CBSE Sample Paper - 03
SUMMATIVE ASSESSMENT –II
Class – IX SCIENCE

Time allowed: 3 hours Maximum Marks: 90

General Instructions:

a) All questions are compulsory.
b) The question paper comprises of two sections, A and B. You are to attempt both the sections.
c) Questions 1 to 3 in section A are one mark questions. These are to be answered in one word or in one sentence.
d) Questions 4 to 6 in section A are two marks questions. These are to be answered in about 30 words each.
e) Questions 7 to 18 in section A are three marks questions. These are to be answered in about 50 words each.
f) Questions 19 to 24 in section A are five marks questions. These are to be answered in about 70 words each.
g) Questions 25 to 33 in section B are multiple choice questions based on practical skills. Each question is a one mark question. You are to select one most appropriate response out of the four provided to you.
h) Questions 34 to 36 in section B are based on practical skills. Each question is a two marks question.

Section A

1. What are polyatomic ions?
2. What is meant by the term chemical formula?
3. State the law of conservation of energy.
4. How would you choose between two characteristics to be used for developing a hierarchy in classification?
5. Why are the ceilings of concert halls curved?
6. What would happen if all the oxygen present in the environment is converted to ozone?
7. Prove that $\upsilon = v\lambda$, where the symbols have their usual meanings.
8. What is a conservative forces? Give an example.
9. Distinguish between loudness and intensity of sound.
10. What are the advantages of the Periodic Table?
11. Explain the formation of Al^{3+} ion and why is it formed?
12. What are the major divisions of the kingdom planate? What is the basis of these divisions?
13. Explain giving reasons why:

    (a) Balanced diet is necessary for maintaining healthy body.

    (b) Health of an organism depends upon the surrounding environmental conditions.

    (c) Our surrounding area should be free of stagnant water.

14. What is the work done by the force of gravity on a satellite moving round the earth? Justify your answer.
15. When a wave travels from one medium to another, the wavelength changes but not the frequency. The wavelength of sound disturbance 30 cm in air and of the wave velocity is 340 m/s. What will be the wavelength of this disturbance in Helium? The speed of sound in helium is 970 m/s and 1450 m/s in water?
16. Derive an expression for the kinetic energy at what height will its kinetic energy and potential energy be equal?
17. Nita's mother fell ill and the doctor diagnosed her with pernicious anemia. She felt lethargic and did not have the energy to do work. Nita helped her mother in household work till she recovered.

    Answer the following questions based on the above information:

    (i) Name the vitamin whose deficiency caused pernicious anaemia.

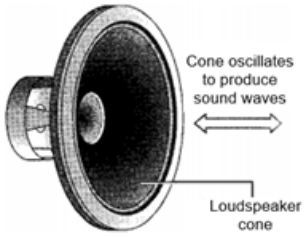
    (ii) What changes do you think the doctor might have made to her diet?

    (iii) Mention the values shown by Nita.
18. List any three human activities that you think would lead to air pollution.
19. A baby is not able to tell her/his caretakers that she/he is sick. What would help us to find out (a) that the baby is sick? (b) what is the sickness?
20. Describe the three main characteristics that are used for a hierarchical classification.
21. What types of energy transformation takes place in the following:

    (i) Electric heater (ii) Solar battery

    (iii) Dynamo (iv) Steam engine and

    (v) Hydroelectric power station?
22. What is a mole? What is the unit of mole? How many molecules are there in a certain mass of a substance?
23. Figure shows a loudspeaker cone oscillating to produce sound waves:



    (a) As the sound wave passes a point, it produces regions of higher and lower pressure. State the names of these regions.

(b) Describe how the movement of the loudspeaker cone produces these regions of different pressure.

(c) State the effect on the loudness and pitch of the sound from the loudspeaker when:

(i) the amplitude increases but the frequency of the sound stays the same.

(ii) the amplitude stays the same but the frequency increases.

24. Why is it necessary to conserve natural resources? How can they be conserved?

Section B

25. 1 Mole of a compound contains:

(a) 6.023×10^{23} atoms (b) 6.023×10^{24} atoms

(c) 60.23×10^{23} atoms (d) 6.023×10^{25} atoms

26. Number of valence electrons in Cl^- ion are:

(a) 16 (b) 8

(c) 17 (d) 18

27. Which of the following structures are characteristics of reptiles but not of amphibians?

(a) Scales (b) Lungs

(c) Smooth moist skin (d) Vertebral Column

28. Making anti-viral drugs is more difficult than making anti-bacterial medicines because:

(a) Viruses make use of host machinery

(b) Viruses are on the border line of living and non-living

(c)Viruses have very few biochemical mechanisms of their own

(d) Viruses have a protein coat.

29. If a body is stored at a height 'h' then it will posses:

(a) Kinetic energy (b) Potential energy

(c) Both (d) None

30. In which form is oxygen stable?

(a) O^{2-} (b) O^{2+}

(c) O (d) Both (a) and (c)

31. Which of the following statements is correct?

(a) Cathode rays travel in straight line and have momentum

(b) Cathode rays travel in straight line and have no momentum

(c) Cathode rays do not travel in straight line but have Momentum

(d) Cathode rays do not travel in straight line and have no momentum

32. $^{20}_{10}Ne$ and $^{22}_{10}Ne$ are

(a) Isotopes (b) Isobars

(c) Isotones (d) Both (a) and (b)

33. Which of the following characteristics does not apply to fungi?

(a) Non-green (b) saprophytic or parasitic

(c) Autotrophic (d) Heterotrophic

34. Under which of the following conditions are you most likely to fall sick? And why?

(a) when you are taking examinations.

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

(c) when your friend is suffering from measles.

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

36. A person is listening to a tone of 500 Hz sitting at a distance of 450m from the source of the sound. What is the time interval between successive compressions from the source? [Speed of sound in air = $330ms^{-1}$]

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Solution

1. The ions which consist of more than one atom are called polyatomic ions.
2. Chemical formula is a shorthand way of representing a compound with the help of symbol of elements participating to make that chemical.
3. The law of conservation of energy states that energy can neither be created nor destroyed, it can only be transformed from one form to another.
4. We should choose the characteristic which is dependent on the previous one and would decide the variety in the next level for developing a hierarchy in classification.
5. The ceilings of concert halls are curved because such architecture helps the sound to reach all the corners and places of concert hall.
6. Ozone is a poisonous gas and is thus only present in a thin layer in the stratosphere. If all the oxygen is converted to ozone, the environment will become poisonous and kill all living forms.
7. Let the time period of a wave be *T* seconds.

   In T seconds, number of waves generated = 1.

   So, in 1 second number of waves generated = $\frac{1}{T}$.

   But number of waves generated in 1 second is frequency.

   Therefore, $v = \frac{1}{T}$

   Now, $\text{Velocity} = \frac{\text{Distance travelled}}{\text{Time taken}}$

   $\upsilon = \frac{\lambda}{T}$

   $\upsilon = \frac{1}{T}.\lambda$

   $\upsilon = v\lambda$
8. Conservative force is the one which does a work moving an object from one point to another but is independent of path. Generally the work done is reversible.

   E.g. gravitational force is a conservative force. When an object rises up to a certain height (h), its potential energy increases by a value of mgh. This increase in potential energy is independent of

path being followed i.e. when object is lifted up or pushed up through a slant. When the object falls back to same ground level, its potential energy also decreases to initial value.

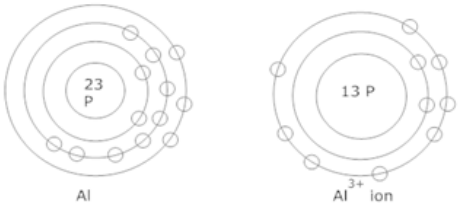
9.

Loudness	Intensity
Loudness is a measure of response of our ear to the sound.	It is the energy passing per second per unit area normal to the direction of energy flow.
It depends on intensity as well as sensitivity of the ear. Therefore, it is not absolute but relative.	It does not depend upon the sensitivity of the ear.
The unit of loudness is decided.	The unit of intensity of watt/ m^2

10. Atomic radius increases down a group because as we move along a group the atomic number increases and the number of shells also increases and the distance of the nucleus from the outermost election increases as it gets far away from the nucleus.

    Atomic radius decreases along a period because as we move from left to right along a period, the atomic number of the atom increases, and the positive charge nucleus and electrons are added to the same orbit and increased nuclear charge will increase the force of attraction of the electrons.

11. Because Al has atomic number of 13, its electronic configuration is 2, 8, 3 so in order that it becomes stable, it should have 8 electrons in its lose $3e^-$ from its outermost shell and as result it has 8 e^- in the outermost shell and forms Al^{3+} ion.



12. Major division of kingdom plantae - thallophya, bryophyta, pteridophyta, gymnosperms and angiosperms. This kingdom includes Basis for classification:

    (a) All organisms which are multicellular, eukaryotic and green autotrophs.

    (b) Green plants are further classified on the basis of differentiation of the plant body.

    (c) Second level of classification plant body has vascular tissue or not. Further classification is based on

    (i) Whether seeds are present or not

    (ii) Whether seeds are enclosed within fruit or not.

13. **(a)** Food is necessary for the growth and development of the body. Balanced diet provides raw materials and energy in appropriate amount needed through nutrients like proteins, carbohydrates, fats, minerals, etc. which in turn are essential for the proper growth and functioning of a healthy body.

    (b) Health is a state of being well enough to function physically, mentally and socially and these conditions in turn depend upon the surrounding environmental conditions, **e.g.,** if there are unhygienic conditions in surrounding area, it is likely that we might get infected or diseased.

    (c) This is so because many water-borne diseases and insect vectors flourish in stagnant water which cause diseases in human beings.

14. The satellite is moving on a round path, displacement in the object is perpendicular to the direction of force. $\theta = 90°$.

    W= $F \times s \operatorname{Cos} \theta$

    = $F \times s \operatorname{Cos} 90°$

    = $F \times 0 = 0$

    Therefore work done is zero.

15. Wavelength of sound disturbance (λ) = 30cm

    Wave velocity of sound (γ) = 340 m/s

    $\nu = \gamma\, \lambda$ (velocity = frequency × wavelength)

    $340 = \gamma \times \frac{30}{100} m$

    $\frac{340 \times 100}{30} = \gamma$

    $\Rightarrow \frac{3400 / s}{3} = \gamma$

    Helium: speed of sound = 970m/s

    $\nu = \gamma\, \lambda$

    $970 = \frac{3400}{3} \times \lambda$

    $\frac{970 \times 3}{3400} = \lambda$

    $0.856m = \lambda$

16. Initial velocity = u = o

    Final velocity = v = 40m/s

    M = Mass of the body

    (a) Kinetic energy = K. E. = $\frac{1}{2} m v^2$

Potential energy = P.E= mgh

Now, K. E = P.E

$\frac{1}{2}mv^2$ = mgh

$\frac{1}{2}m\times(40)^2\ m\times g\times h$

$\frac{1600}{2}=gh$

800 = gh

$\frac{800}{10}=h$

h = 80m

17. (i) Vitamin B12.

    (ii) Increased animal products-meat, egg and dairy products.

    (iii) Self awareness, caring, responsible.

18. (i) Burning of fossil fuels like coal and petroleum releases different oxides of nitrogen and sulphur in air.

    (ii) Burning of wood release suspended particles and smoke in air.

    (iii) Use of harmful chemicals like aerosols, CFCs etc.

19. (a) The following symptoms will indicate that the baby is sick:

    (i) Repeated crying

    (ii) High body temperature

    (iii) Watering of eyes

    (iv) Watery stools

    (v) Redness of eyes

    (vi) Vomiting

    (b) We can report the symptoms which we see in the baby to the doctor who can make his own diagnosis. If need be, he can also conduct some tests for verification and then advise us about the medicines.

20. The three main characteristics used for a hierarchical classification are:

    (i) Complexity of cell structure, i.e., type of cell – prokaryotic or eukaryotic. As a eukaryotic cell has membrane-bound organelles including a nucleus, the cellular processes can be carried out efficiently in isolation from cells. On the other hand, the organisms without a clearly demarcated nucleus and other organelles need to have very different biochemical pathways.

This would naturally have a great effect on every aspect of cell design. Moreover, the nucleated cells would have the capacity to participate in making a multicellular organism as they are capable of taking up specialised functions.

(ii) Body organisation, i.e, whether the organism is unicellular or multicellular. In a eukaryotic multicellular organism, cells that group together to form a single organism use the principle of division of labour. In this type of body design, all cells would not be identical. Rather, groups of cells will carry out specialised functions. Thus, this makes a very basic distinction in the bodydesigns of organisms. As a result, an amoeba will be very different in its bo design from a fish.

(iii) Mode of nutrition: autotrophic *or* heterotrophic. Plants make their own food while animals depend on plants or other animals for their food. For they will definitely have different body design.

21. (i) Electric heater: Electric energy into heat energy.

(ii) Solar battery: Solar energy into electric energy.

(iii) Dynamo: Mechanical energy into electric energy.

(iv) Steam engine: Heat energy to mechanical energy.

(v) Hydroelectric power station: Mechanical energy into electric energy.

22. A mole is the amount of a substance which contains the same number of chemical units (atoms, molecules or ions) as there are atoms in exactly 12 g of carbon-12. The unit of mole is given by the symbol 'mol'.

We know that Avogadro number is 6.02×10^{23}

$$\text{Number of molecules in a certain mass} = \frac{\text{Mass of the substance}}{\text{Molar mass}} \times N_A$$

$$= \frac{W}{M}\times 6.022\times10^{23} \text{ molecules}$$

where '*W*' is the mass of the substance in which number of molecules is to be calculated and 'M' is the molecular mass of the substance.

23. (a) Regions of higher pressure: Compressions Regions of lower pressure: Rarefactions.

(b) Production of regions of higher pressure: when the loudspeaker cone moves forward, i.e., in the direction of propagation of wave, it pushes the layer of air closer. This air layer pushes the next air layer, and process goes on. In this way, the layers of air near the cone are compressed to form a compression, which is a region of higher pressure.

Production of regions of lower pressure: when the cone moves backward. i.e., away from direction of propagation of wave, it leaves a region of low pressure and the air layers, move apart to form a rarefaction.

(c) (i) Loudness increases as greater the amplitude of sound waves, louder the sound will be pitch remains same.

(ii) Loudness remains same. Pitch increases as the pitch of a sound is directly proportional to its frequency.

24. Natural resources are a precious gift of nature to the mankind. The natural resources and the living organisms are interdependent on each other and form the biosphere. We should use them judiciously for our benefit, but avoid their depletion. The only way to create balance and harmony with nature is to conserve our natural resources.

Some of the ways of conservation of our natural resources are:

(i) They should be protected from being polluted.

(ii) More and more vegetation should be planted and endangered species of plants and animals should be protected.

(iii) The wild animals should be conserved by establishing national parks and sanctuaries.

(iv) Hunting of animals should be prohibited.

(v) Recycling of waste materials must be encouraged.

(vi) We should use alternative sources of energy rather than conventional sources like fossil fuels.

Section B

25. (a)

26. (b)

27. (a)

28. (c)

29. (b)

30. (a)

31. (a)

32. (a)

33. (c)

34. We are most likely to fall sick when a friend is suffering from measles since measles is an infectious/communicable disease that can spread easily from one person to the other.

35. Yes we agree with her statement. Because when many balanced forces act on the object its displacement becomes zero.

36. Given frequency, $\upsilon = 500\text{Hz}$,

Time interval between successive compressions is called time period.

Therefore, Time period $T = \frac{1}{\upsilon} = \frac{1}{500\,s^{-1}}$ r= 0.002 s.