CBSE Sample Paper - 04
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. Give one word for the following:

   (i) Positively charged ion

   (ii) A group of atoms carrying a charge

2. Write the atomicity of the following molecules:

   (i) H_2S0_4

   (ii) CCI_4

3. Name the two common forms of mechanical energy.

4. (i) State reasons why Echidna and platypus lay eggs but are considered as mammals.

   (ii) Forelimbs of birds are modified.

5. What is sound and how is it produced?

6. When we breathe in air, nitrogen also goes inside along with oxygen. What is the fate of this nitrogen?

7. A sound wave of wavelength 0.332 m has a time period of 10^{-3} s. If the time period is decreased to 10^{-4} s, calculate the wavelength and frequency of new wave.

8. What are the various energy transformations that occur when you are riding a bicycle?

9. How does the sound produced by a vibrating object in a medium reach your ear?

10. What are the limitations of Rutherford's model of the atom?

11. Explain the variation of atomic radius along a period and down a group.
12. Give difference between vertebrates and invertebrates.
13. 'Public cleanliness is important for individual health'. Comment.
14. Illustrate the law of conservation of energy by discussing the energy changes which occur when we draw a pendulum bob to one side and allow it to oscillate. Why does the bob eventually come to rest? What happens to its energy eventually? Is it a violation of the law of conservation of energy?
15. An observer far away from a railway station hears the train starting. The sound arrives both from the steel rails and through air with a time difference of 3.5s. How far is the railway station from the observer? The speed of sound in air and steal is 340m/s and 5130m/s respectively?
16. What do you understand by the units of electrical energy? How many joules of energy is consumed if the electrical meter shows 400 units of energy?
17. Naveen was suffering from respiratory disorder since long time. His daughter Sarika took him to a doctor. After studying his case, the doctor came to know that Naveen was residing near a very busy road.
    (i) What could be the possible reason for Naveen's respiratory disorder?
    (ii) Which major pollutants are present in exhaust of vehicles?
    (iii) Write the preventive measures that should be taken.
18. Give reasons why:
    (a) step farming is common in hills.
    (b) fertile soil has lot of humus.
19. Becoming exposed to or infected with an infectious microbe does not necessarily mean developing noticeable disease. Explain.
20. (a) Write any four features that all chordates possess.
    (b) Explain the three basic features for grouping all organisms into five major kingdoms.
21. (a) Define kinetic energy of an object. Can kinetic energy of an object be negative? Give reason.
    (b) A car weighing 1200 kg is uniformly accelerated from rest and covers a distance of 40 m in 5 sec. calculate the work, the car engine had to do during this time.
22. (a) What is an octet? How do elements reach an octet?
    (b) Make a schematic atomic structure of Magnesium or phosphorus. (Given: number of protons of Magnesium=12, Phosphorus=15)
23. (a) What are the characteristics of sound waves?

(b) An echo is heard after 3 s. what is the distance of reflecting surface from the source given that the speed of sound is 342 ms^{-1}?

(c) What is SONAR? Write its full form.

24. How are living organisms dependent on the soil? Are organisms that live in water totally independent of soil as a resource?

Section B

25. Neutron is

(a) Chargeless and Massless (b) Chargeless and has Mass

(c) Has charge and Mass (d) Has charge and Massless.

26. Which one of the following is a correct electronic configuration of sodium?

(a) 2,8 (b) 8,2,1

(c) 2,1,8 (d) 2,8,1

27. Water vascular system is characteristic of:

(a) porifera (b) Mollusca

(c) Echinodermata (d) cnidaria

28. Which one of the following deficiency disease?

(a) Diabetes (b) Malaria

(c) Goitre (d) Tetnus

29. If the force is applied at an angle θ then work done is

(a) W = FS Cos θ; F = Force

(b) W = FS θ; S = Distance

(c) W = FS Sin θ; W = work

(d) None

30. Atomic number of an element during a Chemical reaction.

(a) Increases (b) Remain Constant

(c) Decreases (d) May be (a) or (c)

31. Oxygen is:

(a) Monovalent (b) Bivalent

(c) Trivalent (d) Tetravalent

32. Electronic configuration of calcium is

(a) 2, 8, 8, 2 (b) 2, 8, 6, 4

(c) 2, 8, 7, 1 (d) 2, 8, 1, 7

33. Which phylum contains the greatest number of species of animals?

    (a) sponges (b) mollusks

    (c) Arthropods (d) Chordates

34. Under which of the following conditions is a person most likely to fall sick? And why?

    (a) When she is recovering from malaria.

    (b) When she has recovered from malaria and is taking care of someone suffering from chicken-pox.

    (c) When she is on a four-day fast after recovering from malaria and is taking care of someone suffering from chicken-pox.

35. Does the transfer of energy take place when you push a huge rock with all you might and fail to move it? Where is the energy you spend going?

36. An underwater device directs ultrasounds of frequency 75 KHZ towards water surface. What is the wavelength of sound in the air above the water surface and what is its frequency? Speed of sound in air = 340m/s.

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Solution

1. (i) Cation

   (ii) Ion

2. (i) 7

   (ii) 5

3. Kinetic energy and potential energy.

4. (i) They have mammary glands for the production of milk to nourish their young ones.

   (ii) To reduce body weight for flight.

5. Sound is a form of energy that produces a sensation of hearing in our ears. Sound gets produced when any object vibrates/oscillates.

6. The nitrogen inhaled during respiration is not used in the body and it comes out with CO_2 during exhalation.

7. Given wavelength, λ = 0.332 m

   Time period of wave, T = $10^{-3} s$

   Frequency of wave, $\nu = \frac{1}{T} = \frac{1}{10^{-3}} = 1000 \text{Hz}$

   Velocity of wave, $v = \nu\lambda$ = 1000×0.332 = 332 m/s

   In a given medium, the velocity of sound wave remains same.

   New time period of new wave, T'= 10^{-4} s

   Frequency of new wave, $\nu' = \frac{1}{T'} = \frac{1}{10^{-4}} = 10,000 \text{Hz}$

   Wavelength of new wave, $\lambda' = \frac{v}{\nu'}$

   $= \frac{332}{10,000} = 0.332 \text{m}$

8. The muscular energy of the cyclist transforms into kinetic (mechanical) energy. Due to movement of muscles, cyclist also produces heat. Thus muscular energy is converted into heat energy. The tyres of the cycle are in contact with road and experience friction. Due to friction, tyres get heated. Thus kinetic energy of tyres get converted to heat energy.

   Muscular energy of cyclist $\rightarrow$ Kinetic Energy + Heat energy

Kinetic Energy of Tires + Energy of Friction $\rightarrow$ Heat Energy in tyres

9. As we speak, the particles of air near our mouth are pushed forward so they get compressed. Then they compress the other particles of air. As the compression proceeds the particles of air near our mouth expand again and thus rarefaction occurs. This process is repeated further and as a result sound wave propagates in the form of compressions and rarefactions to the listener's ear.

10. (i) According to classical electromagnetic theory, a moving charged particle, such as an electron under the influence of attractive force loses energy continuously in the form of radiations. As a result of this, electron should lose energy and therefore, should move in even smaller orbits ultimately falling into the nucleus. But the collapse does not occur. There is no explanation for this behaviour.

    (ii) Rutherford did not specify the number of orbits and the number of electrons in each orbit.

11. 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.

12.

Vertebrates	**Invertebrates**
Internal skeleton present	Internal skeleton absent.
Vertebral column (backbone) present	Vertebral column (backbone) absent
Two pairs of limbs present.	Three or more pairs of limbs if present
A tail is usually present.	A tail is absent

13. The garbage thrown in open places, overflowing drains or sewer water, stagnant water, etc. are the places where disease-causing microbes multiply and mosquitoes and flies breed. These mosquitoes and flies act as carriers of disease-causing microbes. As a result, diseases may

spread in the community and affect individual health. Thus, public cleanliness is important for individual health.

14. The bob eventually comes to rest due to the frictional force offered by the air and the rigid support holding the thread.

    It is not a violation of the law of conservation of energy since mechanical energy can get converted into another form of energy which cannot be utilised for useful work. This loss of energy is called dissipation of energy.

15. Let distance between railway station and observer = d

    Speed of sound in air = 340m/s

    Time taken by sound in air = $\frac{\text{Distance}}{speed}$

    $= \frac{d}{340} m$

    Speed of sound in steel = 5130m/s

    Time taken by sound in steel = $\frac{d}{5130} m$

    Time difference between sound in steel and air

    $3.5 = \frac{d}{340} - \frac{d}{5130}$

    $3.5 = \frac{5130d - 340d}{340 \times 5130}$

    $3.5 \times 340 \times 5130 = 4790d$

    $\frac{3.5 \times 340 \times 5130}{4790 \times 10} = d$

16. Unit of electrical energy is defined as the energy spent (or used) by electrical appliance at the rate of 1 kw for 1 hr.

    or 1 unit = 1 kwh

    Now, 1kwh = 1000w ×3600s

    = 3.6×10^6ws

    $1w = \frac{1Joule(J)}{1\text{sec}ond(S)}$

    $1unit = 1Kwh = \frac{3.6 \times 10^6 J \times S}{S} = 3.6 \times 10^6 J$

    So, if 400 units of electrical energy is consumed then,

$1 Unit = 3.6 \times 10^6 J$

$400 Units = \frac{3.6}{1\cancel{0}} \times 10^6 \times 40\cancel{0} J$

17. (i) Air pollution.

    (ii) Carbon monoxide, carbon dioxides, nitrogen oxides and smoke.

    (iii) Use of fuel that burns completely, regularly PUC (pollution under control) to be checked of all the vehicles.

18. (a) On the sloping areas in hills, step farming reduces the steepness of the slopes and checking soil erosion.

    (b) Decomposition of dead organic matter takes place in the top layer soil. This convents organic matter into humus. Hence, fertile soil has humus.

19. Because of strong immune system, our body is normally fighting off microbes. We have cells which are specialised to kill the pathogenic microbes. These cells are active when infecting microbes enter the body and if they are successful in removing the pathogen, we remain disease-free. So even if we are exposed to infectious microbes, it is not necessary that we suffer from diseases.

20. (a) The four main characteristics of chordates are as follows:

    (i) Presence of notochord at any stage of life.

    (ii) Presence of dorsal hollow nerve cord.

    (iii) Presence of gill slits at any stage of life.

    (iv) Presence of tail behind the anal opening.

    (b) The groups are formed on the basis of their cell structure, mode and source of nutrition and body organization.

    Whittaker based his scheme of classification on the following three levels of organization:

    (i) Prokaryotic versus Eukaryotic cell structure.

    (ii) Three different modes of nutrition- Photosynthesis (plants), Absorption from the environment (fungi) and Ingestion (animals).

    (iii) Unicellular versus Multicellular organization.

21. (a) Energy by virtue of motion of body is called its kinetic energy. Consider a mass m moving with a speed u and a force F applied on it, which changes its velocity to displacing by s.

    Work done,

W= $ma.\left(\frac{\left(v^2-u^2\right)}{2a}\right)$ (W=F.s)

So, W= $\frac{1}{2}m\left(v^2-u^2\right)$

If initial velocity, u is zero, then w= $\frac{1}{2}mv^2$

K. E. can't be negative as it has all positive quantities. It is scalar quantity, so no direction is taken in to consideration.

(b) m=1200 Kg, s=40 m and t=5 s

Using s= $ut+\frac{1}{2}at^2$ and u=0;

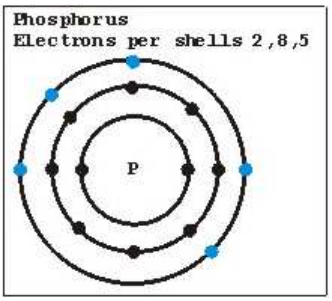
We get a= $\frac{2s}{t^2}=\frac{(2\times 40)}{5^2}=\frac{80}{25}m/s^2$

Work done, = F.s= $ma\times s=1200\times\frac{80}{25}\times 40$

= 153600 joule =153.6 KJ

22. (a) When an atom has 8 electrons in outermost shell, it has octet. An element can attain octet by losing, gaining or sharing electrons.

(b)



23. (a) A sound wave is characterized by its (i) pitch (ii) loudness (iii) quality

(i) Pitch is a relative character dependent on frequency of sound wave. More the frequency, more will be the pitch and vice versa. A low pitched sound will have less number of oscillations per unit than a high pitched sound.

(ii) Loudness or softness is due to the amplitude of the sound. If the amplitude is more, louder will be the sound. Louder sound is caused by the external force of larger magnitude. This is purely relative as "A sound louder for a person can be mild or soft for another." This

depends on intensity which is the amount of energy passing through unit area in one second.

(iii) Quality of sound is a perception used to distinguish the effect of sound in human ear. Two sounds having same loudness and pitch may differ in their quality.

Tone- A sound of single frequency is called a tone.

Note- Series of mixed frequencies produced is called a note.

(b) Since t=3s, $\nu=342 ms^{-1}$, $t=2d/\nu$

$d= \nu t/2 = 342 \times 3/2 = 171 \times 3 = 513$ m

(c) SONAR is a device that uses ultrasonic waves to measure the distance, direction, and speed of the various moving bodies under water.

SONAR consists of:

(i) Transmitter- which releases powerful pulses of ultrasonic frequencies into the sea.

(ii) Receiver- which detects and records the reflected ultrasonic signals.

SONAR refers to Sound navigation and ranging.

24. Living organisms are dependent on the soil in the following ways:

(i) All the plants (even aquatic), on which almost all the organisms depend directly or indirectly for food, grow in the soil, which provides them with nutrients and water for development.

(ii) Soil also supports the very existence of forests, which provide us with wood, building material, fibre and medicinal plants. Forests are also natural habitat for a number of animal species.

(iii) A number of insects and animals make their homes in the soil.

(iv) The organisms that live in water are not totally independent of soil as a resource. The mineral nutrients are present in water in the dissolved form. But their recycling takes place with the help of decomposers that present in soil. Water bodies like rivers get supply of minerals from the soil.

Section B

25. (b)
26. (a)
27. (c)
28. (c)
29. (a)

30. (b)
31. (a)
32. (a)
33. (c)
34. A person is most likely to fall sick when she is on a four-day fast after recovering from malaria and is taking care of someone suffering from chicken-pox because during her fast she was on a limited diet and didn't get sufficient nourishment hence her health condition is poor such that she is very likely to fall sick.
35. While we push a huge rock with all our might(power) but fail to move it no energy transfer occurs as cellular energy simply wastes out in muscle contraction and relaxation even heat generation(sweating).
36. When sound wave travels from one medium to another, the frequency remain unchanged while the wavelength and velocity change

    Frequency in air = 75,000 HZ

    Wavelength, $\lambda = \frac{v}{f} = \frac{340}{75,000} = 4.53 \times 10^{-3} m$