

School Integrated Program

Class – IX

ENTRANCE TEST CUM SCHOLARSHIP (SAMPLE PAPER-1)

[Time: 3 Hours]

[Max Marks: 450]

A. General:

1. This booklet is your Question Paper containing 150 questions.
2. Blank Papers, Clipboards, Log Tables, slide rules, calculators, cellular phones, pagers and electronic gadgets in any form are not allowed to be carried inside the examination hall.
3. The answer sheet, a machine-readable optical mark recognition sheet (OMR Sheet), is provided separately.
4. DO NOT TAMPER WITH / MULTIPLE THE OMR OR THE BOOKLET.
5. Please fill your roll number correctly in the OMR sheet (answer sheet).
6. Both Question Paper and OMR Answer Sheet will be submitted after completion of this examination.

B. Question Paper Format:

1. The Question Paper consists of five parts (Part I: MAT, Part II: Physics, Part III: Chemistry, Part IV: Biology, Part V: Mathematics).
2. Each Question carries +3 marks for correct answer and -1 mark for incorrect answer.

MAT

Directions (Q. 1 - 3): In the following questions, four options (numbers/number, pairs/letter groups) are given. Three of them are alike in a certain way and one is different. Find the odd one out from the alternatives.

1. (a) 242 (b) 80 (c) 25 (d) 728
2. (a) EBD (b) IFH (c) QMO (d) YVX
3. (a) BDGK (b) JLOS (c) HJMQ (d) MORU

Directions (Q. 4 - 8): In the following questions, numbers are written in a sequence. Find the missing number, to replace the question mark, from the given alternatives.

4. KM1, IP3, GS6, EV11, ?
(a) BX18 (b) BY16 (c) CY18 (d) CZ18
5. 23, 48, 99, 203, 413, ?
(a) 826 (b) 837 (c) 835 (d) 833
6. 5, 9, 16, 29, 54, 103, ?
(a) 94 (b) 102 (c) 103 (d) 200
7. 4, 5, 7, 10, 11, 13, 16, ?
(a) 48 (b) 38 (c) 20 (d) 14
8. 47, 53, 59, ?, 67, 71
(a) 61 (b) 63 (c) 64 (d) 65

Directions (Q. 9 & 10): Find out the wrong number in the series:

9. 2, 3, 4, 6, 12, 12, 48, 24, 250
(a) 4 (b) 6 (c) 24 (d) 250
10. 3, 11, 31, 68, 131, 223
(a) 131 (b) 68 (c) 223 (d) 31
11. If the word TRIPPLE is coded as DMOQHSS, how the word VICTORY will be coded?
(a) UJBUNSX (b) WHDSPQZ (c) XSNUBJU (d) ZXPSDHW
12. If the word GRANDEUR is coded as NARGRUED, which word will be coded as SERPEVRE?
(a) PERSERVE (b) PRESEVER (c) PERSEVER (d) PRESERVE

Directions (Q. 13 - 17): Study the information given below and answer the questions that follow:

(i) P, Q, R, S, T and U are six students procuring their Master's degree in six different subjects- English, History, Chemistry, Physics, Hindi and Mathematics.

(ii) Two of them stay in a hostel, two stay as Paying Guest (PG) and the remaining two stay at home.

(iii) R does not stay as PG and studies Chemistry.

(iv) The students studying Hindi and History do not stay as Paying Guest (PG).

(v) T studies Mathematics and S studies Physics.

(vi) U and S stay in a hostel. T stays as Paying Guest (PG) and Q stays at home.

13. Who studies English?
(a) R (b) P (c) S (d) T

14. Which of the following combinations of subject and place of stay is not correct?
 (a) English-Hostel (b) Chemistry-Home
 (c) Mathematics-Paying Guest (d) Physics-Hostel
15. Which of the following pairs of students stay one each at hostel and at home?
 (a) QR (b) SR (c) PQ (d) PS
16. Which subject does Q study?
 (a) History (b) Hindi (c) History or Hindi (d) None of these
17. Which of the following pairs of students stay at home?
 (a) PQ (b) QR (c) RS (d) ST
18. $A + B$ means A is Father of B
 $A - B$ means A is Wife of B
 $A \times B$ means A is brother of B
 $A \div B$ means A is Daughter of B
 If $P + R \div Q$, Which of the following is true?
 (a) P is the Brother of Q (b) P is the Son of Q
 (c) P is the Husband of Q (d) P is the father of Q

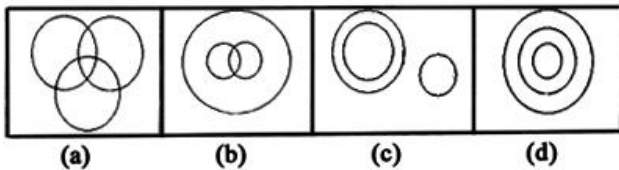
Directions (Q. 19 & 20): Study the information given below and answer the questions that follow:

On a playground, Dinesh, Kunal, Nitin, Atul and Prashant are standing as described below facing the North.

- (i) Kunal is 40 metre to the right of Atul.**
(ii) Dinesh is 60 metre to the South of Kunal.
(iii) Nitin is 25 metre to the West of Atul.
(iv) Prashant is 90 metre to the North of Dinesh.

19. Who is to the North-East of the person who is to the left of Kunal?
 (a) Dinesh (b) Nitin (c) Atul (d) Prashant
20. If a boy walks from Nitin, meets Atul followed by Kunal, Dinesh and then Prashant, how many metres has he walked if he has travelled the straight distance all through?
 (a) 155 m (b) 185 m (c) 215 m (d) 245 m
21. In a row of girls, Kashish is fifth from the left and Mona is sixth from the right. When they interchange their places among themselves, Kashish becomes thirteenth from the left. Then what will be Mona's position from the right?
 (a) Fourth (b) Eighth (c) Fourteenth (d) Fifteenth
22. Reaching the place of meeting 15 minutes before 8.30 am, Anuj found himself half an hour earlier than the man who was 40 minutes late. What was the scheduled time of meeting?
 (a) 8.00 am (b) 8.05 am (c) 8.15 am (d) 8.10 am

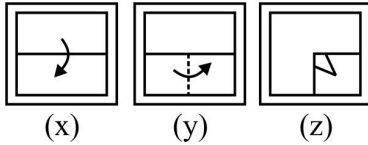
Directions (Q. 23 - 26): In each of the following questions, patterns of circles are used to represent the relationship among different items. Each circle represents an item. Which of the patterns represent the best relationship among the items given in the following question?



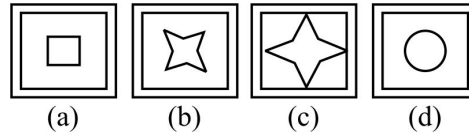
- 23. Human beings, Teachers, Educated
- 24. Antisocial Elements, Pickpockets, Black mailers
- 25. Boys, Students, Players
- 26. Instrumentalists, Musicians, Violinists

Directions (Q. 27 & 28): In following questions, three figures (x), (y) and (z) showing a sequence of folding a paper are given. The figure depicts the cut made on the folded paper. Select the answer from the alternatives, which would most closely resemble the third figure, when it is unfolded.

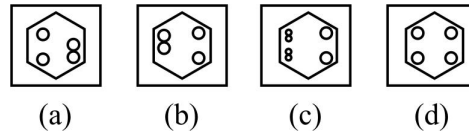
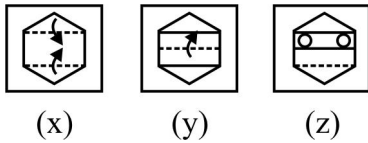
27. **Problem Figures**



Answer Figures



28.



Directions (Q. 29 - 31): Study the information given below and answer the questions that follow:

A wooden cube is painted Blue on all four lateral sides and Green on two opposite sides i.e. top and bottom. It is then cut at equal distances at right angles, two times on each dimension.

- 29. How many cubes will have only one face painted in Blue?
 (a) 1 (b) 2 (c) 3 (d) 4
- 30. How many cubes will have only one face painted in Green?
 (a) 1 (b) 2 (c) 3 (d) 4
- 31. How many cubes will have at least three sides painted?
 (a) 8 (b) 6 (c) 3 (d) 2

Direction (Q. 32 & 33): In the following questions, select the set of conclusion which logically follows from the given statements.

32. **Statements:**

- I. Some cubes are squares.
- II. All squares are circles.

Conclusions:

- I. All cubes are circles.
 - II. Some circles are cubes.
 - III. Some circles are squares.
 - IV. All squares are cubes.
- (a) Only conclusion I follows.
 - (b) Only conclusions I, II and III follow.
 - (c) All conclusions follow.
 - (d) Only conclusions II and III follow.

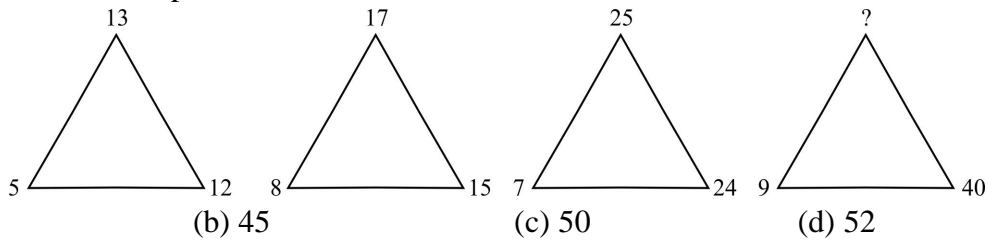
33. **Statements:**

- I. All doors are cots.
- II Some cots are erasers.

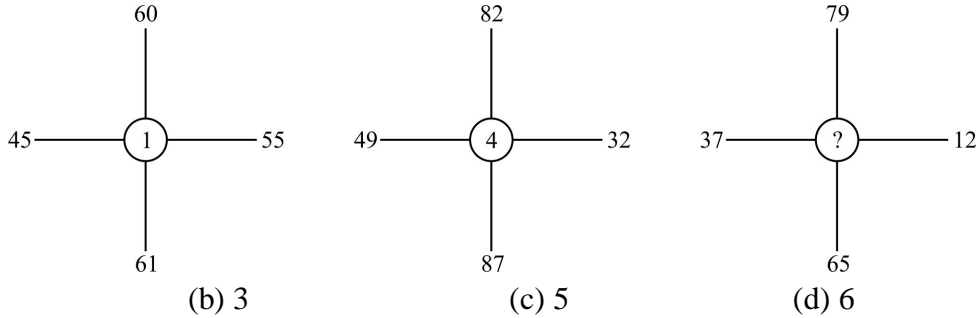
Conclusions:

- I. Some doors are erasers.
 - II. All cots are doors.
 - III. Some cots are doors.
 - IV. Some erasers are doors.
- (a) Only conclusions III and IV follow.
 - (b) Only conclusions I and II follow.
 - (c) Only conclusion III follows.
 - (d) Only conclusion IV follows.

34. Find the number in the position of '?'.



35. Identify the number in the position of '?'

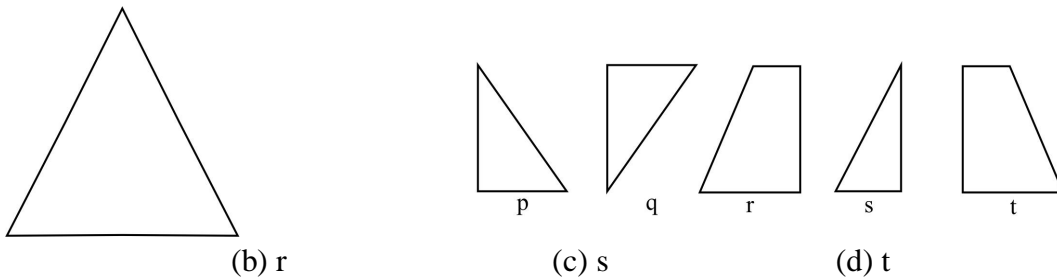


36. In this multiplication question the five letters represent five different digits. Find the values of all the letters.

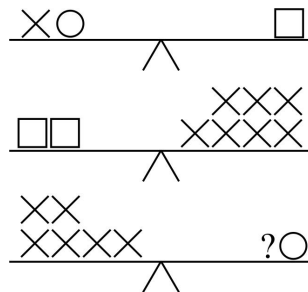
$$\begin{array}{r} \text{SEAM} \\ \text{T} \\ \hline \text{MEATS} \end{array}$$

- (a) M = 3, E = 9, A = 7, T = 4, S = 8 (b) M = 3, E = 9, A = 7, T = 8, S = 4
 (c) M = 4, E = 3, A = 9, T = 7, S = 8 (d) M = 4, E = 9, A = 3, T = 7, S = 8

37. Identify which among the pieces given below will not be required to complete the triangular pattern shown below?

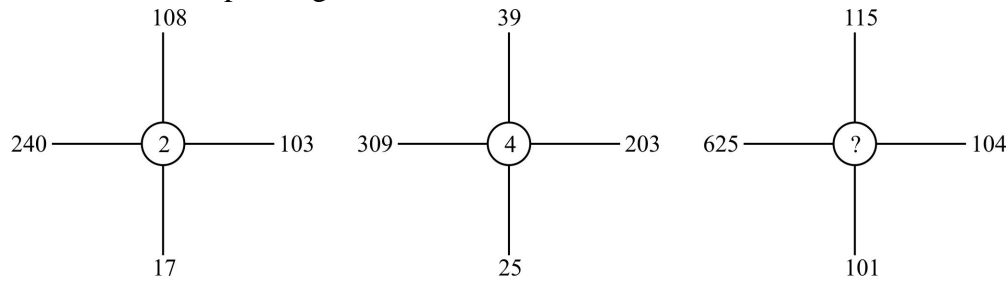


38. Which symbol replaces the '?' if the figure below represents a balance?



- (a) X (b) O (c) □ (d) □ O

39. Identify the number corresponding to the ‘?’



- (a) 3 (b) 5 (c) 7 (d) 8
40. Two candles are of different lengths and thicknesses. The short and the long ones can burn respectively for 3.5 hour and 5 hours. After burning for 2 hours, the candles become equal in length. What fraction of the long candle’s height was the short candle initially?
- (a) $2/7$ (b) $5/7$ (c) $3/5$ (d) $4/5$
41. In a dairy, there are 60 cows and buffalos. The number of cows is twice that of buffalos. Buffalo X ranked seventeenth in terms of milk delivered. If there are 9 cows ahead of Buffalo X, how many buffalos are after X, in rank, in terms of milk delivered?
- (a) 10 (b) 11 (c) 12 (d) 13

Directions (Q. 42 - 45): Study the information given below and answer the questions that follow:

$\alpha, \beta, \gamma, \delta, \epsilon, \phi, \psi, \eta$ are sitting on a merry-go-round facing at the centre. δ is second to the left on η who is third to the left of α , β is fourth to the right of γ who is immediate neighbour of η . Ψ is not a neighbour of β or γ . ϕ is not a neighbour of β .

42. Who is third to the left of β ?
- (a) α (b) γ (c) ϕ (d) Ψ
43. In which of the following pairs is the first person sitting to the immediate right of the second person?
- (a) δ, Ψ (b) β, ϵ (c) η, β (d) Ψ, η
44. What is ϕ ’s position with respect to Ψ ?
- (a) Third towards right (b) Third towards left
(c) Second towards right (d) Second towards left
45. Who is sitting between α and β ?
- (a) Both ϵ and η (b) Both ϕ and γ (c) Only ϵ (d) Only ϕ
46. Twenty four teams are divided into 4 groups of six teams each. Within each group the teams play each other exactly once. The winners of each group then play in the semi-finals. Winners of the semi-finals play in the finals and losers play for the 3rd place. How many matches are played?
- (a) 60 (b) 63 (c) 64 (d) 66
47. I left home for bringing milk between 7am and 8am. The angle between the hour-hand and the minute hand was 90° . I returned home between 7 am and 8 am. Then also the angle between the minute-hand and hour-hand was 90° . At what time (nearest to second) did I leave and return home?
- (a) 7h 18 m 35s & 7h 51m 24s
(b) 7h 19m 24s & 7h 52m 14s
(c) 7h 20m 42s & 7h 53m 11s
(d) 7h 21m 49s & 7h 54m 33s

Directions (Q. 48 - 51): In the following questions, there is a relationship between the two numbers / letters / figures on the left of the sign (: :). This same relationship exists between the two to the right of the sign (: :), of which one is missing. Find the missing one from the alternative.

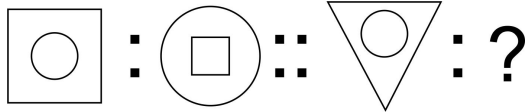
48. 7 : 42 :: 9 : ?

- (a) 75 (b) 65 (c) 46 (d) 72

49. EIKR : HMPX :: GKMT : ?

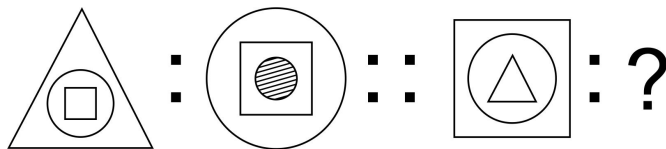
- (a) KORY (b) JORZ (c) JNSZ (d) INQZ

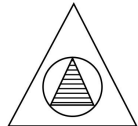
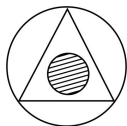
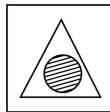
50.



- (a)  (b)  (c)  (d) 

51.



- (a)  (b)  (c)  (d) None of these

Directions (Q. 52 - 54): Read each question carefully and identify the relationship between the first two words, use that relationship to find out the word or pair of words/numbers which when substituted for the question mark maintains the same relationship.

52. SAVE : RESCUE :: SELDOM : ?

- (a) Frequently (b) Rare (c) Usually (d) Mostly

53. NATION : FLAG :: ?

- (a) School : Bus (b) Emblem : Symbol (c) House : Child (d) Company : Biscuits

54. HATE : HATRED :: ?

- (a) Love : Lovable (b) Catch : Caught (c) Deep : Depth (d) Fault : Fault line

Directions (Q. 55-59): Some words are given in column I. These words are written in a code language in column II. The code equivalents of the words given in column I and column II are not necessarily in the corresponding order. Choose the correct code for the words from the given alternatives.

	Column - I	Column - II
i.	Kahu chala na	hum kuch ja
ii.	Aj tak na	ek ja kam
iii.	Man tak pana	saj ek ada
iv.	Hum chala man	kuch not ada
v.	Hum na jai	not kim ja

55. Which word will be code for word Aj?
 (a) ada (b) hum (c) kuch (d) kam
56. Which word will be code for word Hum?
 (a) ja (b) not (c) kuch (d) ek
57. Which word will be code for word pana?
 (a) ada (b) ek (c) saj (d) not
58. Which word will be code for word Kahu?
 (a) hum (b) ada (c) not (d) ja
59. Which word will be code for word Jai?
 (a) ek (b) saj (c) kim (d) J
60. Given the following addition problem, find the number M A N in digits.

$$\begin{array}{r} \text{M A N} \\ + \text{N A M E} \\ \hline \text{3 3 3 3} \end{array}$$

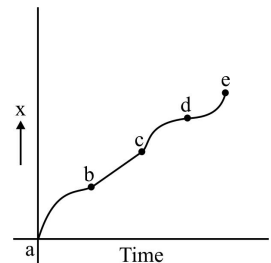
- (a) 321 (b) 132 (c) 123 (d) 103

PHYSICS

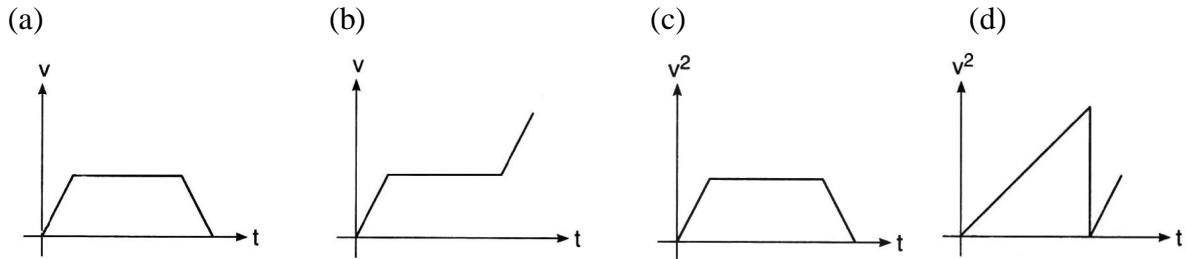
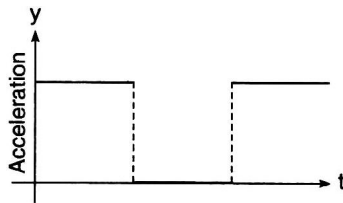
61. A car accelerates from rest at a constant rate α for sometimes after which it decelerates at a constant rate β to come to rest. If the total time of journey is t , then the maximum velocity acquired by the car is given by:
- (a) $\left(\frac{\alpha + \beta}{\alpha\beta}\right)t$ (b) $\left(\frac{\alpha\beta}{\alpha + \beta}\right)t$
- (c) $\left(\frac{\alpha^2 - \beta^2}{\alpha\beta}\right)t$ (d) $\left(\frac{\alpha\beta}{\alpha - \beta}\right)t$
62. An aeroplane moves 400 m towards the north, 300 metres towards west and then 1200 m vertically upwards, then its displacement from the initial position is:
- (a) 1400 m (b) 1500 m (c) 1300 m (d) 1600 m

63. The displacement versus time graph for a body moving in a straight line is shown in figure. Which of the following regions represents the motion when no force is acting on the body?

- (a) ab (b) bc
 (c) cd (d) de



64. Which of the following represents the $v - t$ graph corresponding to the $a - t$ graph shown in figure?



65. A car starts from rest and attains a speed of 8 m/sec in 2 seconds. It travels with uniform speed for next 3 seconds. The total displacement of the car in 5 sec is:

- (a) 4 m (b) 8 m (c) 16 m (d) 32 m

66. Two trains are each 50m long moving parallel towards each other at speeds 10 m/s and 15 m/s respectively, then time taken by the trains to pass each other is:

- (a) $5\sqrt{\frac{2}{3}}$ sec (b) 4 sec (c) 2 sec (d) 6 sec

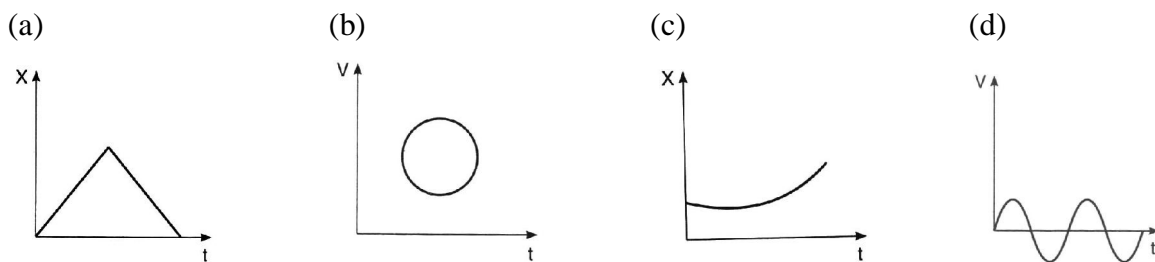
67. A rifle bullet loses $1/20^{\text{th}}$ of its velocity in passing through a plank. The least number of such planks required just to stop the bullet is:

- (a) 5 (b) 10 (c) 11 (d) 20

68. A stone is dropped from the top of the tower and travels 24.5 m in the last second of its journey. The height of the tower is:

- (a) 44.1 m (b) 49 m (c) 78.4 m (d) 72 m

69. Which one of the following curves do not represent motion in one dimension?



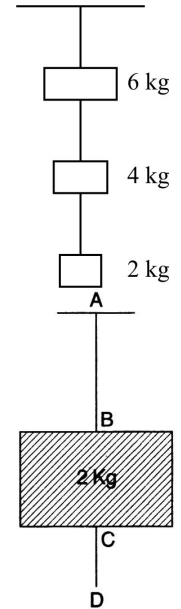
70. A person travels along a straight road for the first half length with velocity v_1 and the second half length with a velocity v_2 . Then the mean velocity v is given by:

- (a) $v = \frac{v_1 + v_2}{2}$ (b) $\frac{2}{v} = \frac{1}{v_1} + \frac{1}{v_2}$ (c) $v = \sqrt{(v_1 v_2)}$ (d) $v = \sqrt{\left(\frac{v_2}{v_1}\right)}$

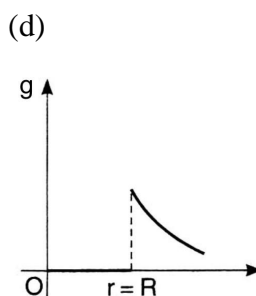
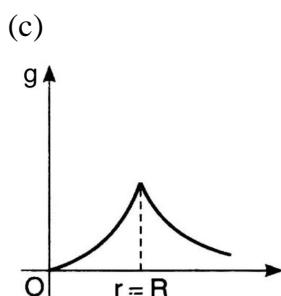
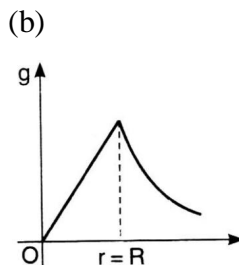
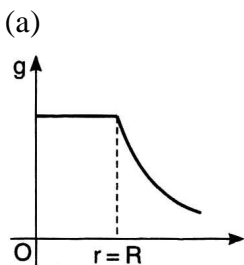
71. Two balls are dropped from heights h and $2h$ respectively from the earth surface. The ratio of time of these balls to reach the earth is:

- (a) $1 : \sqrt{2}$ (b) $\sqrt{2} : 1$ (c) 2:1 (d) 1:4

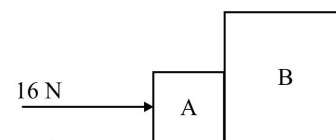
72. The circular orbits of two satellites around earth have radii r_1 and r_2 respectively ($r_1 < r_2$). If angular velocities are same then their centripetal accelerations are related as:
 (a) $a_1 > a_2$ (b) $a_1 < a_2$ (c) $a_1 = a_2$ (d) $a_1 \geq a_2$
73. Two cars of masses m_1 and m_2 are moving along the circular path of radius r_1 and r_2 . They take one round in the same time. The ratio of angular velocity of the two cars will be:
 (a) $m_1 : m_2$ (b) $r_1 : r_2$ (c) $1 : 1$ (d) $m_1 r_1 : m_2 r_2$
74. Three masses of 6 kg, 4 kg and 2 kg are attached to a rigid support as shown in figure. If the string attached to the support breaks and the system falls freely then the tension in the string connecting 4 kg and 2 kg mass is:
 (a) Zero (b) 8 kg wt
 (c) 12 kg wt (d) 6 kg wt
75. A two kg mass is suspended using two strings AB and CD as shown in figure. A sudden jerk is given to the end D of the string, then:
 (a) Part AB of the string breaks
 (b) Part CD of the string breaks
 (c) No part of the string breaks
 (d) Both the strings will simultaneously break
76. A man is at rest in the middle of a pond on perfectly smooth ice. He can get himself to the shore by making use of Newton's:
 (a) First law (b) Second law (c) Third law (d) All the laws
77. When a train stops suddenly passengers in the running train feel an instant jerk in the forward direction because:
 (a) The back of seat suddenly pushes the passengers forward
 (b) Inertia of rest stops the train and takes the body forward
 (c) Upper part of the body continues to be in the state of motion whereas the lower part of the body in contact with seat comes at rest
 (d) Nothing can be said due to insufficient data.
78. Newton's second law gives the measure of:
 (a) Acceleration (b) Force (c) Momentum (d) Angular momentum
79. A body of mass m is taken to the bottom of a deep mine. Then:
 (a) Its mass increases (b) Its mass decreases
 (c) Its weight increases (d) Its weight decreases
80. The time of revolution of planet A around the Sun is 8 times that of another planet B. The distance of planet A from the sun is how many times greater than that of the planet B from the sun?
 (a) 2 (b) 3 (c) 4 (d) 5
81. The moon's radius is $\frac{1}{4}$ that of the earth and its mass is $\frac{1}{80}$ times that of the earth. If g represents the acceleration due to gravity on the surface of the earth, then on the surface of the moon its value is:
 (a) $\frac{g}{4}$ (b) $\frac{g}{5}$ (c) $\frac{g}{6}$ (d) $\frac{g}{8}$



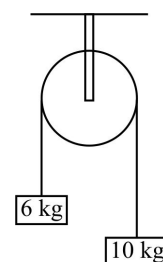
82. If the change in the value of 'g' at a height h above the surface of the earth is the same as at a depth x below it, when both x and h are much smaller than the radius of the earth, then:
 (a) $x = h$ (b) $x = 2h$ (c) $x = h/2$ (d) $x = h^2$
83. The period of a satellite in a circular orbit near a planet is independent of:
 (a) The mass of the planet (b) The radius of the planet
 (c) The mass of the satellite (d) All the three parameters (a), (b) and (c)
84. Assuming earth to be a uniform sphere of mass M and radius R, which one of the following graphs represents the variation of acceleration due to gravity (g) with the distance (r) from the centre of earth?



85. On a smooth plane surface as shown in figure, two blocks A and B of masses 4 kg and 12 kg are accelerated by applying a force of 16 N on A. The direction the force is reversed and the force is applied on B, the force of contact now is:



- (a) 16 N (b) 12 N
 (c) 8 N (d) 4 N
86. A weightless string is suspended on a frictionless pulley, a mass of 6 kg is suspended at the end and mass of 10 kg is suspended on the other end of the string, the tension in the string will be:
 (a) 24.5 N (b) 39.0 N
 (c) 79.0 N (d) 73.5 N



CHEMISTRY

87. You can separate a mixture of sand, salt and water by:
 (a) Filtration and distillation (b) Decantation and evaporation
 (c) Filtration and decantation (d) Decantation and crystallization
88. Which of the following is an example of a solid-in-gas mixture?
 (a) Soil (b) Smoke (c) Moisture (d) Dew
89. Which of the following pair of gases cannot be separated by diffusion method?
 (a) SO_2 and H_2 (b) CO_2 and N_2O (c) NH_3 and N_2 (d) CO_2 and H_2

90. Two miscible liquids having different boiling points can be separated by:
- (a) Sublimation (b) Evaporation
(c) Fractional distillation (d) Decantation
91. Ammonium chloride is separated from a mixture of sodium chloride and ammonium chloride by the process of:
- (a) Evaporation (b) Sublimation
(c) Fractional distillation (d) Filtration
92. The ions Mg^{+2} and PO_4^{-3} combine to form compound:
- (a) $\text{Mg}_3(\text{PO}_4)_2$ (b) $\text{Mg}_2(\text{PO}_4)_2$ (c) $\text{Mg}_2(\text{PO}_4)_3$ (d) $\text{Mg}_3(\text{PO}_4)_3$
93. Name of the element Ni is:
- (a) Nichrome (b) Neon (c) Nickel (d) Nitrogen
94. Carbonate and bicarbonate ions are:
- (a) CO_3^{3-} and HCO_2^- (b) HCO_2^- and CO_3^{3-} (c) HCO_3^- and CO_3^{2-} (d) CO_3^{2-} and HCO_3^-
95. The particles which cannot be deflected under the presence of electric field:
- (a) Electron (b) Proton (c) Neutron (d) α Particle
96. An atom of an element has one electron in the valence shell. It can be represented as:
- (a) ${}_6\text{A}^{12}$ (b) ${}_{19}\text{A}^{39}$ (c) ${}_{13}\text{A}^{27}$ (d) ${}_{12}\text{A}^{24}$
97. The mass number of an element is 27. If it has 14 neutrons then valence shell of this element is:
- (a) K (b) L (c) M (d) N
98. The ratio between the neutrons present in nitrogen atom and silicon atoms with mass numbers 14 and 28 is:
- (a) 7:3 (b) 3:7 (c) 1:2 (d) 2:1
99. The ratio of the energy of photon of 2000\AA wavelength to that of 400\AA wavelength is:
- (a) 1 : 5 (b) 5 : 1 (c) 1 : 2 (d) 2 : 1
100. Who modified Bohr's theory by introducing elliptical orbits for electron path?
- (a) Rutherford (b) Thomson (c) Sommerfeld (d) Hund
101. Number of valence electrons in carbon is:
- (a) 3 (b) 1 (c) 4 (d) None
102. Which of the following elements has least number of electrons in its M shell?
- (a) K (b) Mn (c) Ni (d) Sc
103. At same temperature and pressure which of the following pairs of gases has same rate of diffusion?
- (a) CO, N_2O (b) CO_2 , N_2O (c) N_2O , CH_2 (d) NO_2 , SO_2
104. A gas which diffuses 4 times slowly than H_2 gas is:
- (a) H_2S (b) O_2 (c) CH_4 (d) SO_2
105. The number of atoms present in a molecule of a substance is called:
- (a) Molecularity (b) Atomicity (c) Valency (d) Reactivity
106. The molecular formula of ethanoic acid is $\text{C}_2\text{H}_4\text{O}_2$. Its empirical formula is:
- (a) $\text{C}_4\text{H}_8\text{O}_2$ (b) CH_2O (c) CHO (d) CHO_2

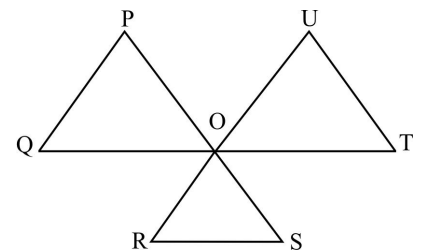
107. The number of molecules contained in 2 g of H₂ is the same as the number of atoms in:
 (a) 1g of H₂ (b) 2g of H₂ (c) 71 g of Cl₂ (d) 28 g of N₂
108. In an organic compound of molar mass 108 g mol⁻¹. C, H and N atoms are present in 9 : 1 : 3.5 by weight. Molecular formula can be:
 (a) C₆H₈N₂ (b) C₇H₁₀N (c) C₅H₆N₃ (d) C₄H₁₈N₃
109. The number of molecules in 16g of methane is:
 (a) 3.0×10^{23} (b) 6.02×10^{23} (c) $\frac{16}{6.02} \times 10^{23}$ (d) $\frac{16}{3.0} \times 10^{23}$
110. The molarity of a solution containing 1.0 g NaOH in 250 mL of water is:
 (a) 0.5 M (b) 0.4 M (c) 0.1 M (d) 2.0 M

BIOLOGY

111. Which of the following is a prokaryotic cell?
 (a) *Spirogyra* (b) *Amoeba* (c) *Chara* (d) *Escherichia coli*
112. The chemical substance most abundantly present in the middle lamella is:
 (a) Calcium pectate (b) Suberin (c) Lignin (d) Calcium phosphate
113. Haversian canals are found in:
 (a) Gall bladder of horse (b) Long bone of rat
 (c) Internal ear of mammals (d) Spinal cord of vertebrates
114. The radiant energy of sunlight is converted to chemical energy and is stored as:
 (a) AMP (b) ADP (c) ATP (d) APP
115. Cell organelle that is involved in autophagy is:
 (a) Golgi apparatus (b) Lysosomes (c) Chromosomes (d) Ribosomes
116. The most abundant class of lipids found in the lipid bilayer are the _____.
 (a) Phospholipids (b) Glycolipids (c) Sphingolipids (d) Liposomes
117. Membrane transport that occurs without the input of extra energy can be classified as:
 (a) Passive transport (b) Active transport
 (c) Catalytic transport (d) Inhibitory transport
118. Centrioles take part in:
 (a) Muscle contraction (b) Membrane architecture
 (c) DNA recognition (d) Cell division
119. Four healthy people in their twenties got involved in injuries resulting in damage and death of a few cells. Which of the following cells are least likely to be replaced by new cells?
 (a) Osteocytes (b) Liver cells
 (c) Neurons (d) Malpighian layer of the skin
120. Sprain is caused by excessive pulling of:
 (a) Nerves (b) Tendons (c) Muscles (d) Ligaments

MATHEMATICS

121. Let x, y, z be non-zero real numbers such that $\frac{x}{y} + \frac{y}{z} + \frac{z}{x} = 7$ and $\frac{y}{x} + \frac{z}{y} + \frac{x}{z} = 9$, then $\frac{x^3}{y^3} + \frac{y^3}{z^3} + \frac{z^3}{x^3} - 3$ is equal to:
 (a) 152 (b) 153 (c) 154 (d) 155
122. The length and breadth of a rectangle are 30 m and 20m respectively. If length is increased by 50% and the breadth by 30%, the percentage increase in its area is:
 (a) 65% (b) 75% (c) 85% (d) 95%
123. An equilateral triangle is described on the diagonal of a square. What is the ratio of the area of the triangle to that of the square?
 (a) $\sqrt{3} : 2$ (b) $2 : \sqrt{3}$ (c) $\sqrt{3} : 4$ (d) $4 : \sqrt{3}$
124. If a, b are natural numbers such that $2013 + a^2 = b^2$, then the minimum possible value of ab is:
 (a) 671 (b) 668 (c) 658 (d) 645
125. If $y + \sqrt{y + \sqrt{y + \sqrt{y + \dots \infty}}} = 7$ then y equals to:
 (a) $\sqrt{7} - 7$ (b) $\sqrt{7} + 7$ (c) $7 - \sqrt{7}$ (d) $7 - 2\sqrt{7}$
126. The cube root of $[(62.8)^3 + (37.2)(37.2)(37.2) + 300(62.8)(37.2)]$ is:
 (a) 100 (b) 10 (c) 1000 (d) 102
127. If $2x = 3y = 4z$, find $x : y : z$.
 (a) 3 : 4 : 6 (b) 4 : 3 : 6 (c) 6 : 4 : 3 (d) 4 : 6 : 3
128. If $x = 7 + 4\sqrt{3}$ then value of $\sqrt{x} + \frac{1}{\sqrt{x}}$ is:
 (a) $2\sqrt{3}$ (b) 4 (c) -4 (d) $\sqrt{3}$
129. The value of x satisfying the equation (considering only positive root)
 $[\sqrt{5 + 2\sqrt{6}} + \sqrt{5 - 2\sqrt{6}}] / [\sqrt{5 + 2\sqrt{6}} - \sqrt{5 - 2\sqrt{6}}] = \sqrt{\frac{x}{2}}$ is:
 (a) 6 (b) 3 (c) $\sqrt{3}$ (d) 9/2
130. Two numbers, x and y , are such that when divided by 6, they leave remainders 4 and 5 respectively, then the remainder when $(x^2 + y^2)$ is divided by 6 will be:
 (a) 3 (b) 4 (c) 5 (d) 1
131. Lines PS, QT and RU intersect at a common point O as shown in the figure. P is joined to Q, R to S and T to U to form triangles. The value of $\angle P + \angle Q + \angle R + \angle S + \angle T + \angle U$ is:
 (a) 270° (b) 360° (c) 450° (d) 540°



133. ABCD is a trapezium with AD and BC parallel sides. E is a point on BC. The ratio of the area of ABCD to that of AED is:

- (a) $\frac{\overline{AD}}{\overline{BC}}$ (b) $\frac{\overline{BE}}{\overline{EC}}$ (c) $\frac{\overline{AD} + \overline{BE}}{\overline{AD} + \overline{CE}}$ (d) $\frac{\overline{AD} + \overline{BC}}{\overline{AD}}$

134. Perimeter of a rhombus is '2p' cm and sum of length of diagonals is 'm' cm, then area of the rhombus is:

- (a) $\frac{1}{4} m^2 p \text{ cm}^2$ (b) $\frac{1}{4} mp^2 \text{ cm}^2$ (c) $\frac{1}{4} (m^2 - p^2) \text{ cm}^2$ (d) $\frac{1}{4} (p^2 - m^2) \text{ cm}^2$

135. ABCD is a parallelogram $m\angle DAB = 60^\circ$, BC = 20cm and AB = 20cm, then area of ABCD is equal to:

- (a) $150\sqrt{3} \text{ cm}^2$ (b) $200\sqrt{3} \text{ cm}^2$ (c) $400\sqrt{3} \text{ cm}^2$ (d) $260\sqrt{3} \text{ cm}^2$

136. The length of a side of a rhombus is 10cm and one of its diagonal is 12 m. The length of other diagonal is:

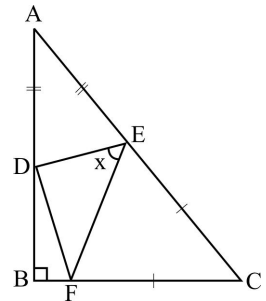
- (a) 15m (b) 18m (c) 16m (d) cannot be determined

137. An interior angle of a regular polygon is 8 times its exterior angle. Then the number of sides of the polygon is:

- (a) 14 (b) 16 (c) 12 (d) 18

138. In the given figure, AD = AE and CF = CE. If $\angle DEF = x^\circ$, then the value of x equals to:

- (a) 30° (b) 45°
(c) 60° (d) 75°



139. If $(x^2 + y^2)^3 = (x^3 + y^3)^2$ then the value of $\frac{x}{y} + \frac{y}{x} =$

- (a) $2/3$ (b) $3/2$ (c) $5/6$ (d) $6/5$

140. In triangle ABC a straight line parallel to BC intersects AB and AC at D and E respectively. If AB = 2AD then DE : BC is:

- (a) 2 : 3 (b) 2 : 1 (c) 1 : 2 (d) 1 : 3

141. G is the centroid of the equilateral ΔABC . If AB = 10 cm then length of AG is:

- (a) $\frac{5\sqrt{3}}{3} \text{ cm}$ (b) $\frac{10\sqrt{3}}{3} \text{ cm}$ (c) $5\sqrt{3} \text{ cm}$ (d) $10\sqrt{3} \text{ cm}$

142. The value of $\sqrt{-\sqrt{3} + \sqrt{3 + 8\sqrt{7} + 4\sqrt{3}}}$ is:

- (a) 1 (b) 2 (c) 3 (d) No real number

143. A rhombus shaped field has green grass for 18 cows to graze. If each side of the rhombus is 30 m and its longer diagonal is 48m, how much area of grass field will each cow be grazing?

- (a) 38 m^2 (b) 48 m^2 (c) 58 m^2 (d) 68 m^2

144. The sides of a triangle are 13 cm, 14 cm and 15 cm. Find the area of triangle formed by joining mid points of the sides of this triangle.

- (a) 21 cm^2 (b) 42 cm^2 (c) 84 cm^2 (d) None of these

145. A point I lies inside a triangle ABC such that IB & IC are angle bisectors. Find $\angle BIC$, if $\angle BAC = 80^\circ$.
(a) 120° (b) 130° (c) 50° (d) 90°
146. If $x = -0.5$ then which one of the following has the smallest value?
(a) $2^{\frac{1}{x}}$ (b) $\frac{1}{x}$ (c) 2^x (d) $\frac{1}{\sqrt{-x}}$
147. John's birthday cake is a delightful cylinder of radius 6 inches and height 3 inches, If the friends cut the cake into 8 equal sectors, the total surface area of a piece of birthday cake in sq. inches, is:
(a) $9(\pi + 4)$ (b) $\frac{27\pi}{2}$ (c) $4(\pi + 4)$ (d) $\frac{9}{2}(3\pi + 8)$
148. Find the diameter of a wheel that makes 113 revolutions to go 2 km 26 decametres. $\left(\text{Take } \pi = \frac{22}{7} \right)$
(a) $4\frac{4}{13}$ m (b) $6\frac{4}{11}$ m (c) $12\frac{4}{11}$ m (d) $12\frac{8}{11}$ m
149. If $[(23)^9 - (23)^8]/22 = (23)^x$, then x equals to:
(a) 8 (b) 1 (c) 9 (d) None of these
150. The perimeter of a triangle is 30 cm and its area is 30 cm^2 . If the largest side measures 13 cm, what is the length of the smallest side of the triangle?
(a) 3 cm (b) 4 cm (c) 5 cm (d) 6 cm