CBSE Sample Paper - 05
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 an example of a tri-atomic molecule of an element.
2. Valency of an element X is 3. Write the chemical formula of its oxide.
3. What is negative work.
4. Why do we keep both snake and turtle in the same class?
5. Why is sound wave called a longitudinal wave?
6. How does the temperature of Earth's atmosphere remain fairly uniform during the day?
7. A sound wave has a frequency 2 kHz and wavelength 40 cm. How long will it take to travel 1.6 km?
8. Define potential energy? What are different types of potential energy?
9. What are wavelength, frequency, time period of a sound wave?
10. Compare the properties of electrons, protons and neutrons.
11. List any three distinguishing features between the models of an atom proposed by J.J. Thomson and Ernest Rutherford.
12. Write characteristics of kingdom Animalia.
13. Give an example where tissue specificity of the infection leads to very general seeming effects.
14. Derive an expression for the potential energy of the body. Calculate P.E of body of mass 10Kg at a height of 10m.
15. Sound waves of wavelength λ travel from a medium in which its velocity is v m/s into another medium in which if velocity is 3 v m/s. What is the wavelength of the sound λ in the second medium?
16. Prove the formula KE = $\frac{1}{2}mv^2$.

17. In a school assembly, the students were asked to wear full sleeves shirts, full pants and socks pulled till knees, use mosquitoes repellants cream during day time.
    (i) Name the disease, about which preventive instruction are given in the assembly.
    (ii) Name the vector of this disease.
    (iii) Give two preventive environmental measures.
    (iv) Which two values were given in assembly related to society?
18. Why does Mathura refinery pose problem to Taj Mahal?
19. What precautions will you take to justify "prevention is better than cure".
20. (i) State two basis of classifying plants and animals into different categories.
    (ii) List three characteristics features of fungi.
    (iii) Some fungal species live in permanent, mutually dependent relationships with cyanobacteria.
    What is this relationship called? Where are they found?
21. What do you mean by work? Give an example of negative work done? What is the work to be done to increase the velocity from 18km/hr to 19km/hr, if the mass of the car is 2000 Kg.
22. (a) Why is the ceiling and wall behind the stage of good conference halls or concert halls made curved?
    (b) Which property of sounds leads to the formation of echoes? Briefly explain.
    (c) What is reverberation? What will happen if the reverberation time in a big hall is too long? How can we reduce it?
23. A person standing between two vertical cliffs and 640 m away from the nearest cliff shouted. He heard the first echo after 4 seconds and the second echo 3 seconds later. Calculate
    (i) the velocity of sound in air, and
    (ii) the distance between the cliffs.
24. "Soil is formed by water." If you agree to this statement then give reasons for your answer.

Section B

25. β –particles are represented as:

    (a) ${}^{0}_{-1}e$ (b) ${}^{0}_{+1}e$

    (c) ${}^{1}_{-1}e$ (d) ${}^{1}_{0}e$

26. Atomic Number of an element is equal to:

    (a) Number of Protons (b) Number of electrons

    (c) Number of neutrons (d) Both (a) and (b)

27. Which one of the following is not the exclusive trait of Arthropoda?

(a) presence of wings (b) jointed appendages

(c) chitinous exoskeleton (d) presence of haemocoel

28. The chemical that kill or stop the growing of certain kinds of microbes are called:

(a) vaccines (b) microbes

(c) antibiotics (d) fungi

29. What is the work done in lifting a body of mass 5Kg vertically through 9m?

(a) 450J (b) -450J

(c) 45J (d) 540J

30. Nitrogen is:

(a) Monatomic (b) Diatomic

(c) Triatomic (d) Tetratomic

31. ${}^{40}_{18}Ar$ and ${}^{40}_{20}Ca$ are

(a) Isotopes (b) Isobars

(c) Isotones (d) Both b and c

32. Which isotope of hydrogen is present in heavy water?

(a) $({}^{3}_{1}H)$ (b) $({}^{2}_{1}H)$

(c) $({}^{3}_{2}H)$ (d) $({}^{1}_{2}H)$

33. Which of the following is not a criterion for classification of living organisms?

(a) Body design of the organism

(b) Ability to produce one's own food

(c) Membrane bound nucleus & cell organelles

(d) Height to the plant

34. A baby is not able to tell her/his caretakers that she/he is sick. What would help us to find out that the baby is sick?

35. A freely falling object eventually stops on reaching the ground. What happens to its kinetic energy?

36. A sound wave travels at a speed of 340m/s. If the wavelength of wave is 1.4m, what is the frequency of wave?

CBSE Sample Paper - 05
SUMMATIVE ASSESSMENT –II
Class – IX SCIENCE

Solution

1. Ozone (O_3)
2. $X_2 0_3$
3. Work done against friction is a negative work.
4. Both snake and turtle are kept in the same class because both are (i) cold-blooded (ii) have scales, (iii) breathe through lungs (iv) have three-chambered hear and (iv) lay eggs with thick covering.
5. Sound wave is called a longitudinal wave because sound waves travel in the air through compressions and rarefactions.
6. Air being a bad conductor of heat, forms a protective blanket around to Earth. During daytime it prevents sudden rise in temperature. At night, it slows down escape of heat into outer space. Thus, it maintains fair uniform temperature during the day and night cycle.
7. Given frequency, v =2 kHz = $2\times10^3 Hz$,

   Wavelength, $\lambda = 40cm$ = 0.40 m

   Speed of sound = $frequency \times wavelength$

   i.e., $\upsilon = v\lambda = \left(2\times10^3 Hz\right)\times 0.40m$

   = $0.80\times10Hz$ = 800 ms^{-1}

   Time, t = $\frac{\text{Distance}}{\text{Speed}}$

   t = $\frac{s}{\upsilon}$

   Given distance, s = 1.6 km = 1.6×10^3 m

   $\text{Time, t} = \frac{1.6\times10^3 \text{ m}}{800 \text{ ms}^{-1}} = \frac{1,600}{800}\text{s} = 2\text{s}$
8. The energy stored in a body or a system due to its position in a force field or due to its state of strain or configuration is called potential energy.

   Different types of potential energy are:

   Gravitational Potential Energy: Due to its position (height) of an object, it possesses gravitational potential energy.

Elastic Potential Energy: Due to its configuration or strain a stretched or compressed spring contains elastic potential energy.

Electrostatic Potential Energy: Energy possessed by a charge due to its position in electric field is called electrostatic potential energy.

In mechanics, we deal with gravitational potential energy and elastic potential energy.

9. **Wavelength**: For a sound wave, the combined length of a compression and an adjacent rarefaction is called its wavelength even the distance between centres of two consecutive compressions or two consecutive rarefactions is also equal to its wavelength.

Frequency: The number of vibrations or oscillations per second is called frequency i.e. it is the number of complete waves or cycles produced in one second.

Time period: The time taken to complete one vibration/oscillation/complete wave is called time period. It is measured in seconds.

10.

Proton	Neutron	Electron
It is positively charged.	It is neutral.	It is negatively charged.
Its mass is equivalent to a hydrogen atom i.e. 1 a.m.u.	It is equal in mass to a proton.	Its mass is 1/1838 of the mass of a proton.
It is present inside the nucleus of the atom.	It is also found inside the atomic nucleus.	It is found outside the nucleus of the atom.

11.

J. J. Thomson Model of Atom	Rutherford's Model
Positive charge forms a kernel.	Nucleus (positive charge) is in the centre.
Electrons present throughout the atom.	Electrons revolve in orbits.
No space is empty.	Most of the space is empty.

12. Characteristics of kingdom animalia are

(a) Animals are multicellular, eukaryotic organisms

(b) Animal nutrition is heterotrophic. They lack photosynthetic pigments.

(c) Animal lack cell walls.

(d) Animals possess the power of locomotion

(e) Most Animals have a nervous system which is used to coordinate their body actions and response.

(f) In sexual reproduction, animals produce haploid male gametes (sperms) and female gametes.

13. We can see the tissue specificity of the infection leading to very general seeming effects in case of HIV infection. The HIV attacks the immune system via the lymph nodes. From here it spreads all over the body and damages its functions. Because of this, the body becomes prone to various diseases as it cannot fight off even the minor infections which otherwise would not have lasted longer.
For example, even a small cold can become pneumonia and a minor gut infection may lead to a severe case of diarrhoea with blood loss.
In the same way, other infections kill people that are suffering from, **e.g.,** HIV-AIDS.
The tissue specificity of the infection (HIV-AIDS) is lymph nodes. General seeming effects are loss of immunity even to minor diseases or infections that ultimately lead to the death of the patient.

14. Potential energy of a body of mass = m Kg at a height = h m from the ground.

Gravitational force of attraction on the body = mgN

In order to lift this body to B at h m above the ground.

In order to lift this body with a constant velocity, force applied = mg N

Distance moved by force = h m

Work done in lifting the body from a to B = $\text{Force} \times \text{Distance}$

$= mg \times h$ = mgh

Energy spent in lifting the body to height 'h'. As energy cannot be destroyed, this energy gets stored in the body as its potential energy

m = 10 Kg

g = 10 m/s^2

h = 10 m

P. E = mgh

$= 10 \times 10 \times 10$

= 1000 Joules

15. Since velocity = wavelength × frequency

$v = \lambda f$

$f = \frac{v}{\lambda}$

Now, when waves moves from one medium to another, the frequency remains the same

$\frac{v_1}{\lambda_1} = \frac{v_2}{\lambda_2}$

Now, when velocity in first Medium = $\sqrt{1}$

velocity in Second Medium = 3v

$$\frac{v}{\lambda_1} = \frac{3v}{\lambda_2}$$

$$\frac{\lambda_1}{\lambda_2} = \frac{1}{3}$$

$$\lambda_2 = \frac{\lambda_1}{3}$$

The wavelength of the sound in the second medium is one – third of the wavelength in the first Medium.

16. Suppose a body of mass m is moving with velocity v. It is brought to rest by applying a retarding force F. Suppose, it traverses a distance s before coming to rest.

Kinetic energy of body, KE =Work done by retarding force to stop it.

i.e., kinetic energy = F.s ... (i)

But retarding force, F=ma ... (ii)

Initial velocity = v, final velocity =0

From the equation $v^2 = u^2 + 2as$, we have

0 = $v^2 - 2as$ (because here a is retardation)

Distance, s $= \frac{v^2}{2a}$ ... (iii)

Substituting values of F and s from (ii) and (iii) in (i), we get

Kinetic energy, KE $= ma \times \frac{v^2}{2a} = \frac{1}{2}mv^2$

17. (i) Dengue.

(ii) Aedes mosquito.

(iii) Water should not be stagnant, use of mosquito repellants.

(iv) Awareness, importance to health.

18. Mathura refinery released acidic gases such as sulphur dioxide and nitrogen dioxide in the air. In the air, in the presence of moisture, sulphur dioxide is oxidised to sulphuric acid (H_2SO_4) and nitrogen dioxide is oxidized to nitric acid. These acid come down to earth surface and water bodies along with rain water. The rain water containing acids as pollutants in it called acid rain. This acid rain is posing problem to the marbles of Taj Mahal.

19. Following precautions should be taken for prevention of diseases:

(i) Maintaining hygienic conditions.

(ii) Awareness about the disease and its causal organism.

(iii) Intake of a balanced diet.

(iv) Regular medical check-up.

20. (i) Plants and animals are totally different from one another. They are classified on basis as follows:

Plants and animals are totally different from one another in the following ways-

(a) Food preparation

(b) Movement

(c) Body parts

(d) Respiration

(e) Reproduction

(ii) Three characteristic features of fungi are

(a) Cell wall is made of chitin

(b) Mode of nutrition is heterotrophic

(c) They are saprophytes.

(iii) Symbiotic relationship.

Symbiosis is a situation in which 2 different organisms live together in close association.

They occur as greyish-green growths on bare rock surfaces, mountain tops, rocky seashores, bark of trees, on the ground, stone walls etc.

21. Work is said to be done when a force applied on an object moves it in its own direction.

Example of negative work- When a body is sliding on a surface, work done by force of friction is negative.

m = 2000 Kg

u= 18 Km/hr

v= 90Km/hr

$= \left(18 \times \frac{5}{18}\right) m/s = 5$ m/s

$v = \left(90 \times \frac{5}{18}\right) = 25$ m/s

Work done to increase velocity,

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

$= \frac{1}{2} \times 2000\left(25^2 - 5^2\right)$

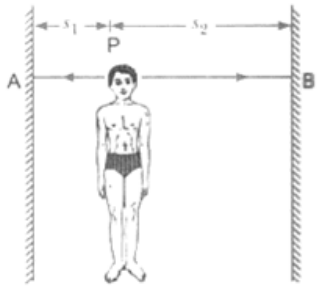
$= 1000\ (625\text{-}25) = 6 \times 10^5\ J$

22. (a) The ceiling and wall behind the stage of conference halls and concert halls are made curved so that the reflected sound from them spreads evenly across the width of the hall.

(b) The property of sound to get reflected from a surface of solid or liquid, and to persist in our brain for a very short time (= 0.1 s) leads to formation of echoes.

(c) The repeated reflection of sound that results in its persistence is called reverberation. Excessive reverberation for too long overlaps with subsequent original sound and makes it unclear to hear. To reduce reverberation, roofs, seats and walls of the hall covered with sound absorbent material such as compressed fibre board, draperies or rough plaster.

23. (i) Let P be the person standing between the cliffs A and B. Let s_1 be distance of nearest cliff A from P and s_2 the distance of second cliff B from P. The first echo is heard when sound reaches the person after being reflected from cliff A.



Given, s_1 = AP = 640 m

Time interval of first echo, t_1 = 4 seconds

From relation, $2s_1 = \upsilon t_1$, we have

Speed of sound, $\upsilon = \frac{2s_1}{t_1} = \frac{2 \times 640}{4} = 320\ \text{m/s}$

Therefore, Speed of sound in air, υ = 320 m/s

(ii) The second echo is heard when sound reaches the person after being reflected from the cliff B.

Time interval of second echo, t_2 = 4 + 3 = 7 seconds

Therefore, from relation, $2s_2 = \upsilon t_2$,

We have, $s_2 = \frac{\upsilon t_2}{2} = \frac{320 \times 7}{2} = 1120\ \text{m}$

Therefore, Distance between cliffs A and B,

$s = s_1 + s_2 = 640 + 1120 = 1760$ m

24. Water helps in formation of soil in the following ways:
    (i) Water wears off the rocks over a long period of time.
    (ii) Small rocks in the flowing water rub against other rocks creating small particles which are carried away downstream and deposited as soil.
    (iii) Water expands on freezing. So when it is deposited in crevices of rocks, rocks crack into smaller pieces.

Section B

25. (a)
26. (a)
27. (a)
28. (c)
29. (a)
30. (b)
31. (b)
32. (b)
33. (d)
34. If the baby is crying and remains restless no matter whatever is done to ease him/her out then he/she is sick.
35. A free falling object eventually stops on reaching the ground since on striking the ground its kinetic energy is transmitted to the ground.
36. Speed of sound wave = 340m/s

    Wavelength of sound wave = 1.4m

    Frequency =?

    Since, velocity = Frequency × Wavelength

    $V = \gamma \lambda$

    $340 = \gamma \times 1.4$

    $\frac{340 \times 10}{1.4} = \gamma$

    $\frac{1700}{7} = \gamma$

    $242.85 / s = \gamma \ \left(frequency \right)$