kg
Velocity u=20m/s
Momentum p1=mu=0. 5×20=10kg.m/s
Velocity v=0.2m/s
Momentum p2=mv=0.5×0.2=0. 1kg.m/s
Change in momentum =p2−p1=0.1−10=−9. 9kg.m/s (Negative sign shows that momentum decreases)</td><td>2</td></tr>
<tr><td>25</td><td>a) Buoyancy force is the upward force a fluid exerts on an object. Archimedes' Principle is the fact that buoyant force is equal to the weight of the displaced fluid.

b) Mass of the tin = 350 grams; Volume = 200 cm³

$$\text{Density} = \frac{\text{Mass}}{\text{Volume}} = \frac{350\ \text{grams}}{200\ \text{cm}^3} = 1.75\text{g/cm}^3$$
The SI Unit of density is kg/m³.
1 g/cm³ = 1000 kg/m³ therefore, 1.75 g/cm³ = 1750 kg /m³
Density = 1750 kg/m³

OR
a) Suppose a body of mass m is place on the earth of mass M and radius R</td><td>2</td></tr>
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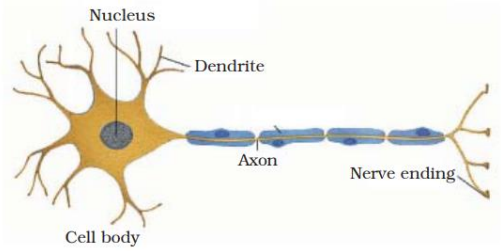
	then, From the universal law of gravitation, $$F = G\frac{M \times m}{R^2} \; - - - - - (1)$$ From the second law of motion, the force $$F = mg - - - -(2)$$ Since it is a free fall, a=g $$F = mg = G\frac{M \times m}{R^2}$$ $$g = G\frac{M}{R^2}$$ b) Given, Initial velocity = u = 0; time taken = t = 4s acceleration = g = 9.8 m/s^2 Using 2nd equation of motion we get, $$v = u + at = 0 + (9.8 \times 4)$$ $$v = 39.2ms^{-2}$$	
26	a) Increase food production without degrading our environment and disturbing the balances maintaining it. b) Photoperiod-The duration of light needed for the proper flowering and development of a plant is called photoperiod.	1+1
	SECTION - C **Q.no. 27 to 33 are short answer questions.**	
27	Definition. Cotton is better absorber of water than nylon. So, during summer cotton clothes absorb sweat, which on evaporation gives a cooling sensation in the body. (1+1+1)	3
28	E.C = 2,6 (1 MARK) – diagram (1 mark)- No. of electron – 2+8+2=12 (1 mark) **OR** 3Postulates (2 marks) Electrons are negatively charged particles. discovered by J.J Thomson.	3
29	a) Cytoplasm provides rigidity to the plant cell and helps it to withstand in dilute medium. b) Folds in mitochondria increase the surface area to help in ATP generating reactions. c) Digestive enzymes in lysosomes help in removal of viruses, worn out organelles, damaged cell.	1+1+1

30	a)  b) Nerve impulses allow us to move our muscles when we want to. The functional combination of nerve and muscle tissue is fundamental to most animals. This combination enables animals to move rapidly in response to stimuli.	1.5x2
31	a) The velocity of body is uniform; thus, acceleration is zero. Hence, no unbalanced force acts on the body. b) The passenger possesses inertia of motion in a moving bus. As the bus stops, their lower body which is in contact with the bus stops while upper part tends to keep moving as they fall forward. Similarly, in the stationary bus, they have inertia of rest. As the bus stars, their lower body moves but the upper body tends to be at rest and they fall backward.	3
32	*a) When a body moves exclusively under the influence of the Earth's gravity*, it is said to be in freefall. b) weight of man on earth, W_e=600 N weight of man on moon, W_m=100 N and acceleration due to gravity, g=9.8 ms^{-2} Let 'm' be the mass of the man. $$We = m \times g$$ $$m = We/g = 600/9.8 = 61.22 \text{ kg}$$ Thus, the mass of man on the earth is 61.22 kg. Now, the mass of a body remains the same everywhere in the universe. So, the mass of man on the moon will also be 61.22 kg. $$Wm = m \times g$$ where mass, m=61.22 kg $$g = Wm/m = 100/61.22 = 1.633 \text{ ms}^{-2}$$ Therefore acceleration due to gravity on the moon is 1.633 ms^{-2}.	3
33	a) $$W = F \times d$$ $$W = 140 \times 15 = 2100 \text{joules}$$	3

	b) **Answer:** $v^2 - u^2 = 2as$ $\Rightarrow s = \left[\frac{v^2 - u^2}{2a}\right]$ $F = ma$ $W = F \times s$ $W = ma\left[\frac{v^2 - u^2}{2a}\right]$ $= \frac{1}{2}mv^2 - \frac{1}{2}mu^2$ $= (K.E.)_{\text{final}} - (K.E.)_{\text{initial}}$ SI unit of Kinetic energy in joules.	
SECTION - D **Q.no. 34 to 36 are Long answer questions.**		
34	a) Heterogeneous /Tyndall/stable (any three) (3 marks) b) Dispersed medium and dispersed phase (1 mark) c) Ink, blood **OR** Two point difference i. Sugar in water ii. air iii. Oil in water	5
35	a)Plastids and mitochondria are two-membraned organelles., The plastid and mitochondrial outer membranes include porin protein, which increases the layer's porosity, the fact that mitochondria and plasmids have some of their own DNA for protein synthesis has earned them the moniker "semi-autonomous cell organelles." b)They proposed the cell theory which explains that the animal and plant cells are composed of cells product of cells. c)There are two types of ER– rough endoplasmic reticulum (RER) and smooth endoplasmic reticulum (SER). RER looks rough under a microscope because it has particles called ribosomes attached to its surface. The ribosomes, which are present in all active cells, are the sites of protein manufacture. The SER helps in the manufacture of fat molecules, or lipids, important for cell function. Some of these proteins and lipids help in building the cell membrane.	2+1+2

OR

a) Grass looks green as due to the presence of a plastid called chloroplast and papaya appears yellow because due to the presence of the plastid chromoplast. The cell organelle responding to this is plastids. The internal organisation of the Chloroplast consists of numerous membrane layers embedded in a material called the stroma. These are similar to mitochondria in external structure. Like the mitochondria, plastids also have their own DNA and ribosomes.

b) Chromatin material is visible as entangled mass of thread like structures. Whenever the cell is about to divide, the chromatin material gets organised into chromosomes.

c)The nucleus plays a central role in cellular reproduction, the process by which a single cell divides and forms two new cells. It also plays a crucial part, along with the environment, in determining the way the cell will develop and what form it will exhibit at maturity, by directing the chemical activities of the cell.

36

a)

Mass	Weight
1. Mass of a body is the measure of its inertia.	1. Weight of the body is the force with which it is attracted towards the earth (W = m x g).
2. Its S.I. unit is kg.	2. Its S.I unit is Newton.
3. It remains constant everywhere and it cannot be zero.	3. Its value changes from place to place and it can be zero.
4. It can be measured by beam-balance.	4. It can be measured by spring balance.
5. It has only magnitude i.e. it is a scalar quantity.	5. It has both magnitude and direction i.e.

b)

$$\text{Pressure} = \frac{F}{A} = \frac{m \times g}{\text{Area}}$$

$$= \frac{100 \times 10}{10^{-2}}\ \text{N/m}^2\ (g = 10\ m/s^2)$$

$$= 100 \times 10 \times 10^2 = 10^5\ \text{N/m}^2$$

When Area = 25 cm^2

$= 25 \times 10^{-4}\ m^2$ and $m = 50$ kg

$$\therefore \text{Pressure} = \frac{F}{A} = \frac{m \times g}{\text{Area}} = \frac{50 \times 10}{25 \times 10^{-4}}$$

$$= 20 \times 10^4\ \text{N/m}^2$$

$$= 2 \times 10^5\ \text{N/m}^2$$

More pressure will be exerted by 50 kg mass on 25 cm^2.

5

	OR a) The upward force experienced by an object when it is immersed into a fluid is called force of buoyancy. It acts in upward direction and it depends on the density of the fluid. Factors affecting buoyant force: i Volume of object immersed in the liquid ii Density of the liquid. b) Given, Density of brick = 15000 kg/m³. $$length \times breath \times height = 1 \times 0.5 \times 1.5$$ $$Volume\ of\ brick\ = l \times b \times h = 1 \times 0.5 \times 1.5 = 0.75\ m^3$$ $$Density\ = mass/\ volume$$ $$Mass\ = Density \times volume$$ $$Mass\ = 15000 \times 0.75 = 11250\ kg$$ Force = weight. $$Force = weight = mass \times acceleration\ due\ to\ gravity$$ $$Force\ = 11250 \times 9.8$$ $$Force\ = 110250\ N.$$ We know that, As $area\ = length \times breadth = 1 \times 0.5 = 0.5$ m². And therefore $$Pressure\ = force\ /area$$ $$Pressure\ = \frac{110250}{0.5} = 220500\ \frac{N}{m^2}.or\ Pa$$	
SECTION – E **Q.no. 37 to 39 are case - based/data -based questions with 2 to 3 short sub - parts. Internal choice is provided in one of these sub-parts.**		
37	a) Define (1 mark) + Y (1 mark) b) i. Solubility increases with increase of temperature. (1 mark) ii. Concentration-amount of solute present in given amount of solution. Solubility – maximum amount of solute that can be dissolved in a given solution. (1 mark)	2+2
38	a) Blood flows and transports gases, digested food, hormones and waste materials to different parts of the body.	1+1+2

	b) Blood is regarded as a connective tissue because as the blood is circulated throughout the body due to pumping action of heart, it carries different materials and gases from one part of the body to another. Hence, it connects different tissues and organs of the body and thus, called as a connective tissue. c)Areolar connective tissue is found between the skin and muscles, around blood vessels and nerves and in the bone marrow. It fills the space inside the organs, supports internal organs and helps in repair of tissues **OR** c)Blood has a fluid (liquid) matrix called plasma, in which red blood cells (RBCs), white blood cells (WBCs) and platelets are suspended. The plasma contains proteins, salts and hormones	
39	a) The slope of the graph of object B is maximum, thus B travelling the fastest. b) No, all three are never at the same point on the road as the graph are not intersecting at a single point c) When B crosses A, then the corresponding position of C will be 6 km from the start. **OR** c) B crosses C, the corresponding position on graph 5 km from the start.	1+1+2