

Karnataka Board Question Papers of Science for Class 9

Section-A

Group-I(2 marks questions)

1. Define the SI unit of work.

ANS:- The SI unit of work is the joule. If a force of one newton displaces a body by one metre, then the work done is said to be one joule.

2. What kind of energy transformation takes place when a body is dropped from some height?

ANS:- When a body is dropped from some height, its potential energy gets converted into kinetic energy.

3. Name two acids that are present in acid rain.

ANS:- Oxides of nitrogen and sulphur.

4. Name the disease caused by water contaminated by mercury.

ANS:- Minamata disease

5.a) How many atoms of sodium are there in a sample measuring 2×10^2 moles?

ANS:- 1 mole of sodium = 6.022×10^{23} atoms of sodium
 2×10 moles of sodium = $(6.022 \times 10^{23}) \times (2 \times 10^2)$ atoms of sodium
= 1.2044×10^{26} atoms of sodium

b) Write the formula of nitrate of B^{2+} and aluminium salt of X^- .

ANS:- Nitrate of B^{2+} : $B(NO_3)_2$
Aluminium salt of X^- : AlX_3

6. Draw a sketch of Bohr's model of the atom with five electrons in the "M" shell. Identify the element and also write its electronic configuration.

7. Describe the class of warm-blooded animals in which the teeth are absent.

ANS:- The class of warm blooded animals in which the teeth are absent is aves, which includes birds. Their forelimbs are modified into wings with feather. They have strong hind limbs for walking. Birds are arboreal in habitat. Their bones are light as they are hollow. Birds breathe through their lungs and have air sacs. They have a four-chambered heart. Aves are also egg-laying creatures. Examples include the parrot, peacock, hen, ostrich, etc.

8. State Archimedes' principle.

ANS:- When a body is immersed fully or partially in a fluid, it experiences an upward force that is equal to the weight of the fluid displaced by it.

9. What is the density of iron in SI system whose relative density is 7.7?

ANS:- If the relative density of iron is 7.7, then its density in the CGS system is $7.7 \text{ g/c}^{\text{m}^3}$. Hence, its density in the SI system is 7700 kg/m^3

10. What are ultrasonic waves? Name three animals that can hear ultrasonic waves.

ANS:- Sound waves that have frequency greater than 20 kHz are called ultrasonic waves. Dolphins, bats and porpoises can hear ultrasonic waves.

Group-II(3 marks questions)

11. Describe any four methods of weathering of soil.

ANS:- Weathering of soil is carried out by different agents:

(i) Big rocks crack and break into particles of soil due to uneven contraction and expansion caused by various climatic conditions.

(ii) Water logged in the cracks of rocks freezes, and the cracks widen, eventually breaking the rocks and forming soil.

(iii) Lichens grow on the surface of rocks and release chemicals that powder the rocks to soil.

(iv) Strong winds erode rocks and carry sand from one place to another.

12. What are the causes of water pollution?

ANS:- The causes of water pollution include:

(i) Dumping industrial chemicals and urban sewage into rivers and lakes.

(ii) Fertilisers and pesticides used in farms running off into water bodies. Dumping hot water from thermal power plants into water bodies, which raises the temperature of the water. This rise in temperature removes the dissolved oxygen and causes the death of many aquatic animals.

13.a) Calculate the molecular mass of $C_6H_{12}O_6$ and P_2O_5 .

(Atomic mass: C = 12, H = 1, O = 16, P = 31) (1)

ANS:- Molecular mass of $C_6H_{12}O_6 = (6 \times 12) + (12 \times 1) + (6 \times 16) = 180 \text{ u}$

Molecular mass of $P_2O_5 = (2 \times 31) + (5 \times 16) = 142 \text{ u}$

b) Carbon dioxide is formed when carbon and oxygen combine in the ratio of 3:8 by mass to. How much amount of oxygen gas would be required to react completely with 36 g of carbon? (2)

ANS:- Carbon and oxygen combine in the ratio of 3:8 by mass.

3 g of carbon combines with 8 g of oxygen

36 g of carbon combines with $(8 \times 36)/3 = 96 \text{ g}$ of oxygen

14. Calculate the mass of:

(i) 1.5 moles of oxygen molecules

(ii) 1.5 moles of oxygen atoms

(iii) 3.011×10^{23} oxygen atoms (atomic mass: O = 16)

ANS:- (i) 1 mole of oxygen molecules weigh = Molar mass = 32 g

1.5 mole of oxygen molecules weigh = $32 \times 1.5 \text{ g} = 48 \text{ g}$

(ii) 1 mole of oxygen atoms weigh = Atomic mass = 16 g

1.5 mole of oxygen atoms weigh = $16 \times 1.5 = 24 \text{ g}$

- (iii) 6.022×10^{23} number of oxygen atoms weigh = 16 g
 3.011×10^{23} number of oxygen atoms weigh = 26g

15. Write any three differences between chordates and non-chordates.

ANS:-

Non-chordates	Chordates
The notochord is absent.	The notochord is present at some developmental stages.
Pharyngeal gill slits are absent.	Pharyngeal gill slits that aid in respiration are present.
The central nervous system is solid and ventral.	The central nervous system is hollow and dorsal.
Respiratory pigment, if present, is in dissolved form in plasma in blood.	Respiratory pigment haemoglobin is present in RBC's.

16. Describe any three infectious agents.

ANS:- Microbes such as bacteria, viruses, fungi, protozoa and worms cause diseases. These are called infectious agents. These agents absorb digested food from the host, and, in turn, cause diseases.

(i) Bacteria are unicellular organisms visible only under a microscope. Some diseases caused by bacteria are typhoid, cholera, tuberculosis etc.

(ii) A virus is the smallest organism that can be seen through an electron microscope and causes common cold, dengue etc.

(iii) Fungi are microscopic and multi-cellular organisms that usually cause skin infections.

(iv) Protozoa are parasitic organisms that can be seen only under a microscope. Some diseases caused by protozoan organisms are sleeping sickness, Kala-azar and amoebiasis.

17. Describe the mode of transmission of diseases through air, water and animals, with examples.

ANS:- The mode of transmission of diseases through air, water and animals are-

(i) Through air: Droplet nuclei containing microbes circulate in the air mainly in overcrowded and poorly ventilated areas, and cause diseases like the common cold, pneumonia and tuberculosis.

(ii) Through water: When the excreta of animals and humans suffering from infectious diseases get mixed with water, it causes diseases like cholera.

(iii) Through animals: Some animals carry infectious agents from a sick person to a healthy person. These animals are called vectors. The most common vectors are mosquitoes, dogs, etc. Animals like dogs and cats transfer the rabies virus when they bite human beings.

18. How can we prevent infectious diseases?

ANS:- Infectious diseases can be prevented by taking different measures:

(i) By providing living conditions that are not over-crowded we can prevent the air borne diseases.

(ii) By providing clean drinking water we can prevent the water borne diseases.

(iii) Vector-borne diseases can be prevented by keeping our surroundings clean to prevent insects from breeding. Public hygiene is a basic step to prevent infectious diseases.

19. Derive the relation between the SI unit and the CGS unit for work.

ANS:- The SI unit for work is the joule, and its CGS unit is the erg.

$$\begin{aligned} 1 \text{ J} &= 1 \text{ N} \times 1 \text{ m} = 1 \text{ kg m/s}^2 \times 1 \text{ m} \\ &= 1 \text{ kg m}^2/\text{s}^2 = 1 \text{ kg} \times (1 \text{ m})^2/(1 \text{ s})^2 \\ &= 1000 \text{ g} \times (100 \text{ cm})^2/(1 \text{ s})^2 \\ &= 10^3 \text{ g} \times 10^4 \text{ cm}^2/1 \text{ s}^2 = 10^7 \text{ g cm}^2/\text{s}^2 = 10^7 \text{ erg} \\ \therefore 1 \text{ J} &= 10^7 \text{ erg} \end{aligned}$$

20. A boy standing in front of a cliff claps and hears an echo at the end of 3 s. Find the distance between the cliff and the boy when the speed of sound in air is 342 m/s.

ANS:- Time to hear echo of clap, $t = 3 \text{ s}$

Speed of sound in air, $v = 342 \text{ m/s}$

Let the distance of the cliff from the boy be 'd'.

Distance travelled by sound = $2d$

Speed of sound = distance/ time = $2d / t$

$$v = 2d / t \quad \text{or} \quad d = vt / 2 = (342 \times 3) / 2$$

$$= 513 \text{ m}$$

Group-III(5 marks questions)

21.a) Explain the term isotope with an example.

ANS:- a) Atoms of the same element with the same number of protons/atomic number, but with a different number of neutrons/mass number, are called isotopes.

b) Which elementary particle out of the elementary particles of an atom influences the following properties of an element? Give suitable reasons for your answer.

i) The chemical identity of an atom

ANS:- i) The chemical identity of an atom depends on the number of protons. The atomic number is defined as the number of protons and no two elements can have the same atomic number.

ii) The mass of an atom

ANS:- ii)The mass of an atom depends upon the number of neutrons and protons.

c) Describe the conclusions of Rutherford's alpha particle scattering experiment?

ANS c):- The conclusions of Rutherford's alpha particle scattering experiment were:

(i)There is a positively charged centre in an atom, called the nucleus. Nearly the entire mass of an atom resides in the nucleus.

- (ii) The electrons move around the nucleus along the orbits.
- (iii) The size of the nucleus is very small as compared to the size of the atom.

22 a) How are the particles in a nucleus made?

ANS:-a) The sub-atomic particles present in the nucleus of an atom are protons and neutrons. Both have a mass of 1u. A proton has a charge of +1, while a neutron is an uncharged particle.

b) How are isotopes important in medicine?

ANS:- b) Radioactive isotopes are used in medicine to trace aspects of body chemistry by the radioactive emissions. They are also used in radiotherapy to kill malignant cancer cells.

c) In Rutherford's scattering experiment, the α -particles that hit the gold foil are deflected back.

Explain

ANS:- c) The fact that very few of the α -particles that hit the gold foil in Rutherford's experiment are deflected back suggests that an atom has a heavy and positively-charged centre, and it occupies a very small volume. Hence, some α -particles are deflected back by the heavy positively-charged centre, while most of them pass through the surrounding empty space.

23. Name the kind of energy transformation that takes place in the following examples: (6 marks)

- a) Electric heater
- b) Dynamo
- c) Microphone
- d) Electric cell
- e) Headphone

ANS:- a) Electric heater: Electrical energy into heat energy

b) Dynamo: Mechanical energy into electrical energy

c) Microphone: Sound energy into electrical energy

d) Electric cell: Chemical energy into electrical energy

e) Headphone: Electrical energy into sound energy

24. Describe the following processes:(6 marks)

- a. Biogeochemical cycle
- b. Greenhouse effect
- c. Formation of ozone layer
- d. Water cycle
- e. Decomposition

ANS:- a. Biogeochemical cycle: The cycling of chemicals between the biological and the geological world is called the biogeochemical cycle. The biotic and abiotic components of the biosphere constantly interact through these cycles. During these interactions there is a transfer of nutrients between the living and the non-living organisms.

b. Greenhouse effect: The earth reflects some of the solar radiation that it receives, back into the atmosphere as infrared radiation. Most of this infrared radiation does not escape back into space, since it is absorbed by atmospheric gases commonly known as greenhouse gases. These gases send the

infrared radiation back to the earth's surface, thereby heating the earth's surface again. This is called the greenhouse effect. It keeps the earth warm to sustain life.

c. Formation of ozone layer: Atomic (O) and molecular oxygen (O₂) react with each other in the presence of ultraviolet rays to form ozone. The upper layer of the atmosphere, known as the stratosphere, is rich in ozone molecules. Hence, this layer is called the ozone shield or the ozone layer. This layer absorbs the harmful ultraviolet radiations from the sun, which prevent them from reaching the earth's surface, which otherwise might damage life forms.

d. Water cycle: Water evaporates from water bodies due to the sun's heat and returns as rain and snow that flows back into the seas through rivers. This movement of water from land to the ocean and back to land is called the water cycle. When the oceans are heated during the day, water turns into water vapour and escapes into the atmosphere. This water vapour in the atmosphere changes to water droplets and condenses to form clouds. These clouds precipitate into rain, snow or fog. Much of the rain water flows into water bodies while some of it penetrates the earth's surface and gets logged as groundwater. In this way water is maintained by the water cycle.

e. Decomposition: Dead plants and animals are decomposed by fungi and bacteria. This decomposition releases the carbon in the remains as carbon dioxide into the atmosphere.

25. Draw the nitrogen cycle, and explain how nitrogen is replenished in the atmosphere.

Ans:- Hint-Process of Nitrogen cycle:-nitrogen fixation->assimilation->ammonification->nitrification->denitrification->anaerobic ammonium oxidation

Section B(1 mark each)

1. Among cat, dog, lion and wolf, which animals belong to the same family?

- a. Dog, lion
- b. Cat, lion
- c. Cat, dog
- d. Dog, wolf

ans:- Cat, lion

2. Organisms of which phylum show the notochord only at some stages during their lives?

- a. Protochordata
- b. Non-chordates
- c. Hemichordata
- d. Chordates

ans:- Protochordat

3. Subhash cut a fresh water plant into small pieces, and he observed that each of these fragments grew into a new plant. Identify the plant.

- a. Sargassum

- b. Spirogyra
- c. Chlamydomonas
- d. Rhizopus

ans:- Spirogyra

4. A cuboidal block of dimensions $10\text{ cm} \times 6\text{ cm} \times 4\text{ cm}$ is placed on a surface. It exerts maximum pressure when the side with the dimensions ____ is in contact with the surface.

- a. $10\text{ cm} \times 4\text{ cm}$
- b. $10\text{ cm} \times 6\text{ cm}$
- c. $6\text{ cm} \times 4\text{ cm}$
- d. Any dimension

ans:- $6\text{ cm} \times 4\text{ cm}$

5. The SI unit for pressure is ____.

- a. dyn/cm^2
- b. dyn/m^2
- c. N/cm^2
- d. N/m^2

ans:- N/m^2

6. A balloon filled with air is immersed forcibly and gradually into a water trough. The balloon experiences maximum upthrust when it is immersed:

- a. Up to one-fourth of its volume in water
- b. Up to half of its volume in water
- c. Up to three-fourths of its volume in water
- d. Completely in water

ans:- Completely in water

7. The density of gold is $19.3\text{ g}/\text{cm}^3$. Its relative density is ____.

- a. 193
- b. 1.93
- c. 19.3
- d. 0.193

ans:- 19.3

8. The purity of gold in an ornament can be found, without destroying it, by using ____.

- a. The law of conservation of mass
- b. The principle of moments
- c. Archimedes' principle
- d. Bernoulli's principle

ans:- Archimedes' principle

9. The relative density of silver is 10.8. Its density is:

- a. 108 kg/m^3
- b. 1.08 g/m^3
- c. 10.8 g/m^3
- d. $10.8 \times 10^3 \text{ kg/m}^3$

ans:- $10.8 \times 10^3 \text{ kg/m}^3$

10. A man standing between two parallel cliffs fires a gun and hears two successive echoes at the end of 4 s and 6 s. The distance between the cliffs is ___m. (Speed of sound in air is 330 m/s.)

- a. 1600 m
- b. 1650 cm
- c. 1650 m
- d. 1590 m

ans:- 1650 m

11. The frequency of a tuning fork is 256 Hz. The number of vibrations made by the fork in 10 s is

- _____.
- a. 25.6
 - b. 256
 - c. 2560
 - d. 5120

ans:- 2560

12. In which of the following does sound travel faster?

- a. Railway track
- b. Tissue paper
- c. Garden water pipe
- d. Car tyre

ans:- Railway track

13. The Galton whistle, also called a dog whistle, produces sounds in the range:

- a. Below 20 Hz
- b. 20 Hz to 20 kHz
- c. Above 20 kHz
- d. 10 Hz to 20 Hz

ans:- Above 20 kHz

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