SHUNYASAARTHI

CLASS X · 2026-27 · MODEL PAPER

Class X Science (Code 086) Model Paper 4

Question paper

Maximum marks: 80

Time: 3 hours

Subject code: 086

Instructions

All 39 questions are compulsory, with one selected option for each internal choice.

Sections A, B, and C assess Biology, Chemistry, and Physics respectively.

Show equations, working, units, and labelled diagrams where requested.

Section A

Question 1

1 mark

Mcq

Choose the correct answer.

(a) Which form of heterotrophic nutrition involves secreting enzymes onto the food source outside the organism? [1 mark]

A. Saprotrophic
B. Holozoic
C. Parasitic
D. Autotrophic

Question 2

1 mark

Mcq

Choose the correct answer.

(a) Which part of the brain maintains posture and equilibrium of the body? [1 mark]

A. Fore-brain
B. Mid-brain
C. Hind-brain
D. Cerebral cortex

Question 3

1 mark

Mcq

Choose the correct answer.

(a) Regeneration differs from simple reproduction because it [1 mark]

A. always uses spores
B. requires fertilisation
C. rebuilds missing body parts to form a whole organism
D. only occurs in plants

Question 4

1 mark

Mcq

Choose the correct answer.

(a) A woman carrier for an X-linked recessive trait marries a normal man. What proportion of their sons is expected to express the trait? [1 mark]

A. 0%
B. 25%
C. 50%
D. 100%

Question 5

1 mark

Mcq

Choose the correct answer.

(a) Which gas do green plants take in from the air to make carbohydrates during photosynthesis? [1 mark]

A. Oxygen
B. Carbon dioxide
C. Hydrogen
D. Nitrogen

Question 6

1 mark

Mcq

Choose the correct answer.

(a) When you unknowingly jerk your hand away upon touching a hot object, this action is an example of: [1 mark]

A. voluntary action
B. reflex action
C. learned response
D. conditioned reflex

Question 7

1 mark

Mcq

Choose the correct answer.

(a) Why is variation in DNA copies advantageous for a population? [1 mark]

A. It guarantees all offspring survive
B. It produces individuals that may adapt to changing environments
C. It prevents any mutations
D. It speeds up cell division

Question 8

1 mark

Assertion Reason

Choose the correct answer.

(a) Assertion (A): A gene is a section of DNA that provides information for making a protein affecting a trait. Reason (R): A germ cell carries only one set of genes from its parent. [1 mark]

A. Both A and R true and R explains A
B. Both A and R true but R does not explain A
C. A true, R false
D. A false, R true

Question 9

1 mark

Assertion Reason

Choose the correct answer.

(a) Assertion (A): Hydrochloric acid in the stomach helps the digestion of proteins. Reason (R): Hydrochloric acid creates an acidic medium that facilitates the action of pepsin. [1 mark]

A. Both A and R true and R explains A

B. Both A and R true but R does not explain A

C. A true, R false

D. A false, R true

Question 10

2 marks

Short Answer

Answer the question with working and reasons where needed.

(a) Differentiate between biotic and abiotic components of an ecosystem with one example each. [2 marks]

Question 11

2 marks

Short Answer

Attempt one option.

Option A

Answer the question with working and reasons where needed.

(a) Describe the process of budding in Hydra in two steps. [2 marks]

OR

Option B

Answer the question with working and reasons where needed.

(a) Define budding and give one example of an organism that reproduces by budding. [2 marks]

Question 12

2 marks

Short Answer

Answer the question with working and reasons where needed.

(a) Explain how the sex of a human child is determined genetically. [2 marks]

Question 13

3 marks

Short Answer

Answer the question with working and reasons where needed.

(a) A community generates 500 kg of daily waste, of which 60% is biodegradable. Calculate the mass of biodegradable and non-biodegradable waste, and suggest appropriate disposal methods for each. [3 marks]

Question 14

3 marks

Short Answer

Answer the question with working and reasons where needed.

(a) Describe the role of gibberellins in seed germination. [3 marks]

Question 15

4 marks

Case Based

Arjun accidentally touches a hot iron plate and immediately withdraws his hand, without thinking. The next morning he notices his potted plant bending toward the window light and wonders how organisms coordinate such responses.

(a) Read the following scenario and answer the question. Case: Arjun accidentally touches a hot iron plate and immediately withdraws his hand, without thinking. Question: What type of action does Arjun’s withdrawal of his hand represent? [1 mark]

(b) Based on the case passage, identify which part of the central nervous system primarily mediates the hand-withdrawal reflex. [1 mark]

Attempt one of the final two-mark options.

Option A

(c) (i) From the same scenario, what term describes the plant’s growth toward the window light? (ii) Which plant hormone accumulates on the shaded side of the stem to cause bending toward light? [2 marks]

OR

Option B

(c) Trace the nerve impulse from Arjun's hand to the muscle that withdraws it, and explain why the response is rapid. [2 marks]

Question 16

5 marks

Long Answer

Attempt one option.

Option A

Answer both connected parts. Show the required method, explanation and units.

(a) Define the term allele as used in genetics. [2 marks]

(b) A pea plant heterozygous for tallness (Tt) is crossed with a homozygous short plant (tt). Use a Punnett square to determine the genotypic and phenotypic ratios of their offspring. [3 marks]

OR

Option B

Answer both connected parts. Show the required method, explanation and units.

(a) State Mendel's law of independent assortment. [2 marks]

(b) A woman with normal vision, who is a carrier for red-green colour blindness, marries a man with normal vision. Determine the probability that their son will be colour blind. [3 marks]

Section B

Question 17

1 mark

Mcq

Choose the correct answer.

(a) Which term describes the loss of electrons in a chemical reaction? [1 mark]

A. Oxidation
B. Reduction
C. Hydrolysis
D. Neutralization

Question 18

1 mark

Mcq

Choose the correct answer.

(a) What colour does methyl orange exhibit in a basic solution? [1 mark]

A. Red
B. Colourless
C. Yellow
D. Green

Question 19

1 mark

Mcq

Choose the correct answer.

(a) Why do ionic compounds conduct electricity only in molten or aqueous state? [1 mark]

A. Their ions are free to move and carry charge

B. Electrons are free to move through a metallic lattice

C. Molecules form covalent bonds

D. Neutral atoms carry charges

Question 20

1 mark

Mcq

Choose the correct answer.

(a) Why do most carbon compounds exhibit low melting and boiling points? [1 mark]

A. They form ions that repel each other

B. They have weak forces between molecules

C. They conduct electricity in solid state

D. They consist of heavy atoms only

Question 21

1 mark

Mcq

Choose the correct answer.

(a) Which of the following is an example of a combination reaction? [1 mark]

A. $CaO + H_2O \rightarrow Ca(OH)_2$

B. $CaCO_3 \rightarrow CaO + CO_2$

C. $Zn + CuSO_4 \rightarrow ZnSO_4 + Cu$

D. $CaCl_2 + Na_2SO_4 \rightarrow CaSO_4 + 2NaCl$

Question 22

1 mark

Mcq

Choose the correct answer.

(a) Bleaching powder is produced by passing chlorine over which substance? [1 mark]

A. Dry slaked lime, $Ca(OH)_2$

B. Quicklime, CaO

C. Gypsum, $CaSO_4 \cdot 2H_2O$

D. Washing soda, $Na_2CO_3 \cdot 10H_2O$

Question 23

1 mark

Mcq

Choose the correct answer.

(a) Which metal can displace copper from copper(II) sulfate solution? [1 mark]

A. Gold

B. Silver

C. Zinc

D. Mercury

Question 24

1 mark

Assertion Reason

Choose the correct answer.

(a) Assertion (A): Carbon compounds generally do not conduct electricity. Reason (R): Covalent bonding in carbon compounds does not generate ions. [1 mark]

A. Both A and R true and R explains A

B. Both A and R true but R does not explain A

C. A true, R false

D. A false, R true

Question 25

2 marks

Short Answer

Answer the question with working and reasons where needed.

(a) Write the chemical equation for the reaction of iron with copper sulphate solution and state the observable change in the solution's colour. [2 marks]

Question 26

3 marks

Short Answer

Attempt one option.

Option A

Answer the question with working and reasons where needed.

(a) State the colour of phenolphthalein in acidic and basic solutions, and explain how this helps identify a basic solution. [3 marks]

OR

Option B

Answer the question with working and reasons where needed.

(a) Describe the neutralisation reaction between sodium hydroxide and hydrochloric acid in terms of ions, and state the products formed. [3 marks]

Question 27

3 marks

Short Answer

Answer the question with working and reasons where needed.

(a) Explain how an ionic compound is formed between sodium and chlorine atoms, and state two characteristic properties of ionic compounds. [3 marks]

Question 28

4 marks

Case Based

A group of students investigated four organic compounds: Compound A is C2H6 with only single bonds; Compound B is C2H4 containing one C=C bond; Compound C is CH3CH2OH featuring an –OH group; and Compound D is CH3COOH with a –COOH group. They observed that Compound A and B are non-conductors, Compound B underwent addition reaction with hydrogen to yield ethane, Compound C dehydrated to ethene on heating with acid, and Compound D formed an ester when reacted with ethanol.

(a) Based on the passage, which compound is unsaturated? [1 mark]

(b) Which structural feature shared by the four compounds illustrates carbon's catenation? [1 mark]

Attempt one of the final two-mark options.

Option A

(c) (i) Which functional group is present in Compound C as per the passage? (ii) According to the passage, which reaction type does Compound B undergo? [2 marks]

OR

Option B

(c) Write the reaction of Compound B with hydrogen to form Compound A, and explain the change in bonding. [2 marks]

Question 29

5 marks

Long Answer

Attempt one option.

Option A

Answer both connected parts. Show the required method, explanation and units.

(a) Write the balanced chemical equation for the formation of water from hydrogen and oxygen and identify the reaction type. [2 marks]

(b) Explain the chemical process involved in whitewashing walls using slaked lime. Write the balanced equation and state how a shiny finish is obtained. [3 marks]

OR

Option B

Answer both connected parts. Show the required method, explanation and units.

(a) Balance the chemical equation $Fe + H_2O \rightarrow Fe_3O_4 + H_2$ and justify why it is balanced. [2 marks]

(b) Balance the equation $Al + HCl \rightarrow AlCl_3 + H_2$, name the reaction type, and give a brief reason for its classification. [3 marks]

Section C

Question 30

1 mark

Mcq

Choose the correct answer.

(a) In a glass prism, which colour of the visible spectrum deviates the most from the path of the incident white light beam? [1 mark]

A. Red
B. Orange
C. Green
D. Violet

Question 31

1 mark

Mcq

Choose the correct answer.

(a) Which type of lens is used to correct myopia? [1 mark]

A. Convex lens
B. Concave lens
C. Cylindrical lens
D. Convex bifocal lens

Question 32

1 mark

Assertion Reason

Choose the correct answer.

(a) Assertion (A): The SI unit of potential difference is joule per coulomb. Reason (R): One volt is the potential difference that does one joule of work for one coulomb of charge. [1 mark]

A. Both A and R true and R explains A

B. Both A and R true but R does not explain A

C. A true, R false

D. A false, R true

Question 33

2 marks

Short Answer

Answer the question with working and reasons where needed.

(a) Define accommodation of the human eye and briefly describe how it adjusts to focus on near and distant objects. [2 marks]

Question 34

2 marks

Short Answer

Attempt one option.

Option A

Answer the question with working and reasons where needed.

(a) Write the expression for the equivalent resistance of resistors connected in series. [2 marks]

OR

Option B

Answer the question with working and reasons where needed.

(a) State Ohm's law for a conductor at constant temperature. [2 marks]

Question 35

3 marks

Short Answer

Answer the question with working and reasons where needed.

(a) Explain three linked reasons why convex mirrors are used as rear-view mirrors in vehicles. [3 marks]

Question 36

3 marks

Short Answer

Answer the question with working and reasons where needed.

(a) If a current of 5 A flows through a resistor of 2 Ω for 10 minutes, calculate the heat produced in the resistor. [3 marks]

Question 37

3 marks

Short Answer

Answer the question with working and reasons where needed.

(a) Explain the pattern of magnetic field lines produced by a current-carrying circular loop. [3 marks]

Question 38

4 marks

Case Based

A student sets up a circuit with a 6 V battery, variable resistor, ammeter in series and voltmeter across the resistor. At a 100 Ω setting, the voltmeter reads 6.0 V and ammeter 0.06 A; at 200 Ω, they read 6.0 V and 0.03 A. Separately, the student compares two test wires of the same material and length. The second wire has twice the cross-sectional area of the first.

(a) What is the function of the voltmeter in the student's experimental setup? [1 mark]

(b) Calculate the resistance setting corresponding to a current of 0.04 A in the experiment. [1 mark]

Attempt one of the final two-mark options.

Option A

(c) (i) Which property differs between the two test wires? (ii) What is the ratio of the second wire's resistance to the first wire's resistance? [2 marks]

OR

Option B

(c) Use the two 6 V readings to calculate both resistance settings and explain the effect of doubling resistance on current. [2 marks]

Question 39

5 marks

Long Answer

Attempt one option.

Option A

Answer both connected parts. Show the required method, explanation and units.

(a) Explain dispersion of white light through a glass prism and why violet light deviates more than red. [2 marks]

(b) Explain how a triangular glass prism disperses white light into its constituent colours. Give three points. [3 marks]

OR

Option B

Answer both connected parts. Show the required method, explanation and units.

(a) A person cannot see objects closer than 1 m clearly. Name the defect and state the type of lens used for its correction. [2 marks]

(b) Describe the causes of myopia and explain how it is corrected. Provide three points. [3 marks]