Future Topper

Annual Examination Practice Paper 1

Class IX Science (086)

Time allowed: 3 hours Maximum marks: 80

Syllabus covered: the full Class IX Science syllabus (Exploration, NCERT). Unit weightage follows CBSE: World of Living 27, Matter: Its Nature and Behaviour 25, Motion, Force, Work and Sound 23, Earth as a System 5.

General instructions

1. This paper has 39 questions in three sections. All questions are compulsory.
2. Section A (Biology and Earth Science): questions 1 to 16, 32 marks.
3. Section B (Chemistry): questions 17 to 27, 25 marks.
4. Section C (Physics): questions 28 to 39, 23 marks.
5. Each section has multiple-choice and assertion-reason questions of 1 mark, followed by questions of 2 to 5 marks. Marks are shown against each question.
6. Internal choice is given in some questions. Attempt only one of the choices.
7. Draw neat, labelled diagrams wherever needed.

Section A: Biology and Earth Science

32 marks

1. Which cell organelle is the site of protein synthesis? **1**

(a) Lysosome (b) Vacuole
(c) Ribosome (d) Centrosome

2. Yeast usually reproduces asexually by **1**

(a) budding (b) binary fission
(c) spore formation (d) fragmentation

3. Pollination is the transfer of pollen grains from **1**

(a) stigma to anther (b) anther to stigma
(c) ovary to stigma (d) style to ovary

4. In the scientific name *Homo sapiens*, the word *sapiens* names the **1**

(a) genus (b) kingdom
(c) family (d) species

5. Bacteria belong to the kingdom **1**

(a) Protista (b) Monera
(c) Fungi (d) Plantae

6. Viruses are called acellular because they **1**

(a) are very small (b) cause diseases
(c) are not made of cells (d) live in water

7. Bacteria that fix atmospheric nitrogen are found in the root nodules of **1**

(a) pea and gram plants (b) wheat plants
(c) mango trees (d) cactus plants

8. **Assertion (A):** Plants grown by vegetative propagation are very similar to the parent plant. **1**

Reason (R): Only one parent is involved, and no fusion of gametes takes place.

(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

9. **Assertion (A):** Fungi are placed in the kingdom Plantae. **1**
Reason (R): Fungi have a cell wall.

(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

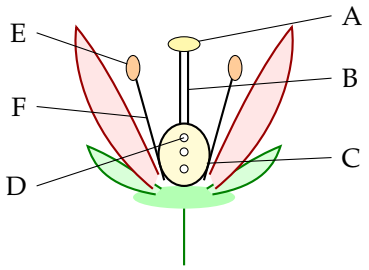
10. Distinguish between pollination and fertilisation in flowering plants. **2**

11. Give two reasons why scientists classify living organisms. **2**

OR

Write two features of organisms placed in the kingdom Protista, with one example.

12. The figure shows the longitudinal section of a flower. Name the parts labelled A to F. Which labelled parts together make up the male reproductive part, and which make up the female reproductive part? **3**



13. Name the kingdom to which each of these belongs, and give one feature of that kingdom: (i) *Amoeba*, (ii) mushroom, (iii) a bacterium that causes curd to set. **3**

14. Read the passage and answer the questions. **4**

A single plant may produce thousands of seeds. If they all fell right under the parent, the young plants would compete with it and with each other for light, water and minerals. Plants have many ways of sending seeds away: some seeds have wings or hairs, some fruits are hooked or juicy, some float, and some pods burst open.

(a) Why do plants need to disperse their seeds? (1)

(b) Which agent carries winged seeds, such as those of drumstick? (1)

(c) How are seeds suited to being dispersed by animals and by water? Give one example of each. (2)
OR

(d) Explain dispersal by explosion with one example. (2)

15. Read the passage and answer the questions. **4**

Nitrogen makes up about 78% of the air, yet most living things cannot use it in this form. Certain bacteria in the soil and in the root nodules of some plants change it into compounds plants can absorb. Animals get nitrogen by eating plants. When plants and animals die, their nitrogen returns to the soil, and some of it is finally sent back to the air.

(a) Why can plants not use nitrogen gas directly from the air? (1)

(b) Name one natural process, other than the action of bacteria, that fixes nitrogen. (1)

(c) Explain the roles of decomposers and of denitrifying bacteria in the nitrogen cycle. (2)
OR

(d) How can too much use of chemical fertilisers harm rivers and lakes? (2)

16. Describe the four main types of animal tissue. For each, give one function and one place where it is found in the body. **5**

OR

Describe five methods of asexual reproduction, with one example of each.

Section B: Chemistry

25 marks

17. Pure water can be obtained from sea water by **1**

(a) filtration (b) sublimation
(c) chromatography (d) distillation

18. Isotopes of an element have the same **1**

(a) mass number (b) number of neutrons
(c) atomic number (d) physical properties

19. The chemical formula of aluminium oxide is **1**

(a) Al_2O_3 (b) AlO_3
(c) Al_3O_2 (d) AlO

20. **Assertion (A):** The valency of sodium is 1. **1**
Reason (R): A sodium atom has 11 protons in its nucleus.

(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

21. Write the distribution of electrons in the shells of a chlorine atom (atomic number 17). What is its valency? Give a reason. **2**

22. A mixture contains common salt, sand and ammonium chloride. Write the steps to separate all three. **2**

23. In Rutherford's alpha particle scattering experiment, write three observations and the conclusion drawn from each about the structure of the atom. **3**

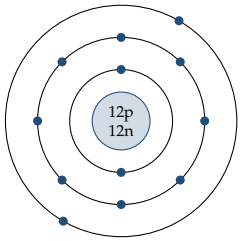
24. Define isotopes and isobars, with one example of each. Give one use of an isotope. **3**

25. State the law of constant proportions. In carbon dioxide, carbon and oxygen are combined in the mass ratio $3 : 8$. How many grams of oxygen combine with 12 g of carbon? **3**

OR

Write any three postulates of Dalton's atomic theory. Which postulate explains the law of conservation of mass?

26. The figure shows the Bohr model of an atom of element X, which has atomic number 12 and mass number 24. **4**



(a) Write its electron distribution in shells. (1)

(b) What is its valency? (1)

(c) What ion does X form? Write the formula of the compound it forms with chlorine, and say whether this compound is ionic or covalent. (2)

OR

(d) Find the number of protons and neutrons in its nucleus, and describe how its electrons are arranged according to Bohr's model. (2)

27. Write the chemical formulae of: (i) calcium hydroxide, (ii) ammonium sulphate, (iii) magnesium chloride, (iv) sodium carbonate. **4**

OR

Find the molecular mass of H_2SO_4 and the formula unit mass of $CaCO_3$. (H = 1 u, C = 12 u, O = 16 u, S = 32 u, Ca = 40 u.) Why do we use "formula unit mass" and not "molecular mass" for $CaCO_3$?

Section C: Physics

23 marks

28. A force of 10 N moves an object 5 m in the direction of the force. The work done is **1**

(a) 2 J (b) 50 J
(c) 15 J (d) 500 J

29. The SI unit of power is the **1**

(a) joule (b) newton
(c) watt (d) pascal

30. Sound cannot travel through **1**

(a) water (b) steel
(c) vacuum (d) air

31. A sound wave has a time period of 0.02 s. Its frequency is **1**

(a) 0.02 Hz (b) 20 Hz
(c) 5 Hz (d) 50 Hz

32. The motion of a rocket is explained by **1**

(a) Newton's first law (b) Newton's second law
(c) Newton's third law (d) the law of conservation of mass

33. A lever has an effort arm of 60 cm and a load arm of 20 cm. Its mechanical advantage is **1**

(a) $\frac{1}{3}$ (b) 3
(c) 40 (d) 1200

34. **Assertion (A):** During a storm, we see the lightning before we hear the thunder. **1**
Reason (R): Light travels much faster than sound in air.

(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

35. What is an echo? Find the least distance a wall must be from you to hear a clear echo, if the speed of sound is 344 m/s and the sensation of a sound lasts about 0.1 s in our ears. **2**

36. State the work-energy theorem. A ball of mass 2 kg moving at 3 m/s is pushed until its speed becomes 5 m/s. How much work was done on it? **3**

OR

A ball of mass 1 kg is dropped from a height of 20 m. Taking $g = 10\ \text{m/s}^2$ and ignoring air resistance, find (i) its potential energy at the top, (ii) its kinetic energy when it is 10 m above the ground, and (iii) its speed just before it hits the ground.

37. A train speeds up uniformly from 36 km/h to 72 km/h in 10 s. Find (i) its acceleration and (ii) the distance it covers in this time. Check your answer to (ii) using a second equation of motion. **3**

38. Read the passage and answer the questions. **4**
Bats hunt at night by sending out very high-pitched sounds and listening for the echoes. Ships use the same idea in SONAR to find the depth of the sea and to locate objects under water.

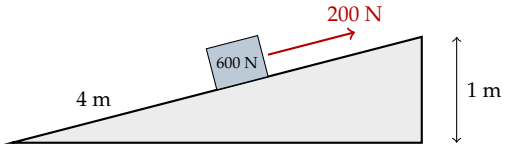
(a) What is ultrasound? (1)

(b) Why are bats able to hunt in darkness? (1)

(c) A ship sends an ultrasonic pulse to the sea bed and receives its echo 4 s later. If sound travels at 1500 m/s in sea water, how deep is the sea? (2)
OR

(d) What is reverberation? Why are curtains and soft boards used in big halls? (2)

39. A box weighing 600 N is pushed up a ramp (inclined plane) 4 m long to a platform 1 m high, using an effort of 200 N, as shown. **4**



(i) Define mechanical advantage, and find it for this ramp.

(ii) Find the work done by the effort and the work done on the box.

(iii) Why are the two values in (ii) different?

OR

A girl of mass 50 kg runs up a staircase of 30 steps, each 20 cm high, in 15 s. Taking $g = 10\ \text{m/s}^2$, find (i) the work she does against gravity and (ii) her power.

***** End of question paper *****

Solutions

Answers give the points an examiner looks for. Any correct answer in the student's own words should get full credit.

Section A

1. **Answer: (c) Ribosome**

2. **Answer: (a) budding**

3. **Answer: (b)**

4. The first word names the genus and the second the species. **Answer: (d)**

5. **Answer: (b) Monera**

6. **Answer: (c)**

7. *Rhizobium* lives in the root nodules of leguminous plants. **Answer: (a)**

8. No gametes fuse, so the new plant gets the same genetic material as the parent. R explains A. **Answer: (a)**

9. Fungi have their own kingdom, so A is false. They do have cell walls (made of chitin), so R is true. **Answer: (d)**

10. Pollination is the transfer of pollen from the anther to the stigma. Fertilisation is the fusion of the male gamete with the female gamete (egg) inside the ovule. Pollination comes first and makes fertilisation possible.

11. Any two: it makes the huge variety of organisms easier to study; it shows how groups are related to one another; it helps us identify organisms and name them in a way scientists everywhere understand.
OR: Protista are single-celled eukaryotes. Some have cilia or flagella for moving, and they may make their own food or take it in. Example: *Amoeba*, *Paramecium* or *Euglena*.

12. A: stigma. B: style. C: ovary. D: ovule. E: anther. F: filament.
E and F together form the stamen, the male reproductive part. A, B and C (with the ovules, D) form the pistil (carpel), the female reproductive part.

13. (i) Protista: single-celled eukaryote. (ii) Fungi: no chlorophyll; gets food from dead and decaying matter; cell wall made of chitin. (iii) Monera: single-celled, with no well-defined nucleus.

14. (a) To avoid crowding, so that young plants do not compete with the parent and with each other, and so the plant can spread to new places.
(b) Wind.
(c) Animals: seeds with hooks or spines stick to fur (for example, *Xanthium*), or juicy fruits are eaten and the seeds passed out. Water: fruits that are light, with a fibrous coat that floats (for example, coconut).
OR (d): When ripe, the pods dry and burst open suddenly, throwing the seeds some distance away. Examples: balsam, castor, pea.

15. (a) Nitrogen gas is very unreactive, and plants have no way of changing it into a form they can use.
(b) Lightning, which makes nitrogen combine with oxygen to form oxides that reach the soil in rain.
(c) Decomposers break down dead plants, animals and wastes, and return their nitrogen to the soil as ammonia and other compounds. Denitrifying bacteria change soil nitrates back into nitrogen gas, which returns to the air.
OR (d): Extra fertiliser is washed into rivers and lakes, where it makes algae grow very fast. When the algae die and rot, the bacteria use up the oxygen in the water, and fish and other animals die.

16. **Epithelial tissue:** covers and protects the body and its organs; skin, lining of the mouth.
Connective tissue: joins and supports parts of the body, and carries materials; bone, blood, cartilage, tendons.
Muscular tissue: contracts and relaxes to cause movement; muscles of the arms (striated), walls of the stomach (smooth), heart (cardiac).
Nervous tissue: receives and carries messages around the body; brain, spinal cord, nerves.
OR: Binary fission: the parent cell divides into two, as in *Amoeba*. **Budding:** a small outgrowth forms on the parent and breaks off as a new individual, as in yeast or *Hydra*. **Fragmentation:** the body breaks into pieces, and each piece grows into a new organism, as in *Spirogyra*. **Spore formation:** spores are released and each grows into a new individual, as in *Rhizopus* (bread mould). **Vegetative propagation:** new plants grow from a root, stem or leaf of the parent, as in potato (stem tubers) or *Bryophyllum* (leaves).

Section B

17. **Answer: (d) distillation**

18. **Answer: (c) atomic number**

19. Al has valency 3 and O has valency 2; crossing over gives Al_2O_3. **Answer: (a)**

20. Both are true, but the valency comes from sodium's one outer electron (2, 8, 1), not from the number of protons. **Answer: (b)**

21. Chlorine: 2, 8, 7. It has 7 electrons in its outer shell and gains 1 electron to complete an octet, so its valency is 1.

22. Heat the mixture: ammonium chloride sublimes and can be collected on a cool surface. Add water to what is left and stir: the salt dissolves. Filter: sand stays on the filter paper. Evaporate the filtrate to get the salt.

23. Most alpha particles passed straight through the gold foil, so most of the atom is empty space.
Some were deflected through small angles, so the positive charge is not spread out but packed in a small region.
Very few (about 1 in 12,000) bounced straight back, so the positive charge and almost all the mass are in a very small nucleus at the centre.

24. Isotopes are atoms of the same element with the same atomic number but different mass numbers, for example ${}^{12}_{6}C$ and ${}^{14}_{6}C$. Isobars are atoms of different elements with the same mass number, for example ${}^{40}_{18}Ar$ and ${}^{40}_{20}Ca$. Uses of isotopes: cobalt-60 in treating cancer, iodine-131 in treating goitre, or uranium-235 as nuclear fuel (any one).

25. In a chemical substance, the elements are always present in definite proportions by mass, whatever its source.
$\frac{\text{carbon}}{\text{oxygen}} = \frac{3}{8}$, so oxygen $= 12 \times \frac{8}{3} = 32$ g.
OR: Any three: all matter is made of tiny particles called atoms; atoms cannot be created or destroyed in a chemical reaction; atoms of a given element are identical in mass and properties; atoms of different elements have different masses; atoms combine in small whole-number ratios to form compounds. The postulate that atoms are neither created nor destroyed explains the law of conservation of mass.

26. (a) 2, 8, 2. (b) 2.
(c) X loses 2 electrons to form X^{2+}. With chlorine (Cl^-) it forms XCl_2, which is ionic.
OR (d): Protons $= 12$, neutrons $= 24 - 12 = 12$. In Bohr's model the electrons move in fixed shells round the nucleus: 2 in the K shell, 8 in the L shell and 2 in the M shell.

27. (i) $Ca(OH)_2$ (ii) $(NH_4)_2SO_4$ (iii) $MgCl_2$ (iv) Na_2CO_3
OR: $H_2SO_4 = 2(1)+32+4(16) = 98$ u. $CaCO_3 = 40+12+3(16) = 100$ u. $CaCO_3$ is an ionic compound made of ions, not separate molecules, so we use formula unit mass.

Section C

28. $W = F \times s = 10 \times 5 = 50$ J. **Answer: (b)**

29. **Answer: (c) watt**

30. Sound needs a medium to travel. **Answer: (c)**

31. $f = \frac{1}{T} = \frac{1}{0.02} = 50$ Hz. **Answer: (d)**

32. The gases push backward and the rocket is pushed forward with an equal force. **Answer: (c)**

33. MA $= \frac{\text{effort arm}}{\text{load arm}} = \frac{60}{20} = 3$. **Answer: (b)**

34. **Answer: (a)**

35. An echo is the sound heard again after it reflects from a surface such as a wall or cliff. The sound must take at least 0.1 s to go to the wall and come back. Total distance $= 344 \times 0.1 = 34.4$ m, so the wall must be at least $\frac{34.4}{2} = 17.2$ m away.

36. The work done on an object equals the change in its kinetic energy.
$W = \frac{1}{2}m(v^2 - u^2) = \frac{1}{2} \times 2 \times (25 - 9) = 16$ J.
OR: (i) $PE = mgh = 1 \times 10 \times 20 = 200$ J.
(ii) At 10 m, $PE = 100$ J. Total energy stays 200 J, so $KE = 100$ J.
(iii) Just before it hits the ground, all 200 J is kinetic: $\frac{1}{2} \times 1 \times v^2 = 200$, so $v = 20$ m/s.

37. $u = 36$ km/h $= 10$ m/s, $v = 72$ km/h $= 20$ m/s, $t = 10$ s.
(i) $a = \frac{20-10}{10} = 1$ m/s^2.
(ii) $s = ut + \frac{1}{2}at^2 = 100 + 50 = 150$ m.
Check: $v^2 - u^2 = 2as$ gives $400 - 100 = 2 \times 1 \times s$, so $s = 150$ m.

38. (a) Sound with a frequency above 20,000 Hz, too high for humans to hear.
(b) They send out ultrasound and listen for the echoes from objects such as insects. From the time and direction of the echo, they can tell where the object is without seeing it.
(c) The sound travels down and back, so depth $= \frac{1500 \times 4}{2} = 3000$ m.
OR (d): Reverberation is the persistence of sound in a big hall because of repeated reflections from the walls and ceiling. Curtains and soft boards absorb sound, so they cut down these reflections and make speech and music clearer.

39. (i) Mechanical advantage $= \frac{\text{load}}{\text{effort}} = \frac{600}{200} = 3$.
(ii) Work by effort $= 200 \times 4 = 800$ J. Work on box $= 600 \times 1 = 600$ J.
(iii) Some of the effort's work is used against friction and turns into heat, so less useful work is done on the box. (Efficiency $= \frac{600}{800} \times 100 = 75\%$.)
OR: Height climbed $= 30 \times 0.2 = 6$ m.
(i) $W = mgh = 50 \times 10 \times 6 = 3000$ J.
(ii) $P = \frac{3000}{15} = 200$ W.