Please check the examination details below before entering your candidate information

Candidate Name	Class	Section

BLOOM Science Olympiad (BSO)

Question Paper 2023-24

Class 9

Total Questions 50+5 (Tie Breaking Section)

Total Time Allotted : 60 minutes

Total Marks 60

Instructions

1. There are **50 Multiple Choice Questions** in this booklet having 4 options out of which **ONLY ONE** is correct.
2. There are two sections in the Question Paper; Section 1 having 40 Questions carrying 1 Mark each & Section 2 having 10 Higher Difficulty Order Questions carrying 2 Marks each.
3. All questions are compulsory. There is **NO negative** marking for incorrect answers.
4. Total time allotted to complete the paper is 60 minutes.
5. Please fill in your details in the space provided on this page before attempting the paper.

OMR Sheet Instructions

1. Before starting the paper, fill in all the details in the OMR Sheet.
2. Additional 10 minutes will be provided to fill up the OMR sheet, before the start of the exam.
3. Use HB Pencil to darken the circle of the correct Option in OMR sheet. The correct way to darken the circle in OMR sheet is shown below.

4. Use black or blue ball point pen/HB pencil to fill the information in the OMR sheet. Partially filled OMR sheet will not be checked.
5. Return the OMR sheet to the invigilator after the exam.

CODE#1

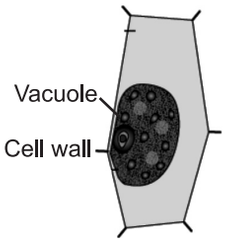
SC9

BLOOM CAP

Founded by | arihant

Section A (1 Mark)

1. Examine the depicted figure,



Can you identify the phenomenon represented in the given figure.

(a) Osmosis
(b) Plasmolysis
(c) Biogenosis
(d) Distribution

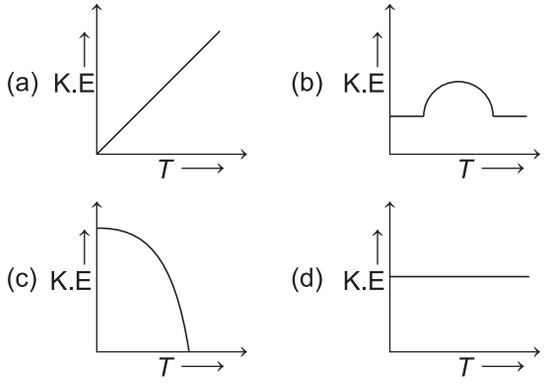
2. Choose the most appropriate organelles, which plays a crucial role in detoxifying many poisons and drugs in liver cells.

(a) Lysosome
(b) Cisternae
(c) Vesicles
(d) SER

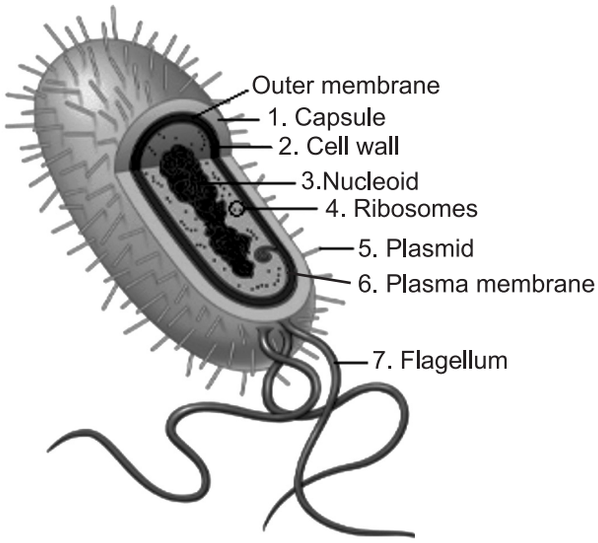
3. Which one of the following is the most extended or longest cell of human body?

(a) Kidney cell (b) Nerve cell
(c) Muscle cell (d) Liver cell

4. Particles of matter are continuously moving in random manner. They possess kinetic energy. The correct representation of graph of kinetic energy *v/s* temperature is



5. Examine the diagrammatic representation.



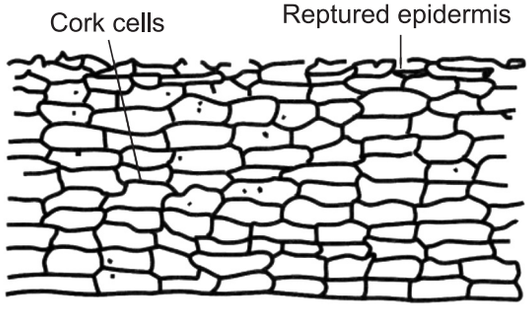
Which of the following statement is incorrect regarding the depicted organism?

(a) They have membrane bound organelles
(b) Their chromosomes are composed of only nucleic acid
(c) They have only very small ribosomes or organelles
(d) They lack nuclear membrane

6. What would be the displacement of a particle moving in a circular path of radius '*r*' after a displacement of half a circle?

(a) $2\pi r$ (b) πr (c) $2r$ (d) zero

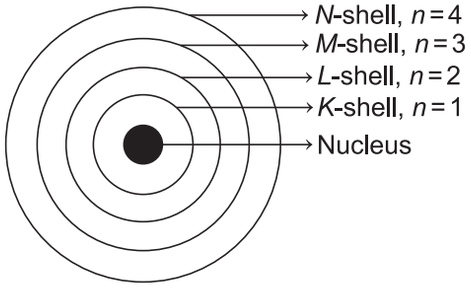
7. Examine the represented diagram.



Name the chemical presents in the wall of these cells that makes them impervious to gases and water.

(a) Suberin (b) Chlorophyll
(c) Pectin (d) Starch

8. The below mentioned diagram represents orbit or shells which are called energy levels. Energy levels in an atom are shown below.



The orbits are represented as *K*, *L*, *M*, *N*, … so on. The maximum number of electrons in any 'n^{th}' energy shell is given by

(a) n^2 (b) $2n^2$

(c) $2n$ (d) n^3

9. Increase in the length of the plants, while growing is due to the presence of

(a) lateral meristem (b) apical meristem

(c) parenchyma (d) periblem

10. The muscles that are found in the iris of the eye, in the bronchi of the lungs and in uterus are

(a) heart muscles (b) straited muscle

(c) smooth muscle (d) ligament muscle

11. Which technique is used to obtain variety with high yield and other desired character?

(a) Selection (b) Introduction

(c) Hybridisation (d) Mutation

12. Which element is required in large quantity by the plants?

(a) Iron (b) Nitrogen

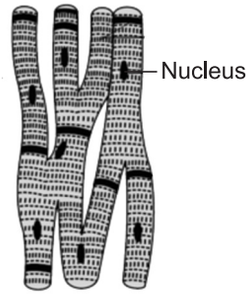
(c) Zinc (d) Copper

13. Among these honeybee species, which one is of Italian origin?

(a) *Apis florae* (b) *Apis cerana indica*

(c) *Apis dorsata* (d) *Apis mellifera*

14. Examine the diagrammatic representation.



By observing the figure carefully. Identify the most appropriate charcteristic of the following, from the given option.

(a) Voluntary muscles (b) Involuntary muscles

(c) Smooth muscles (d) Striated muscles

15. Natasha was performing an experiment in chemistry lab. She took a compound *X* and dissolved it in water. Then the colour of the solution changed from colourless to pink (or dark pink). The compound *X* is,

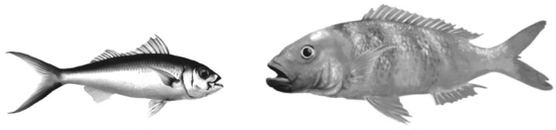
(a) copper sulphate

(b) potassium permanganate

(c) hydrogen chloride

(d) sodium chloride

16. Examine the represented diagram.



(*X*) (*Y*)

Which of the following options correctly explains the features of '*X*' and '*Y*'.

(a) Surface feeders (b) Bottom feeders

(c) Middle zone feeder (d) Feeds on weeds

17. Henry was experimenting with copper sulphate. He took them into a glass of hot water and another containing cold water. He allowed the crystals to settle at the bottom. He saw that the colour of the water started turning into blue but it was much more faster in hot water as compound to cold water.

The phenomenon that was observed in the above experiment is

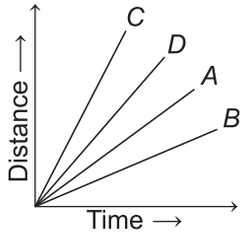
(a) particles of matter are very small in size.

(b) particles of matter are continuously moving.

(c) intermixing of particles of two different types on their own by diffusion.

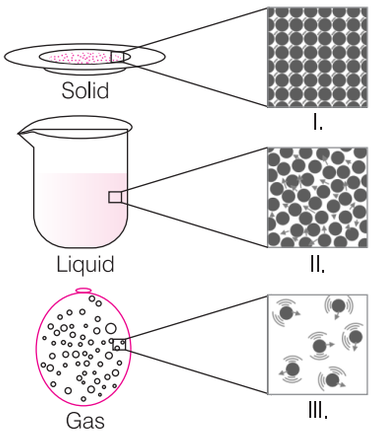
(d) as temperature rises, different particles move differently.

18. Four cyclists *A*, *B*, *C* and *D* are cycling on a levelled straight road. Their distance-time graphs are shown in the given figure. Which of the following is correct regarding the motion of these cyclists?



(a) Cyclist *A* is faster than *D*.
(b) Cyclist *B* is the slowest.
(c) Cyclist *D* is faster than *C*.
(d) Cyclist *C* is the slowest.

19.



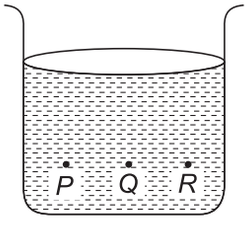
Look at the above picture carefully. There are three states of matter as shown. The pressure exerted by the particles per unit area on the walls of the container is in order

(a) I < II < III (b) III < I < II
(c) I > II > III (d) II > I > III

20. If the mass of a substance is trippled and the density is doubled than the original density, the change in new volume, V' of substance would be

(a) $V' = 3V$ (b) $V' = 2V$
(c) $V' = \frac{2}{3}V$ (d) $V' = \frac{3}{2}V$

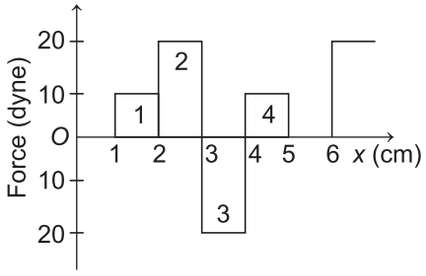
21. The diagram given below shows a beaker filled with water. 3 points are marked inside the beaker as *P*, *Q*, *R*, respectively.



Which of the following statement(s) is true?

(a) Point *Q* has highest pressure as compared to points *P* and *R*.
(b) Point *P* has a higher pressure than point *Q*.
(c) Point *R* has a higher pressure than point *Q*.
(d) Points *P*, *Q* and *R* have the same pressure.

22. The relationship between force and position is shown in figure given (in one dimensional case). The work done by force in displacing a body from $x = 1$ cm to $x = 5$ cm is



The relationship between force and position

(a) 20 erg (b) 40 erg
(c) 60 erg (d) 70 erg

23. An element's atomic mass was taken to be 40 g. If the element exists with it's isotopes actual atomic mass will be,

(a) greater than 40 g
(b) less than 40 g
(c) equal to 40 g
(d) average mass of all the isotopes

24. A student was using chromic acid for an experiment. It accidently fell onto his lab coat. The formula of it is H_2CrO_4. What would be the formula of divalent metal chromate?

(a) M_3CrO_4 (b) $MCrO_4$
(c) $M_2(CrO_4)_3$ (d) M_2CrO_4

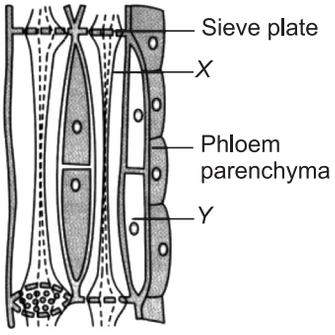
25. An element contains 17 protons, 18 neutrons and 17 electrons. From the following given table which one would be the isotope of this element?

	Protons	Neutrons	Electrons
(a)	17	20	17
(b)	17	18	16
(c)	18	18	17
(d)	20	18	17

26. A neutral atom of an element having nucleus with a nuclear charge 13 times and mass 27 times as that of hydrogen nucleus. What is the ratio of electrons to protons in its stable positively charged ion?

(a) 27 : 13 (b) 10 : 13
(c) 20 : 24 (d) 10 : 14

27. Examine the represented diagram.



Choose the most appropriate option which represents '*X*' and '*Y*'?

(a) *X* — Sieve tube, *Y* — Companion cells
(b) *X* — Parenchyma, *Y* — Vesicle
(c) *X* — Vessel, *Y* — Nucleolus
(d) *X* — Fibre, *Y* — Companion cells

28. A man beating a drum infront of a cliff hear the echo after 4 s. What is the distance of man from the cliff, if velocity of sound in air is 330 m/s?

(a) 660 m (b) 680 m (c) 900 m (d) 1000 m

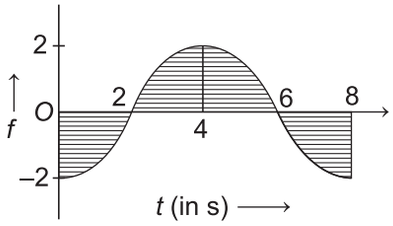
29. If the displacement of an object is proportional to square of time, then the object moves with

(a) uniform velocity (b) uniform acceleration
(c) increasing acceleration (d) decreasing acceleration

30. When a car at high speed makes a sharp turn, the driver in a car tends to get thrown to the side opposite to the turn. This is due to

(a) inertia of motion (b) inertia of time
(c) inertia of rest (d) inertia of direction

31. A force-time graph for the motion of a body is shown in figure. Change in linear momentum between 0 and 8 s is



(a) zero (b) 4 Ns
(c) 8 Ns (d) None of these

32. The gravitational force between two objects is *F*. If masses of both objects are halved without changing distance between them, then the gravitational force would become

(a) $\frac{f}{2}$ (b) $\frac{f}{4}$ (c) *f* (d) 2*f*

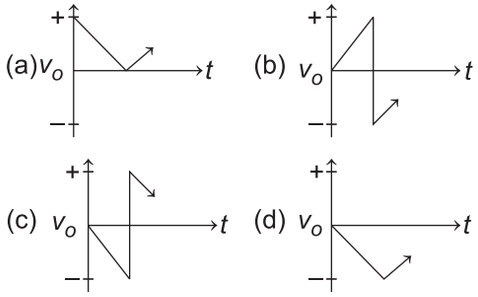
33. A body is moving in a circular path with acceleration '*a*'. If its velocity gets four times, find the ratio of acceleration after and before the change

(a) 4 : 1 (b) 1 : 16 (c) 16 : 1 (d) 1 : 4

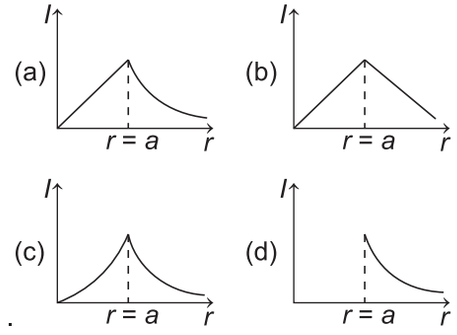
34. Romila was cooking shahi paneer in the kitchen. She wanted to surprise her husband with good food as it was a sunday. Her husband was upstairs. He quickly came and asked Romila that what was she cooking. The whole aroma of shahi paneer travelled from kitched to the room upstairs. This phenomenon is known as diffusion. Which factors would not affect or influence the rate of diffusion?

(a) Temperature
(b) Molecular size
(c) Barriers in the substance
(d) Potential energy

35. A tennis ball is dropped so that it falls vertically on the floor and bounces again. Taking velocity upwards as positive, which of the following graphs best represents the variation of its velocity *v* with time *t* ?



36. Which one of the following graphs correctly represents the variation of gravitational field (*f*) with the distance (*r*) from the centre of a spherical shell of mass *M* and radius "*a*".



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37. *Amoeba* engulfs food and other material from its external environment, through a process termed as

(a) plasmolysis (b) endocytosis
(c) exocytosis (d) Both (b) and (c)

38. The force of gravitation between two bodies of mass 1 kg each separated by a distance of 1 m in vacuum is

(a) 6.67×10^{-11} N (b) 6.67×10^{-10} N

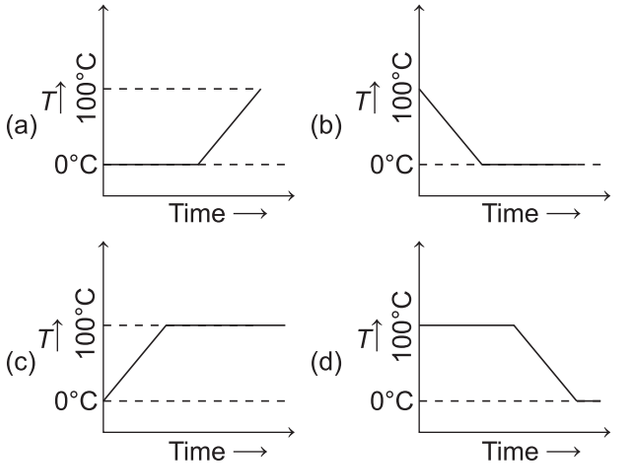
(c) 6.67×10^{-9} N (d) 6.67×10^{-8} N

39. A girl is standing between two walls claps his hand and hears two distinct echoes after 1.8 s and 2.2 s, respectively. What is the distance between the nearest wall ?

(a) 306 (b) 374

(c) 645 (d) 610

40. Rakesh was heating ice and water. He measured the temperature of the content of the beaker as a function of time. Which graph correctly represents the results?



Section 2 (2 Marks)

41. Given below are two statement.

Statement I Nervous tissue is made up of neurons that receive and conduct impulses.

Statement II The skeletal muscles consist of elongated cells and therefore they are also called striated muscles.

Choose the correct answer from the options given below.

(a) Both statement I and Statement II are true
(b) Statement I is true, but Statement II is false
(c) Statement I is false, but Statement II is true
(d) Both statement I and Statement II are false

42. Match the elements in Column I with their respective atomic mass (u) and atomicity in Column II and Column III.

Column I	Column II	Column III
A. Phosphorus	(a) 40 u	(i) Diatomic
B. Sulphur	(b) 31 u	(ii) Tetra-atomic
C. Chlorine	(c) 35.5 u	(iii) Monoatomic
D. Argon	(d) 32 u	(iv) Polyatomic

Choose the correct answer from the options given below.

(a)

A	B	C	D
(b)	(d)	(c)	(a)
(ii)	(iv)	(i)	(iii)

(b)

A	B	C	D
(a)	(b)	(c)	(d)
(ii)	(iv)	(i)	(iii)

(c)

A	B	C	D
(b)	(d)	(a)	(c)
(i)	(ii)	(iii)	(iv)

(d)

A	B	C	D
(c)	(b)	(d)	(a)
(i)	(ii)	(iii)	(iv)

43. Given below are two statements, one is labelled as Assertion (A) and other is labelled as Reason (R).

Assertion (A) Mitochondria is the powerhouse of the cell.

Reason (R) Mitochondria are able to make their own protein.

Choose the correct answer from the options given below.

(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

44. Match the following pairs in Column I and Column II.

	Column I		Column II
(i)	Endoplasmic reticulum	(m)	Flattened sacs
(ii)	Golgi bodies	(n)	Suicidal bags
(iii)	Mitochondria	(o)	Membrane biogenesis
(iv)	Lysosomes	(p)	Powerhouse of the cell
(v)	Mitosis	(q)	Equational division

Choose the correct answer from the options given below.

(a) (i)-o, (ii)-m, (iii)-p, (iv)-n, (v)-q
(b) (i)-m, (ii)-n, (iii)-o, (iv)-q, (v)-p
(c) (i)-o, (ii)-m, (iii)-n, (iv)-q, (v)-p
(d) (i)-q, (ii)-p, (iii)-m, (iv)-n, (v)-o

45. Given below are two statements, one is labelled as Assertion (A) and other is labelled as Reason (R).

Assertion (A) Pure water contains hydrogen and oxygen combined in ratio 1 : 8 by mass.

Reason (R) A chemical compound always contains elements combined together in fixed proportion by mass,

In the light of above statements choose the correct answer from the options given below.

(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.

46. Read the following statements carefully and choose the correct option accordingly.

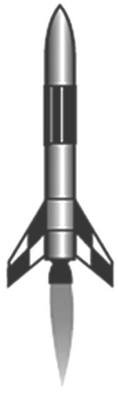
Statement I The universal gravitational constant is same as acceleration due to gravity.

Statement II Gravitational constant and acceleration due to gravity have same dimensional formula.

(a) Both Statement I and Statement II are true and Statement II is the correct explanation of the Statement I.
(b) Both Statement I and Statement II are true but Statement II is not the correct explanation of the Statement I.
(c) Statement I is true but Statement II is false.
(d) Statement I and Statement II both are false.

Case Study

Answer the question on the basis of your understanding of the following case and related studies concepts :



A rocket is used for carrying a satellite to a suitable height above the ground. Thrust is generated by the propulsion system of the rocket. For every action there is an equal and opposite reaction. The fuel in the rocket is burnt and exhaust gases are made to escape in the downward direction through a narrow nozzle. As a reaction, rocket moves upward. Rockets work on the principle of conservation of momentum, which state that the linear momentum of mass of rocket at any instant must be equal to vector sum of linear momentum of rocket and linear momentum of exhaust gases as the exhaust gases escape, the residual mass of rocket decreases with time and motion of rocket is an accelerated motion.

47. Rockets work on the principle of

(a) conservation of linear momentum
(b) Newton's first law of motion
(c) Newton's second law of motion
(d) conservation of energy

48. The direction of exhaust gases is

(a) parallel to rocket
(b) upwards direction
(c) perpendicular to rocket
(d) downward direction

49. Which law of Newton's is associated with rocket propulsion?

(a) Newton's 1st law
(b) Newton's 2nd law
(c) Newton's 3rd law
(d) Pascal's law

50. Which type of motion is followed by the rocket?

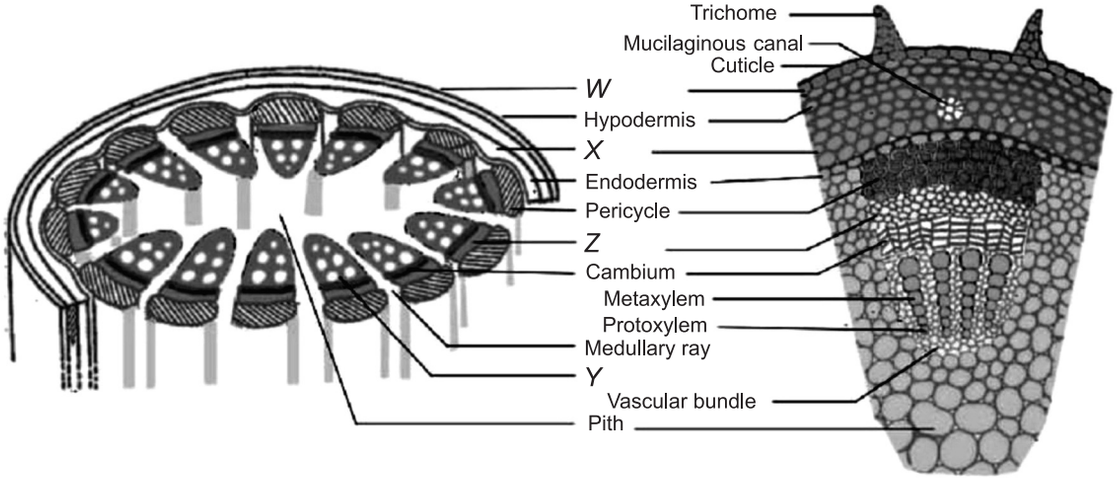
(a) Uniform motion (b) Accelerated motion
(c) Circular motion (d) Rotational motion

Tie-Breaking Section

Instructions

1. This section consists of 5 questions.
2. The score achieved in this section will not be included in the total marks.
3. If overall marks of two or more students are same, winner will be decided based on the score in this section.
4. Participation in this section is optional and students may choose to attempt it or not.

1. Examine the following diagram carefully and identify the types of cells represented as '*W*', '*X*', '*Y*' and '*Z*'.



(a) $W \rightarrow$ Epidermis, $X \rightarrow$ Parenchyma, $Y \rightarrow$ Xylem, $Z \rightarrow$ Phloem
(b) $W \rightarrow$ Endodermis, $X \rightarrow$ Cholenchyma, $Y \rightarrow$ Phloem, Z $\rightarrow$ Xylem
(c) $W \rightarrow$ Xylem, $X \rightarrow$ Parenchyma, $Y \rightarrow$ Epidermis, $Z \rightarrow$ Phloem
(d) $W \rightarrow$ Epidermis, $X \rightarrow$ Endodermis, $Y \rightarrow$ Phloem, $Z \rightarrow$ Xylem

2. A student added 15-20 mL of concentrated H_2SO_4 in a test tube which contained 5 g sugar crystals. He warmed it gently using a bunsen burner. He noticed that white crystals slowly turned brown and became a black mass.

Choose the most appropriate observation from the options given below.

(a) H_2SO_4 turned black, but no chemical changes took place.
(b) It is only a physical change.
(c) It is an irreversible physical change.
(d) Sugar got charred by the action of hot concentration H_2SO_4 and a chemical change took place.

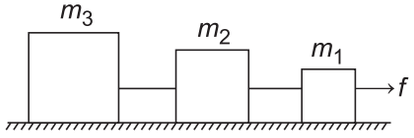
3. How much lime is obtained by burning 350 kg of lime stone?

(a) 224 kg (b) 196 kg (c) 320 kg (d) 220 kg

4. Two solid rubber balls *P* and *Q* having masses 200 gm and 400 gm respectively, are moving in opposite direction with velocity of *P* equal to 0.3 m/s. After collision, the two balls come to rest, then the velocity of *Q* is

(a) 0.15 m/s
(b) 1.5 m/s
(c) – 0.15 m/s
(d) None of the above

5. Three block of masses $m_1 = m$, $m_2 = 2m$ and $m_3 = 3m$, connected by two strings, are placed on a horizontal frictionless surfaces, as shown in the figure. A horizontal force *f* is applied to mass m_1 as shown.



The force of mass m_3 is

(a) f (b) $\frac{f}{2}$
(c) $\frac{f}{3}$ (d) $\frac{f}{6}$