



Class – IX

ENTRANCE TEST CUM SCHOLARSHIP (SAMPLE PAPER-2)

[Time: 3 Hours]

[Max Marks: 450]

A. General:

1. This booklet is a Question Paper containing 150 questions.
2. Blank Papers, Clipboards, Log Tables, slide rules, calculators, cellular phones, 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 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 and marking scheme:

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

1. Here are some words translated from an artificial language
'mie pie' is blue light
'mie tie' is blue berry
'aie tie' is rasp berry
Which words could possibly mean 'light fly'?
(a) pie zie (b) pie mie (c) aie zie (d) aie mie
2. If in certain code, STUDENT is written as RSTEDMS, then how would TEACHER be written in the same code?
(a) SZZDGEO (b) SZDDGEO (c) SDZDGDQ (d) SDZCGDQ
3. Which group of letters is different from others?
(a) CBAED (b) IJHGK (c) SROPT (d) TVWYZ
4. In the following letter sequence, some of the letters are missing. These are given in order as one of the alternatives below. Choose the correct alternative.

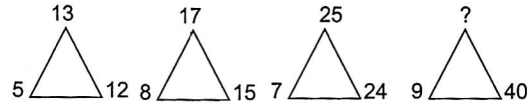
$\alpha\beta_ \alpha\alpha_ \beta\beta\beta_ \alpha\alpha\alpha\alpha_ \beta\beta$

(a) $\alpha\beta\beta\alpha$ (b) $\beta\alpha\beta\alpha$ (c) $\alpha\alpha\alpha\beta$ (d) $\alpha\beta\alpha\beta$
5. Fill one of the option given below at?

| | | |
|-----|----|-----|
| -C | 2B | -3A |
| 2A | ? | -B |
| -3C | -A | 2B |

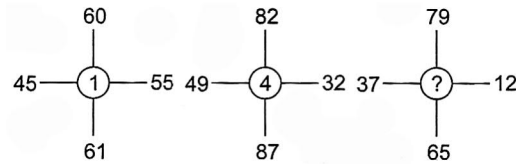
(a) -3C (b) -2C (c) 3C (d) 2B
6. Vimla used to board the train from metro station A to go to her office. Since, station A is a terminus. She had no problem in getting a seat. Ever, since she shifted to locality B she finds it difficult to get a seat, as by the time the train reaches locality B it becomes crowded. Find the statement among the alternatives which must be true as per the given information.
(a) Vimla would prefer to take a bus rather than the metro
(b) Vimla's travel to office has become less comfortable ever, since she has shifted
(c) Commuters staying in and around locality B would demand metro services originating from station near locality B
(d) Vimla would look for a job close to her home.
7. Ramesh started going for regular morning walks for controlling his blood sugar. He did so for a month and also started taking yoga lessons without going for any pathological examination. He underwent pathological test after two months and found that the blood sugar level has come down. Presuming that he had not changed his food habits during these two months, which statement among the alternatives given below, follows most logically?
(a) Blood sugar level comes down after doing regular morning walk
(b) Blood sugar level comes down after doing yoga
(c) Blood sugar level comes down on doing regular morning walk and yoga
(d) Regular morning walk, yoga or both may bring down sugar level despite not changing food habits

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



- (a) 41 (b) 45 (c) 50 (d) 52

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



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

10. Find the next number in the sequence

0, 2, 24, 252, ...

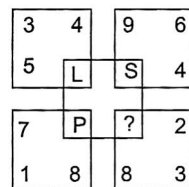
- (a) 620 (b) 1040 (c) 3120 (d) 5430

11. Find the next number in the sequence

6, 24, 60, 120, ...

- (a) 180 (b) 210 (c) 240 (d) 360

12. Find the letter to be placed in place of ? in the figure given.



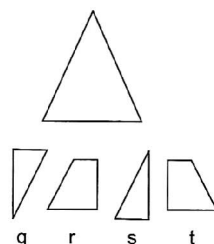
- (a) M (b) N (c) Q (d) R

13. In this multiplication question the five letters represent five different digits. What are the actual figures if there is no zero?

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

- (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

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



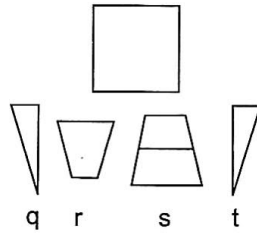
- (a) q (b) r (c) s (d) t

15. Find the missing number in the following series.

2, 10, 26, ..., 242

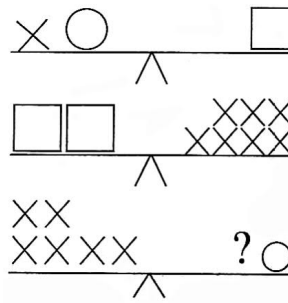
- (a) 80 (b) 81 (c) 82 (d) 84

16. A pattern is given below. You have to identify which among the following pieces will not be required to complete the pattern?



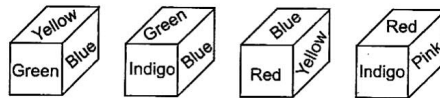
- (a) q (b) r (c) s (d) t

17. Which symbol replaces the question mark ? Figure below represent a balance.



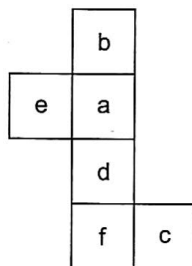
- (a) × (b) ○ (c) □ (d) □○

18. On the basis of the four position of a dice given below, find the colour of the face opposite 'yellow'.



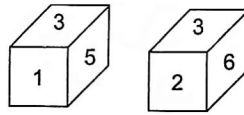
- (a) Indigo (b) Red (c) Pink (d) Blue

19. If the given figure is folded to form a box, which among the boxes below will be formed?

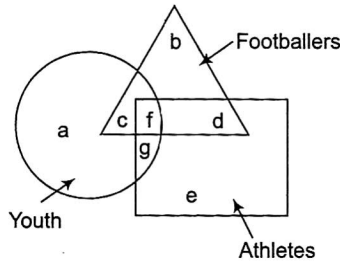


- (a) (b) (c) (d)

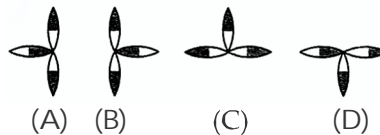
20. Two positions of a dice are shown. Which number will appear on the face opposite the one having 5?



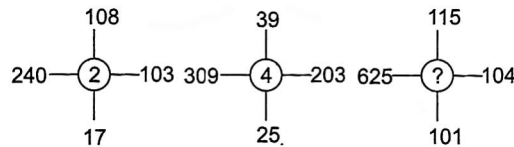
- (a) 1 (b) 2 (c) 4 (d) 6
21. In the figure, the circle represents youth, the triangle represents footballers and the rectangle represents athletes. Which letter(s) represent(s) athletes among youths who are not footballers?



- (a) Only g (b) g and c (c) Only f (d) f and d
22. Find the odd one out.







- (a) A (b) B (c) C (d) D
23. Identify the remember corresponding to the '?'.



- (a) 3 (b) 5 (c) 7 (d) 8
24. Which of the given alternative is the mirror image of REASON, if the mirror is placed below the word?
- (a) REAZON (b) NOSAER (c) REAZON (d) NOSAER
25. A sprinter goes off the starting block for 100 m run and at that instant the second hand of a stopwatch had pointed towards North. He touches the finishing line exactly after 12 s. In which direction did the second hand point when he just crossed the finishing line?
- (a) 18° North of East (b) 18° East of North
(c) 72° North of East (d) 82° East of North
26. Two candles are of different length and thicknesses. The short and the long ones can burn respectively for 3.5 h and 5 h After burning for 2 h, the lengths of the candles become equal in length. What fraction of the long candle's height was the short candle initially?

- (a) $\frac{2}{7}$ (b) $\frac{5}{7}$ (c) $\frac{3}{5}$ (d) $\frac{4}{5}$

27. Mother was asked how many gifts she had in bag. She replied that there were all dolls but six, all cars but six, and all books but six. How many gifts had she in all?
 (a) 9 (b) 18 (c) 27 (d) 36
28. Question given below has a problem and two Statements I and II. Decide, if the information given in the statement is sufficient for answering the problem:
 K, R, S and T are four players in Indian cricket team. Who is the oldest among them?
 I. The total age of K and T together is more than that of S.
 II. The total age R and K together is less than that of S.
 (a) Data in Statement I alone is sufficient
 (b) Data in Statement II alone is sufficient
 (c) Data in both statements together is sufficient
 (d) Data in both statements together is not sufficient
29. Which of the following diagram/sets indicate the relation between women, mothers and parents?
 (a)  (b)  (c)  (d) 
30. In a diary, 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 in rank in terms of milk delivered?
 (a) 10 (b) 11 (c) 12 (d) 13
31. What is the mirror image of b3k4s ?
 (a) z4k3d (b) z4k3d (c) z4k3d (d) z4k3d
- Directions (Q. Nos. 32-36) These questions are based on the following information $\alpha, \beta, \gamma, \phi, \psi,$ and η 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 $\eta. \psi$ is not a neighbour of β or $\gamma. \phi$ is not a neighbour of $\beta.$
32. Who is third to the left of β ?
 (a) α (b) γ (c) ϕ (d) ψ
33. In which of the following pairs is the first person sitting to the immediate right of the second person?
 (a) ϕ, ψ (b) β, ϵ (c) η, β (d) ψ, η
34. 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
35. Who is sitting between α and β ?
 (a) Both ϵ and η (b) Both ϕ and γ (c) Only ϵ (d) Only ϕ
36. How many of them are sitting between γ and β ?
 (a) 0 or 6 (b) 1 or 5 (c) 2 or 4 (d) 3
37. In a school 120 boys have registered for a singles carom tournament. Each match eliminates one player. How many matches are to be organised to determine the champion?
 (a) 60 (b) 61 (c) 119 (d) 120

38. Amongst five friends, Lata, Alka, Rani, Asha and Sadhana. Lata is older than only three of her friends. Alka is younger to Asha and Lata. Rani is older than only Sadhana. Who amongst them is the eldest?
 (a) Asha (b) Lata (c) Alka (d) Sadhana
39. 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 semifinals. Winners of the semi-final play in the finals and losers for the 3rd place. How many matches are played?
 (a) 60 (b) 63 (c) 64 (d) 66

Directions (Q. Nos. 40-41) Take the given statement(s) as true and decide which of the conclusion logically, follows from tie statements.

40. Statement All actors are musicians. No musicians is a singer. Some singers are dancers. Some dancers are musician's.

Conclusions

- I. Some actor are singers.
- II. Some dancers are actors.
- III. No actor is a singer.

- (a) Only Conclusion I follows
- (b) Only, Conclusion III follows
- (c) Exactly one of the Conclusions I or III follows
- (d) Only Conclusion II follows

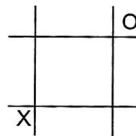
41. Statement All clocks are alarms. No clocks are cuckoos. All cuckoos are alarms. Some cuckoos are birds.

Conclusions

- I. Some alarms are birds
- II. No clock is a bird
- III. All birds are alarms

- (a) Only Conclusion I follows (b) Only Conclusion II follows
- (c) Only Conclusion III follows (d) Both Conclusion II and III follows

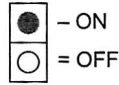
42. Two players X and O play a game of 'noughts and crosses' on a 3 × 3 grid. The purpose of the game is for a player to get 3 symbols belonging to the player in a straight line (vertically, horizontally or diagonally). Each player marks one symbol on his or her turn. After two moves (1 turn each), the grid looks as follows with X to play next. Where should X put his symbol next so that he will always win this game finally regardless of how well O plays?



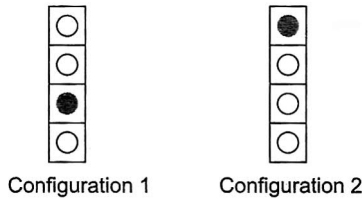
- (a) Bottom row right corner
- (b) Bottom row middle cell
- (c) Middle row left most cell
- (d) It is not possible to always ensure X wins, If O plays carefully

43. An electrical circuit for a set of 4 lights depends on a system of switches A, B, C and D. When, these switches work they have the following effect on the lights. They each change the state of two lights (i.e., on becomes off and off becomes on). The lights that each switch controls are as follows

| | | | |
|---------|---------|---------|---------|
| A | B | C | D |
| 1 and 2 | 2 and 4 | 1 and 3 | 3 and 4 |



In Configuration 1 shown below, switches CBDA are activated in turn, resulting in Configuration 2. One switch did not work and had no effect which was that switch?



- (a) A (b) B (c) C (d) D

44. If is to as is to ?

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

- 45.

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

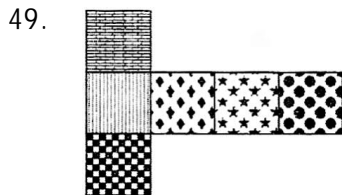
46. A, B, C, D and E are sitting on a bench. A is sitting next to B, C is sitting next to D. D is not sitting next to E who is sitting on the left end of the bench. C is on the second position from the right. A is to the right of B and E. Counting from the left, in which position is A sitting?

- (a) 2 (b) 3
(c) 5 (d) Cannot be determined

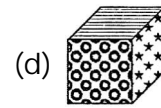
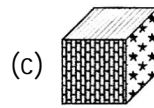
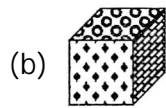
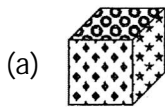
47. I left home for bringing milk between 7 am and 8 am. The angle between the hour hand and the minute hand was 90°. I returned home between 7 am and 8 am. Then, also the angle between the minute hand and hour hand was 90°. At what time (nearest to second) did I leave and return home?

- (a) 7 h 18 min 35 s and 7 h 51 min 24 s (b) 7 h 19 min 24 s and 7 h 52 min 14 s
(c) 7 h 20 min 42 s and 7 h 53 min 11 s (d) 7 h 21 min 49 s and 7 h 54 min 33 s

48. I left home at 3:00 pm and returned at 3:48 pm. The clock was rotated by 45° , so that when I left, the hour hand of a clock was pointing along the South-East direction. In which direction would the hour hand point when I returned?
- (a) 15° East of South
(b) 21° East of South
(c) 63° South of East
(d) 27° South of East



When the above is folded into a cube, which is the only cube that can be produced amongst the following?



50. What will be water image of CHICK?

- (a) CHICK (b) CHICK (c) KCIHC (d) KCIHC

Directions (Q. Nos. 51-52) Find out the missing one from the given alternatives.

51. $35 : 91 :: 189 : (?)$

- (a) 343 (b) 341 (c) 280 (d) 210

52. $\frac{7}{11} : \frac{13}{11} : \frac{19}{23} : (?)$

- (a) $\frac{25}{27}$ (b) $\frac{29}{31}$ (c) $\frac{23}{29}$ (d) $\frac{29}{23}$

Directions (Q. Nos. 53) In the following questions some relations are written by particular indicators as shown below

- \bigcirc = Greater than
 $+$ = Equal to
 \triangle = Not Equal to
 \bigcirc/\bigcirc = Not greater than
 \times = Not less than
 \square = Less than

Find out the correct answer for each question..

53. If $p \triangle q \bigcirc r$, it is possible that

- (a) $p \times q \times r$ (b) $p \times q \square r$ (c) $p \square p \emptyset r$ (d) $p \emptyset q \emptyset r$

Directions (Q. Nos. 54-58) Words in capital letters in Column I are written in small letters in a code language in Column II. Decode the language and find out the correct alternative for the given letters in each questions.

| Column I | Column II | Column I | Column II |
|----------|-----------|----------|-----------|
| HERO | tbfw | BLUE | eglt |
| JOIN | bakp | CIGAR | vsqwp |
| LAZY | nsvg | WRIT | wpxy |
| MINE | pdkl | VIRUS | pzwoe |
| PART | rwsx | QUACK | jqems |
| SAURY | wveos | PIRL | wprg |

54. Code for letters in the word TOIL are
 (a) pxba (b) bpgn (c) bpxg (d) mpxg
55. Code for letters in the word COST are
 (a) boqx (b) xqps (c) qost (d) xqnr
56. Code for letters in the word ULCER are
 (a) ggwmr (b) teqwp (c) ktegp (d) egqtw
57. Code for letters in the word SINE are
 (a) ptkl (b) toka (c) ptok (d) optb
58. Code for letters in the word 'ARCH' are
 (a) frsq (b) wfsq (c) wqfp (d) sqfn
59. A and B are brothers. C and D are sisters. A's son is D's brother. How is B related to C?
 (a) Brother (b) Father (c) Uncle (d) Son

Direction (Q. No. 60) Read the following information carefully and answer the question given below.

'A + B' means 'A' is the daughter of 'B'.

'A – B' means 'A' is the husband of 'B'.

'A × B' means 'A' is the brother of 'B'.

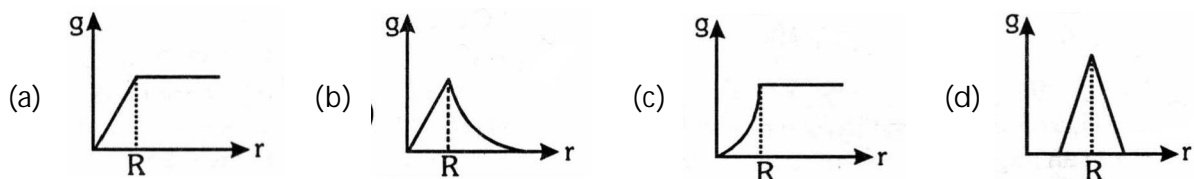
60. If $P + Q - R$, then which one of the following is true?
 (a) R is the mother of P (b) R is the sister-in-law of P
 (c) R is the aunt of P. (d) R is the mother-in-law of P

PHYSICS

61. An object is dropped from the top of a tower. Find distance covered by the object in 5th second.
 (a) 125 m (b) 45 m (c) 5 cm (d) 10 m
62. Two cars A and B moving with uniform velocities of 60 km/ph and 80 km/ph respectively are at points X and Y on a straight road 420 km apart. If the cars meet at a point P between X and Y, the ratio of the distance P_x and P_y is :
 (Assuming that cars are moving in opposite directions)
 (a) 7 : 5 (b) 3 : 4 (c) 6 : 7 (d) 7 : 6

63. The units $\text{kg m}^{-1} \text{sec}^{-2}$ may correspond to –
 (a) Work done by a force (b) Pressure
 (c) Energy per unit volume (d) (b) & (c) both
64. The angular acceleration of particle moving along a circular path with uniform speed is –
 (a) Uniform but non-zero
 (b) Zero
 (c) Variable
 (d) Such as cannot be predicate from the given information
65. A satellite of mass m revolves around the earth of radius R at a height x from its surface. If g is the acceleration due to gravity on the surface of the earth, the orbital speed of the satellite is-
 (a) gx (b) $\frac{gR}{R-x}$ (c) $\frac{gR^2}{R+x}$ (d) $\left(\frac{gR^2}{R+x}\right)^{1/2}$
66. If g is the acceleration due to gravity on the earth's surface, the gain in the potential energy of an object of mass m raised from the surface of the earth to a height equal to the radius R of the earth, is-
 (a) $2mgR$ (b) $\frac{1}{2}mgR$ (c) $\frac{1}{4}mgR$ (d) mgR
67. A body of mass m dropped from a height H reaches the ground with a speed of $1.2\sqrt{gH}$. Then work done by air friction :-
 (a) $-0.38 mgH$ (b) $+0.38 mgH$ (c) $-0.28 mgH$ (d) $+0.28 mgH$
68. A projectile attains a certain maximum height when projected from earth. If it is projected at the same angle and with the same initial speed from the moon, where the acceleration due to gravity is one-sixth that on earth, by what factor will be maximum height of the projectile increase ?
 (a) $\sqrt{3}$ (b) 3 (c) $\sqrt{6}$ (d) 6
69. The co-ordinates of a moving particle at anytime 't' are given by $x = \alpha t^3$ and $y = \beta t^3$. The speed of the particle at time 't' is given by
 (a) $3t\sqrt{\alpha^2 + \beta^2}$ (b) $3t^2\sqrt{\alpha^2 + \beta^2}$ (c) $t^2\sqrt{\alpha^2 + \beta^2}$ (d) $\sqrt{\alpha^2 + \beta^2}$
70. A student wants to test the laws of gravity on himself. He falls from a 320 m high building. Five seconds after his fall a superman dives off the same building to save the student. What must be initial velocity of the superman in order that he catches the student just before the ground is reached ?
 (a) 91.7 m/s (b) 125 m/s (c) zero (d) 20 m/s
71. A goods train accelerating uniformly on a straight railway track, approaches an electric pole standing on the side of track, its engine passes the pole with velocity u and the guard's room passes with velocity v . The middle wagon of the train passes the pole with a velocity.
 (a) $\frac{u+v}{2}$ (b) $\frac{1}{2}\sqrt{u^2 + v^2}$ (c) \sqrt{uv} (d) $\sqrt{\left(\frac{u^2 + v^2}{2}\right)}$

72. A block of mass 4 kg is kept on ground. Coefficient of friction between block and the ground is 0.80. An external force of magnitude 30 N is applied on block parallel to the ground. The resultant force exerted by ground on block is -
 (a) 40 N (b) 30N (c) 50 N (d) zero
73. A body of mass M and moving with velocity u makes a head on-elastic collision with another stationary body of m. If $A = m/M$, then the ratio (f) of the loss of energy of M to its initial energy will be :-
 (a) $f = A(A + 1)^2$ (b) $f = \frac{A}{(A+1)^2}$ (c) $f = \frac{uA}{(A+1)^2}$ (d) $f = \frac{4A}{(A+1)^2}$
74. One gram of matter is completely transformed into energy. Energy released in kWh is :
 (a) 9×10^{20} (b) 2.5×10^7 (c) 2.5×10^{10} (d) 4×10^{13}
75. A body moves with velocity v, 2v and 3v in the first, second and third, one third distance of path travelled. Its average speed is :-
 (a) $\left(\frac{6}{11}\right)v$ (b) $\left(\frac{12}{11}\right)v$ (c) $\left(\frac{18}{11}\right)v$ (d) $\left(\frac{36}{11}\right)v$
76. Two cars A and B are travelling in the same direction with velocities v_1 and v_2 ($v_1 > v_2$). When the car A is at a distance d behind of the car B, the driver of the car A applied the brake producing a uniform retardation a. There will be no collision when
 (a) $d < \frac{(V_1 - V_2)^2}{2a}$ (b) $d < \frac{V_1^2 - V_2^2}{2a}$ (c) $d > \frac{(V_1 - V_2)^2}{2a}$ (d) $d > \frac{V_1^2 - V_2^2}{2a}$
77. A spring of spring constant 5×10^3 N/m is stretched initially by 5cm from the unstretched position. Then the work required to stretch it further by another 5 cm is
 (a) 12.50 Nm (b) 18.75 Nm (c) 25.00 Nm (d) 6.25 Nm
78. An object A of mass 2 kg is moving with a velocity of 3 m/s and collides head-on with an object B of mass 1 kg moving in opposite direction with a velocity of 4 m/s. After collision, both objects coalesce so that they move with a common velocity equal to
 (a) 3 m/s (b) 2 m/s (c) 1 m/s (d) 2/3 m/s
79. A body of mass 4 kg weighs 4.8 kg-wt when suspended in moving lift. The acceleration of the lift is
 (a) 9.80 ms^{-2} downwards (b) 9.80 ms^{-2} upwards
 (c) 1.96 ms^{-2} downwards (d) 1.96 ms^{-2} upwards
80. A particle of mass 10 g moves along a circle of radius 6.4 cm with a constant tangential acceleration. What is the magnitude of the acceleration if the kinetic energy of the particle becomes equal to 8×10^{-4} J by the end of the second revolution after the beginning of the motion?
 (a) 0.1 m/s^2 (b) 0.15 m/s^2 (c) 0.18 m/s^2 (d) 0.2 m/s^2
81. Variation of 'g' w.r.t. height or depth is correctly represented by



82. On a planet (whose size is the same and mass 4 times as that of the earth), the energy needed to lift a 2 kg mass vertically upwards through 2 m distance on the planet is ($g = 10 \text{ m/s}^2$ on the surface of the earth)
- (a) 16 joules (b) 160 joules (c) 32 joules (d) 320 joules
83. If the radius of the earth were to be increased by a factor of 3, by what factor would its density have to be changed to keep 'g' the same ?
- (a) 3 (b) 1/3 (c) 6 (d) 1/6
84. The escape velocity from the earth's surface is V_e . The velocity of a satellite while orbiting just above the earth's surface is V_0 . Then the relation between these velocities is
- (a) $V_e = \sqrt{2}V_0$ (b) $V_e = \frac{1}{\sqrt{2}}V_0$ (c) $V_e = V_0$ (d) $V_e = 2V_0$
85. If 'R' is the radius of earth, the height at which the weight of a body becomes $\frac{1}{4}$ th of its weight on the surface of the earth is
- (a) 2R (b) R (c) $\frac{R}{2}$ (d) $\frac{R}{4}$

CHEMISTRY

86. The number of valence electrons in Magnesium is :
- (a) 7 (b) 9 (c) 5 (d) 2
87. Two elements A and B have 9 and 10 electrons in M-shell and N-shell respectively. The ratio of their atomic numbers is :
- (a) 2 : 3 (b) 3 : 4 (c) 3 : 2 (d) 1 : 2
88. According to Thomson :
- (a) negative charge of an atom is uniformly distributed throughout the atom.
 (b) the volume occupied by positive charge is less than that occupied by the negative charge.
 (c) electrons are embedded in the positive charge which is spread uniformly.
 (d) none of the above
89. ${}^y_x\text{A}$, ${}^{y+1}_x\text{A}$ are two isotopes of element A. What is the difference between the number of neutrons in the isotopes is ?
- (a) $1-2y$ (b) $1-x$ (c) 1 (d) $2x-1$
90. Low pressure is maintained in the discharge tube to :
- (a) increase the number of molecules
 (b) increase ionisation of gas molecules
 (c) decrease the velocity of the rays coming from the cathode
 (d) all the above
91. The ion of an element has 3 positive charge. Mass number of the atom is 27 and the number of neutrons is 14. What is the number of electrons in the ion?
- (a) 13 (b) 10 (c) 14 (d) 16

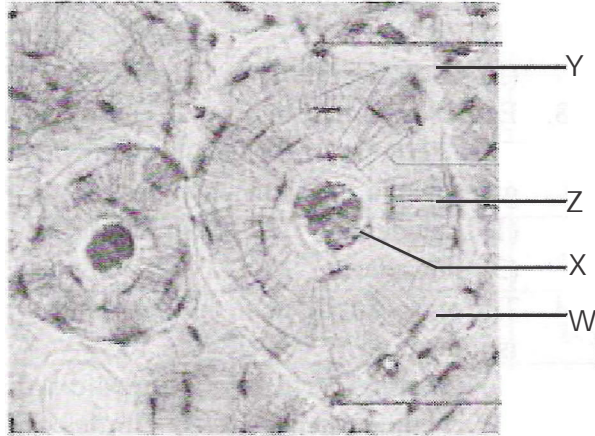
92. A, B, C and D are four gases. If the order of their critical temperature is $D < B < C < A$. Then, which of the following gases has the highest boiling point?
 (a) A (b) B (c) C (d) D
93. Addition of potassium nitrate to water results in :
 (a) increase in freezing point (b) decrease in freezing point
 (c) change in colour of ice (d) both (a) and (c)
94. Identify the heterogeneous mixture among the following:
 (a) Brine solution (b) Duralumin (c) Alnico (d) Smoke
95. Which of the following is a pure substance?
 (a) Duralumin (b) Magnalium (c) Bell metal (d) Magnesium
96. Which of the following gases can be separated completely from a mixture by using water as solvent?
 (a) CO_2 and O_2 (b) N_2 and NH_3 (c) CO_2 and NH_3 (d) H_2 and N_2
97. Identify the mixture which can be separated by magnetic separation method.
 (a) chalk powder + sand (b) iron + sand
 (c) common salt + sand (d) sulphur + sand
98. Which among the following is true?
 (a) Air is a bad conductor of heat and thermal expansion of solids is more than that of gases.
 (b) Air is a good conductor of heat and thermal expansion of solids is less than that of gases.
 (c) Air is a bad conductor of heat and thermal expansion of solids is less than that of gases.
 (d) Air is a good conductor of heat and thermal expansion of solids is more than that of gases.
99. An element has two isotopes with mass numbers 16 and 18 respectively. The average atomic weight is 16.5u. The percentage abundance of these isotopes is _____ and _____ respectively.
 (a) 75, 25 (b) 25, 75 (c) 50, 50 (d) 33.33, 66.67
100. Which among the following are isobars?
 (a) ${}_b\text{X}^a$ and ${}_b\text{X}^{a+1}$ (b) ${}_b\text{X}^a$ and ${}_c\text{X}^b$ (c) ${}_b\text{X}^a$ and ${}_{b+1}\text{X}^a$ (d) ${}_b\text{X}^a$ and ${}_{b-1}\text{Y}^{a-1}$
101. The formula of Calcium phosphate is :
 (a) Ca_2PO_4 (b) CaPO_4 (c) $\text{Ca}_2(\text{PO}_4)_3$ (d) $\text{Ca}_3(\text{PO}_4)_2$
102. The number of oxygen atoms present in 0.25 moles of magnesium perchlorate [$\text{Mg}(\text{ClO}_4)_2$] is :
 (a) 4N (b) 8N (c) 6N (d) 2N
103. If the rate of diffusion of a gas is r and its density is d , then under similar conditions of pressure and temperature _____
 (a) $r \propto d$ (b) $r \propto \sqrt{d}$ (c) $r \propto \frac{1}{\sqrt{d}}$ (d) $r \propto \frac{1}{d}$

104. Which among the following contains 43.4% of sodium by mass?
 (a) Sodium bicarbonate (b) Sodium nitrate
 (c) Sodium carbonate (d) Sodium chloride
105. A mixture of red and blue ink can be separated by :
 (a) distillation (b) fractional distillation
 (c) filtration (d) chromatography
106. Sterilization of medical equipments is made by :
 (a) O₃ (b) Cl₂ (c) N₂ (d) H₂
107. Evaporation causes :
 (a) heating
 (b) cooling
 (c) neither heating nor cooling
 (d) sometimes heating and sometimes cooling.
108. Which of the following substances is unable to undergo sublimation?
 (a) Camphor (b) Napthalene (c) Common salt (d) Dry ice
109. The boiling point of water at the Kelvin scale is _____ .
 (a) 173 K (b) 100 K (c) 272 K (d) 373.16 K
110. Gases have :
 (a) fixed shape (b) fixed volume
 (c) both fixed shape and fixed volume (d) neither fixed shape nor fixed volume

BIOLOGY

111. When does pairing of homologous chromosomes occur in meiosis?
 (a) Leptotene (b) Zygotene (c) Pachytene (d) Diplotene
112. To keep the vegetables fresh, the vendors regularly sprinkle water on the vegetables in their basket. Which phenomenon can be observed in the above case?
 (a) Endosmosis (b) Exosmosis (c) Endocytosis (d) Dehydration
113. Chlorophyll is present _____ .
 (a) in the grana of chloroplasts (b) in the stroma of chloroplasts
 (c) on the surface of chloroplasts (d) dispersed throughout the chloroplasts
114. Proteins are synthesised in the _____ .
 (a) Centrosomes (b) Golgi bodies (c) Mitochondria (d) Ribosomes
115. Acrosome of sperm is formed by _____ .
 (a) Lysosome (b) Mitochondria (c) Golgi body (d) Ribosome
116. Amoeba engulfs a bacterial cell. Once the bacterial cell has been digested, Amoeba will dispose of indigestible materials by which of the following processes?
 (a) Diffusion (b) Through gated channels in membrane proteins
 (c) Exocytosis (d) Active transport
117. Which one of the following plant tissues is not a simple permanent tissue?
 (a) Xylem (b) Collenchyma (c) Sclerenchyma (d) Parenchyma

118. Identify W, X, Y, Z in the given diagram.



- (a) W → Lamellae, X → Haversian Canal, Y → Canaliculus, Z → Lacuna
- (b) W → Lacuna, X → Lamellae, Y → Haversian Canal, Z → Canaliculus
- (c) W → Lamellae, X → Lacuna, Y → Haversian Canal, Z → Canaliculus
- (d) W → Haversian Canal, X → Canaliculus, Y → Lamellae, Z → Lacuna

119. Mammalian erythrocytes are _____ .

- (a) circular
- (b) biconcave
- (c) non-nucleated
- (d) all of the above

120. Companion cells are usually seen associated with _____ .

- (a) fibres
- (b) parenchyma
- (c) xylem vessels
- (d) sieve tubes

MATHEMATICS

121. If $\sqrt{13 - x\sqrt{10}} = \sqrt{8} + \sqrt{5}$, then what is the value of x?

- (a) -5
- (b) -6
- (c) -4
- (d) -2

122. $\sqrt{11\sqrt{11\sqrt{11\sqrt{11}} \dots 4 \text{ terms}}}$ =

- (a) $\sqrt[16]{11^5}$
- (b) $\sqrt[16]{11}$
- (c) $\sqrt[16]{11^{14}}$
- (d) $\sqrt[16]{11^{15}}$

123. If $\sqrt{5^n} = 125$, then $5^{\sqrt{64}} =$ _____ .

- (a) 25
- (b) $\frac{1}{125}$
- (c) 625
- (d) $\frac{1}{25}$

124. Express $0.\overline{34} + 0.\overline{34}$ as a single decimal.

- (a) $0.\overline{6788}$
- (b) $0.\overline{689}$
- (c) $0.\overline{6878}$
- (d) $0.\overline{687}$

125. The value of x in $\sqrt[3]{4x-7} - 5 = 0$ is :-

- (a) 33
- (b) 44
- (c) 55
- (d) None of these

126. If $\left(x^3 + \frac{1}{x^3}\right) = 52$, the value of $\left(x + \frac{1}{x}\right)$ is

- (a) 4
- (b) 3
- (c) 6
- (d) 13

127. If $(x^5 - 9x^2 + 12x - 14)$ is divided by $(x - 3)$, the remainder is

- (a) 184
- (b) 56
- (c) 2
- (d) 25

128. Factorize the polynomial $8x^3 - \frac{1}{64}$

(a) $\left(2x - \frac{1}{4}\right)\left(4x^2 - \frac{x}{2} + \frac{1}{16}\right)$

(b) $\left(2x - \frac{1}{8}\right)\left(4x^2 + \frac{x}{2} - 16\right)$

(c) $\left(2x - \frac{1}{4}\right)\left(4x^2 + \frac{1}{16} + \frac{x}{2}\right)$

(d) $\left(2x - \frac{1}{4}\right)\left(4x^2 + \frac{x}{2} - 16\right)$

129. $x^{831} + y^{831}$ is always divisible by

(a) $x - y$

(b) $x^2 + y^2$

(c) $x + y$

(d) None of these

130. The points $(a, b + c)$, $(b, c + a)$ and $(c, a + b)$

(a) are collinear

(b) form a scalene triangle

(c) form an equilateral triangle

(d) None of the above

131. The radius of a circle with centre $(-2, 3)$ is 5 units, then the point $(2, 5)$ lies _____ .

(a) on the circle

(b) inside the circle

(c) outside the circle

(d) None of the above

132. The inclination of the line $\sqrt{3}y - x + 24 = 0$, to the x-axis will be:

(a) 60°

(b) 30°

(c) 45°

(d) 135°

133. The lines $x - 2y + 3 = 0$, $3x - y = 1$ and $kx - y + 1 = 0$ are concurrent. Find k.

(a) 1

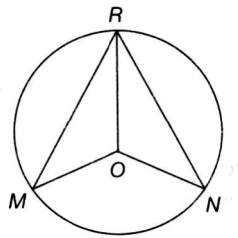
(b) $\frac{1}{2}$

(c) $\frac{3}{2}$

(d) $\frac{5}{2}$

134. \widehat{MN} is the arc of the circle with centre O. If $\angle MOR = 100^\circ$ and $\angle NOR = 135^\circ$, then

$\frac{1}{2}\angle ORN + \frac{1}{4}\angle ORM$ is _____ .



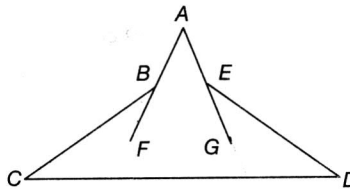
(a) $22\frac{1}{2}^\circ$

(b) 40°

(c) 125°

(d) $21\frac{1}{4}^\circ$

135. In the following figure (not to scale), $\angle BCD = 40^\circ$, $\angle EDC = 35^\circ$, $\angle CBF = 30^\circ$ and $\angle DEG = 40^\circ$. Find $\angle BAE$



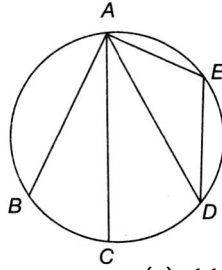
(a) 70°

(b) 80°

(c) 110°

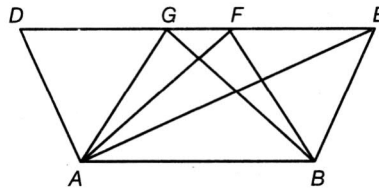
(d) 35°

136. In the given figure, AC is the diameter. AB and AD are equal chords. If $\angle AED = 110^\circ$, then find $\angle BAD$.



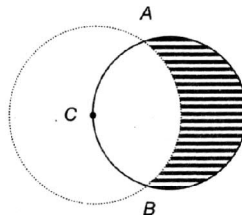
- (a) 40° (b) 55° (c) 110° (d) 120°

137. In the given figure, $\overline{AB} \parallel \overline{DE}$ and area of the parallelogram ABFD is 24 cm^2 . Find the area of $\triangle AEB$.



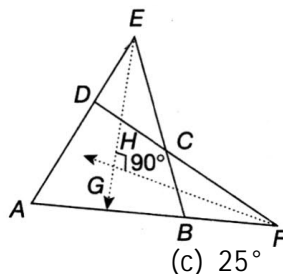
- (a) 8 cm^2 (b) 12 cm^2 (c) 10 cm^2 (d) 14 cm^2

138. In the given figure, \overline{AB} is the diameter of the circle with area π sq. units. Another circle is drawn with C as centre, which is on the given circle and passing through A and B. Find the area of the shaded region.



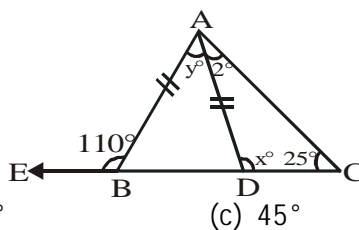
- (a) $\frac{\pi}{3}$ sq. units (b) $\frac{2\pi}{3}$ sq. units (c) 1 sq. units (d) 1.2 sq. units

139. In the given figure, ABCD is a cyclic quadrilateral, $\angle ABC = 70^\circ$, \overline{FG} bisects $\angle CFA$, \overline{EG} bisects $\angle DEB$, $\angle CE = 60^\circ$ and $\angle EGF = 90^\circ$. Find $\angle HEC$.



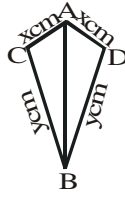
- (a) 20° (c) 40° (b) 25° (d) 45°

140. In the figure given below, find $\angle Z$:



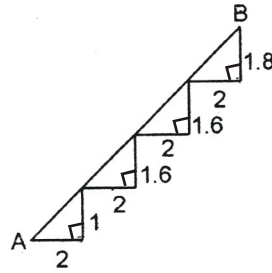
- (a) 40° (b) 110° (c) 45° (d) None of these

141. By which congruency property, the two triangles connected by the following figure are congruent



- (a) SAS property (b) SSS property (c) RHS property (d) ASA property

142. There is a staircase as shown in figure, connecting points A and B. Measurements of steps are marked in the figure. Find the straight line distance between A and B



- (a) 11 (b) 10 (c) $\sqrt{11}$ (d) $\sqrt{10}$

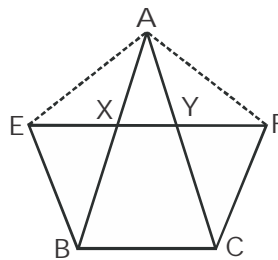
143. If ABCD is a parallelogram, then $\angle A - \angle C$

- (a) 180° (b) 0° (c) 360° (d) 90°

144. In a square ABCD, its diagonals bisect at O. Then the triangle AOB is

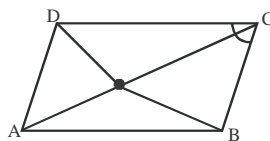
- (a) An equilateral triangle
 (b) An isosceles but not right angled triangle
 (c) A right angled but not an isosceles triangle
 (d) An isosceles right angled triangle

145. In figure, XY is a line parallel to the side BC and $\triangle ABC$, $BE \parallel AC$ and $CF \parallel AB$ meet XY in E and F respectively. Also $EX = FY$, then $\text{ar}(\triangle ABE)$ is equal to



- (a) $\text{ar}(\triangle ABC)$ (b) $\text{ar}(\triangle ACF)$
 (c) $\text{ar}(\triangle XEB) + \text{ar}(\triangle YFC)$ (d) None of these

146. In the given figure, P is a point in the interior of parallelogram ABCD. If the area of parallelogram ABCD is 60 cm^2 , then area of $\triangle ADP +$ area of $\triangle BPC =$



- (a) 15 cm^2 (b) 30 cm^2 (c) 45 cm^2 (d) 20 cm^2

147. If a sphere is placed inside a right circular cylinder so as to touch the top, base and the lateral surface of the cylinder. If the radius of the sphere is R , the volume of the cylinder is :
- (a) $2\pi R^3$ (b) $8\pi R^3$ (c) $\frac{4}{3}\pi R^3$ (d) None of these
148. A cylinder is circumscribed about a hemisphere and a cone is inscribed in the cylinder so as to have its vertex at the centre of one end and the other end as its base. The volumes of the cylinder, hemisphere and the cone are respectively in the ratio of:
- (a) $3 : \sqrt{3} : 2$ (b) $3 : 2 : 1$ (c) $1 : 2 : 3$ (d) $2 : 3 : 1$
149. If the surface areas of two spheres are in the ratio $4 : 9$, then the ratio of their volumes is :
- (a) $8 : 25$ (b) $8 : 26$ (c) $8 : 27$ (d) $8 : 28$
150. The radius of base and the volume of a right circular cone are doubled. The ratio of the length of the larger cone to that of the smaller cone is :
- (a) $1 : 4$ (b) $1 : 2$ (c) $2 : 1$ (d) $4 : 1$