SHUNYASAARTHI

CLASS X · 2026-27 · MODEL PAPER

Class X Science (Code 086) Model Paper 2

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) In Spirogyra, asexual reproduction by fragmentation means: [1 mark]

A. formation of buds on the parent filament

B. fusion of gametes to form a zygote

C. breaking of the filament into pieces that grow independently

D. production of multiple spores within a cell

Question 2

1 mark

Mcq

Choose the correct answer.

(a) According to Mendel’s law of segregation, during the formation of gametes, each gamete receives: [1 mark]

A. both alleles of a gene pair

B. one allele of each gene pair

C. only dominant alleles

D. only recessive alleles

Question 3

1 mark

Mcq

Choose the correct answer.

(a) Which valve prevents backflow of blood from the left ventricle into the left atrium? [1 mark]

A. Mitral valve
B. Tricuspid valve
C. Pulmonary valve
D. Aortic valve

Question 4

1 mark

Mcq

Choose the correct answer.

(a) Which of the following best describes a voluntary action? [1 mark]

A. Occurs immediately without thinking
B. Initiated deliberately by the brain
C. Mediated only by the spinal cord
D. Independent movement of plants

Question 5

1 mark

Mcq

Choose the correct answer.

(a) Binary fission in Amoeba is characterized by: [1 mark]

A. formation of spores inside the cell
B. division of the nucleus only
C. splitting into two equal halves along any plane
D. regeneration from body fragments

Question 6

1 mark

Mcq

Choose the correct answer.

(a) What is the main use of a Punnett square in genetics? [1 mark]

A. Sequencing DNA segments

B. Predicting offspring genotype and phenotype ratios

C. Measuring chromosome number

D. Calculating mutation rates

Question 7

1 mark

Mcq

Choose the correct answer.

(a) Anaerobic respiration in human muscle primarily yields which end product? [1 mark]

A. Lactic acid

B. Ethanol

C. Carbon dioxide

D. Water

Question 8

1 mark

Assertion Reason

Choose the correct answer.

(a) Assertion (A): Many involuntary actions are controlled by the mid-brain and hind-brain. Reason (R): The cerebellum is the main thinking part of the brain. [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): Pollination always requires insects. Reason (R): Pollination is the transfer of pollen grains from anther to stigma. [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 biodegradable and non-biodegradable substances. Provide one example for each category. [2 marks]

Question 11

2 marks

Short Answer

Attempt one option.

Option A

Answer the question with working and reasons where needed.

(a) Describe saprotrophic nutrition with an example. [2 marks]

OR

Option B

Answer the question with working and reasons where needed.

(a) Define life processes and list the main processes involved. [2 marks]

Question 12

2 marks

Short Answer

Answer the question with working and reasons where needed.

(a) State two structural features that protect the brain and spinal cord. [2 marks]

Question 13

3 marks

Short Answer

Answer the question with working and reasons where needed.

(a) If 2×10^5 J of solar energy falls on the leaves of green plants, calculate the amount of energy stored as chemical energy by producers, given that they capture about 1% of incident sunlight. Also state why this stored energy is important. [3 marks]

Question 14

3 marks

Short Answer

Answer the question with working and reasons where needed.

(a) Describe Mendel's law of independent assortment and illustrate it using a dihybrid cross of seed shape and seed colour. [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) Which part of the brain maintains posture and equilibrium? [2 marks]

(b) Describe the three major regions of the human brain and their primary functions. [3 marks]

OR

Option B

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

(a) Based on the NCERT description, define a reflex action and give one example. [2 marks]

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

Section B

Question 17

1 mark

Mcq

Choose the correct answer.

(a) Which of the following best explains why metals exhibit a shiny metallic lustre? [1 mark]

A. Presence of tightly bound core electrons

B. Delocalised electrons on the surface reflecting light uniformly

C. Mobile ions oscillating under incident light

D. Arrangement of atoms in cubic lattices

Question 18

1 mark

Mcq

Choose the correct answer.

(a) Which of the following reactions is most likely with ethene (C_2H_4)? [1 mark]

A. Addition of bromine across the C=C bond

B. Substitution of a hydrogen atom by chlorine

C. Formation of a ring structure without breaking bonds

D. Decomposition into methane

Question 19

1 mark

Mcq

Choose the correct answer.

(a) Rancidity in edible oils is primarily caused by: [1 mark]

A. oxidation of unsaturated fatty acids

B. reduction of triglycerides

C. polymerization of glycerol

D. precipitation of free fatty acids

Question 20

1 mark

Mcq

Choose the correct answer.

(a) When sodium carbonate reacts with dilute hydrochloric acid, which gas is evolved that turns lime water milky? [1 mark]

A. Oxygen

B. Hydrogen

C. Carbon dioxide

D. Nitrogen

Question 21

1 mark

Mcq

Choose the correct answer.

(a) Which metal reacts most vigorously with cold water to produce hydroxide and hydrogen gas? [1 mark]

A. Magnesium

B. Calcium

C. Sodium

D. Silver

Question 22

1 mark

Mcq

Choose the correct answer.

(a) What is the term for the unique ability of carbon to form long chains of carbon atoms? [1 mark]

A. Polymerisation
B. Catenation
C. Isomerisation
D. Coordination

Question 23

1 mark

Mcq

Choose the correct answer.

(a) Which metal is protected from corrosion by the formation of a thin, adherent oxide layer? [1 mark]

A. Aluminium
B. Iron
C. Copper
D. Sodium

Question 24

1 mark

Assertion Reason

Choose the correct answer.

(a) Assertion (A): A solution of NaOH when diluted to ten times its original volume changes its pH by 1 unit. Reason (R): Diluting a base decreases $[OH^-]$ by the same factor and pOH increases by 1. [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) Explain how (i) painting or oiling and (ii) galvanising help prevent corrosion of iron. [2 marks]

Question 26

3 marks

Short Answer

Attempt one option.

Option A

Answer the question with working and reasons where needed.

(a) Provide the IUPAC name and structural formula of the compound CH3–CH(OH)–CH3, and identify its functional group. [3 marks]

OR

Option B

Answer the question with working and reasons where needed.

(a) Give the IUPAC name of CH3COOH, write its displayed structural formula, and identify its functional group. [3 marks]

Question 27

3 marks

Short Answer

Answer the question with working and reasons where needed.

(a) Define a double displacement reaction and write two balanced chemical equations with state symbols for such reactions. [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) Define metallic lustre. [2 marks]

(b) Compare metals and non-metals in terms of lustre, malleability and electrical conductivity. Give one difference for each. [3 marks]

OR

Option B

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

(a) State any two physical properties that distinguish non-metals from metals. [2 marks]

(b) Describe what happens when an iron nail is placed in copper(II) sulfate solution. Write the balanced equation, the observation, and explain the reaction using the reactivity series. [3 marks]

Section C

Question 30

1 mark

Mcq

Choose the correct answer.

(a) Tyndall effect can be observed in which of the following? [1 mark]

A. Clear sugar solution
B. Salt solution
C. Colloidal suspension of milk in water
D. Pure distilled water

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): In a metallic wire, conventional current is taken opposite to the direction of electron drift. Reason (R): Conventional current is defined as the direction of positive-charge flow, while electrons carry negative 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) Explain dispersion of white light through a glass prism and why violet light deviates more than red. [2 marks]

Question 34

2 marks

Short Answer

Attempt one option.

Option A

Answer the question with working and reasons where needed.

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

OR

Option B

Answer the question with working and reasons where needed.

(a) Define electric current and state its SI unit. [2 marks]

Question 35

3 marks

Short Answer

Answer the question with working and reasons where needed.

(a) Explain with ray interpretation how a convex lens produces an image when the object is placed between the lens and its principal focus, and state the nature of the image. [3 marks]

Question 36

3 marks

Short Answer

Answer the question with working and reasons where needed.

(a) A copper wire of length 2 m and cross-sectional area 1.0×10^{-6} m² has a resistivity of 1.7×10^{-8} Ω·m. Calculate its resistance. [3 marks]

Question 37

3 marks

Short Answer

Answer the question with working and reasons where needed.

(a) Describe the function of a fuse in a domestic electric circuit. Why is choosing the correct fuse rating important? [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) Define accommodation of the human eye and briefly describe how it adjusts to focus on near and distant objects. [2 marks]

(b) Explain how the eye adjusts its focal length to focus on (a) a near object, and (b) a distant object. Give three points in your answer. [3 marks]

OR

Option B

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

(a) State the near point and far point of a normal human eye and give their values. [2 marks]

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