



Class – IX

ENTRANCE TEST CUM SCHOLARSHIP (SAMPLE PAPER-3)

[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

Directions: (Q. Nos. 1-9) Select the related letter/word/number from the given alternatives.

1. PQR : CBA :: ?
(a) MNO : UVW (b) GIH : DFE (c) SUT : VWX (d) LMN : ZYX
2. AZBY : ? :: EVFU : GTHS
(a) CWXD (b) CXDW (c) CDWX (d) CXWD
3. ZXVT : ? :: MKIG : NPRT
(a) DCBA (b) ACEG (c) ABCD (d) CXWD
4. 25 : 125 :: 36 : ?
(a) 180 (b) 206 (c) 216 (d) 318
5. BEGK : ADFJ :: PSVY : ?
(a) ROUX (b) ORUX (c) LQUT (d) LOQT
6. BDFH : SUWY :: CEGI : ?
(a) QTWZ (b) PTVX (c) JLMP (d) TVXZ
7. Spiritual : Belief :: Orchestral : ?
(a) Theatre (b) Situation (c) Music (d) Direction
8. Finger : Hand :: ?
(a) Chair : Table (b) Cycle : Wheels (c) Bank : Money (d) Month : Year
9. Length : Metre :: Power : ?
(a) Calorie (b) Degree (c) Watt (d) Kilogram

Directions: (Q. Nos. 10-15) find the odd word/number/letters/number pair from the given alternatives.

10. (a) VWY (b) QRT (c) LMO (d) JKL
11. (a) AB (b) CD (c) EF (d) GI
12. (a) CX (b) DW (c) JQ (d) LR
13. (a) Pathology (b) Geology (c) Cardiology (d) Radiology
14. (a) 24 (b) 49 (c) 80 (d) 15
15. (a) 704, 11 (b) 256, 4 (c) 832, 13 (d) 310, 5

Directions: (Q. Nos. 16-20) A series is given, with one term missing. Choose the correct alternative from the given ones that will complete the series.

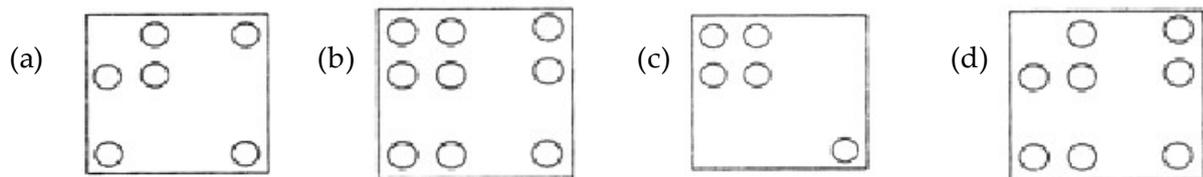
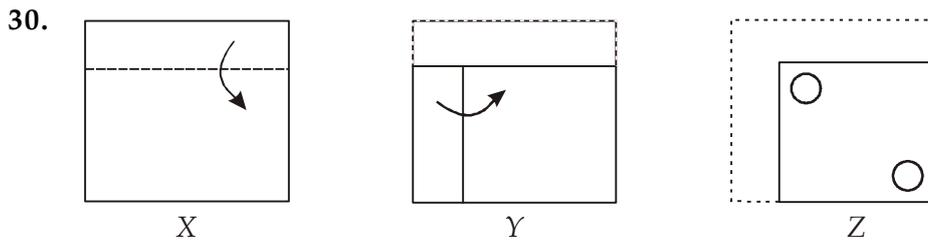
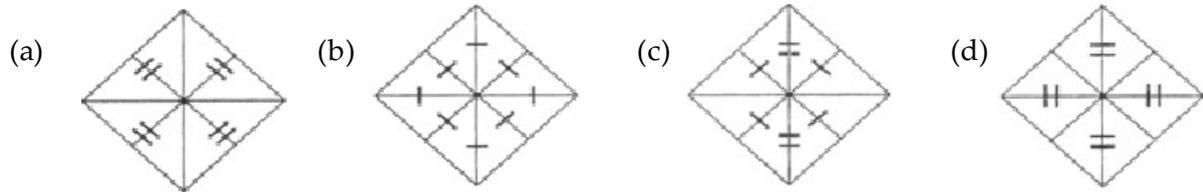
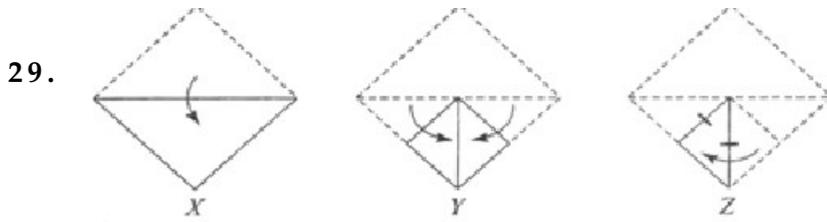
16. AZ YB CX ?
(a) WD (b) DW (c) QA (d) UJ
17. 10, 43, 175, ?, 2815
(a) 703 (b) 1320 (c) 315 (d) 633
18. abcd, zyxw, efgh?
(a) vuts (b) tuvs (c) stuw (d) xyzw

19. BCFG, JKNO, RSVW, ?
 (a) STUX (b) HIKL (c) ZADE (d) MNPQ
20. CIM, HNR, MSW, ?
 (a) SXA (b) UYB (c) RXB (d) ZEH
21. Which one set of letters when sequentially placed at the gaps in the given letter series shall complete the series?
 a_bbc__a_bcc
 (a) a c a b (b) b c a b (c) a b c b (d) b c a b
22. Mohit walks a distance of 5 km towards South, then turns to his right and walks 3 km. He again turns right and walks 5 km. He then turns to his left and walks 5 km. How far is he from the starting point and in which direction?
 (a) 5 km and West (b) 3 km and North (c) 3 km and East (d) 8 km and West
23. In certain code, RAGHAVAN is written as GARVAHNA. In that code which word will be written as MATHAVAN?
 (a) MATVAHNA (b) TAMVAHAN (c) TAMHAVNA (d) TAMVAHNA
24. If $38 + 15 = 66$ and $29 + 36 = 99$, then $82 + 44 = ?$
 (a) 77 (b) 88 (c) 80 (d) 94
25. If + means \div , - means \times , \times means +, \div means -, give the value for
 $45 + 9 - 3 \times 15 \div 2$
 (a) 40 (b) 36 (c) 56 (d) 28
26. A man started from a place and walked towards North for 5 km then turned 90° to his right and walked another 5 km. Then he turned 45° to his right and walked 2 kms and turned 45° to his left. What is his direction now?
 (a) South (b) South East (c) East (d) South West

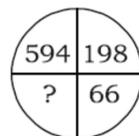
Directions: (Q. Nos. 27-28) Select the missing number from the given responses.

27. 7 8 6
 4 9 5
 3 2 ?
 25 70 29
 (a) 9 (b) 1 (c) 8 (d) 5
28. 3 4 5
 6 7 8
 9 1 2
 57 11 ?
 (a) 42 (b) 21 (c) 11 (d) 18

Directions: (Q. Nos. 29-30) Choose a figure out of (a), (b), (c) and (d) which would more closely resemble the unfolded form of figure Z.



31. Insert the missing number.

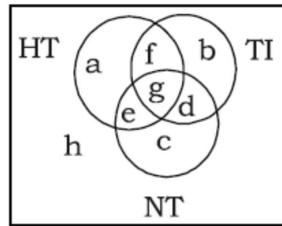


- (a) 22 (b) 33 (c) 11 (d) 44

32. If the letters in PRABA are coded as 27595 and THILAK are coded as 368451, how can BHARATI be coded?

- (a) 9657538 (b) 9567538 (c) 9675538 (d) 9567568

33. The below Venn diagram shows a city population which read three popular daily newspapers Hindustan Times (HT), The Times of India (TI) and Navbharat Times (NT) :



If a person is randomly selected from the city population and it is found that he reads at least one of the three newspapers then the person belongs to which part of the population? ($P \rightarrow$ Population)

- (a) g (b) $a + b + c$ (c) $P - h$ (d) $P - g$
34. If in a code language PARENT is written as BDFGJK and CHILDREN is written as MOXQUFGJ, how is REPRINT written in that code?

- (a) FGBFXGD (b) BGBFXJK (c) FGBUXJK (d) FGBFXJK

Directions: (Q. Nos. 35-37) : Read the information given below and answer the following questions:

P is the father of R , but R is not his son. T is the daughter of R . U is the wife of P . Q is the brother of R . S is the son of Q . V is the wife of Q . W is the father of V .

35. Who is the grandmother of S ?
 (a) W (b) P (c) R (d) U
36. Who is the son of U ?
 (a) Q (b) R (c) T (d) S
37. Who is the father-in-law of Q ?
 (a) R (b) P (c) T (d) W
38. Gita is 314 days elder to Suman, while Sapna is 70 weeks elder to Gita. If Sapna was born on Thursday, then on which day Suman was born?
 (a) Friday (b) Tuesday (c) Saturday (d) Wednesday
39. At what time between 10 and 11 'O'clock, will the hand of clock be at right angle?
 (a) $38\frac{2}{11}$ min past (b) $6\frac{5}{11}$ min past (c) $38\frac{3}{11}$ min past (d) $8\frac{2}{11}$ min past
40. Four persons A, B, C and D are sitting along the different sides of a table. B is sitting towards left of A, C who is facing West, is sitting to the right of D. Who is facing South?
 (a) A (b) B (c) B or D (d) Data inadequate

Directions : (Q. Nos. 41-44), Select the missing letter/word/number from the given alternatives.

41. WYV, ?, IKH, BDA
 (a) OPR (b) ROP (c) PRO (d) QON
42. 3, 15, ?, 63, 99, 143
 (a) 27 (b) 45 (c) 35 (d) 56

43. 2, 3, 6, 7, 14, 15, ?

- (a) 16 (b) 30 (c) 31 (d) 32

44. 3120, ?, 122, 23, 4

- (a) 4888 (b) 621 (c) 610 (d) 732

Directions : (Q. Nos. 45-46): In each of the following questions two pairs of numbers on either side of the sign “:” is given, out of which one number in either pair is missing. Numbers in each pair are connected in the same way. Identify the correct number which can take place the missing number.

45. $\frac{3}{7} : \frac{14}{6} :: \frac{5}{2} : ?$

- (a) $\frac{4}{10}$ (b) $\frac{3}{5}$ (c) $\frac{1}{4}$ (d) 5

46. $\sqrt{\frac{3}{2}} : 3\sqrt{2} :: \sqrt{\frac{2}{3}} : ?$

- (a) $2\sqrt{3}$ (b) $\sqrt{3}$ (c) $\frac{\sqrt{3}}{2}$ (d) $\frac{2}{\sqrt{3}}$

Directions : (Q. Nos. 47-49): In each of the following questions, you are given a combination of alphabets and/or numbers followed by four alternatives (a), (b), (c) and (d). Choose the alternative which more closely resembles the mirror-image of the given combination.

47. WHITE

- (a) ELIHW (b) ETIHW (c) WHITE (d) ETIHW

48. BRISK

- (a) BRISK (b) BRISK (c) KRSIB (d) BRISK

49. PAINTED

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

50. Five boys A, B, C, D and E are sitting in a row. A is adjacent to E. E is in middle of the row. A is not adjacent to B or C. Then D is adjacent to whom ?

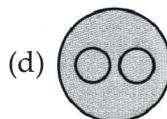
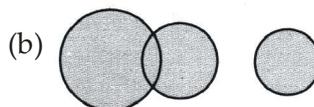
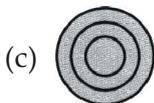
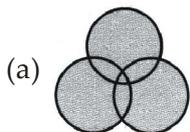
- (a) C (b) A (c) B (d) D

51. Six students including P are sitting on two benches in two rows, three in each as the following:

Q is the neighbour of U, and R is the neighbour of T. S is second to the left of U. R is sitting diagonally opposite to S. T is not at the end of any row. Who is facing Q ?

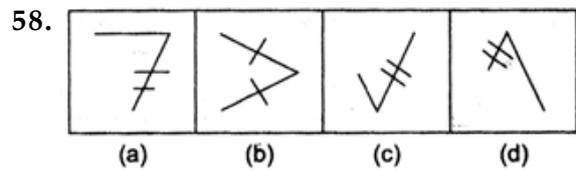
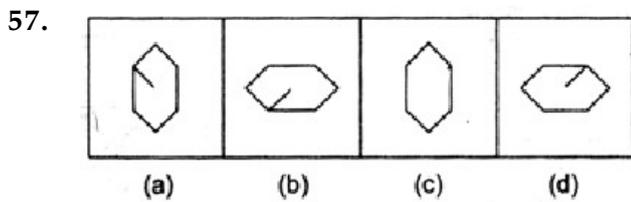
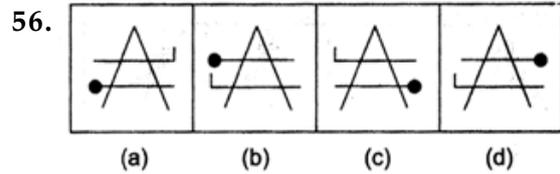
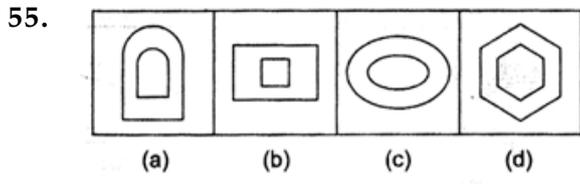
- (a) T (b) S (c) Q (d) R

Directions : (Q. Nos. 52-54): Each of the questions given below contains three classes of items. There may or may not be the relationship amongst these three. You are to choose one of the diagrams out of (a), (b), (c) and (d) that can fit regarding the relationship for the three classes.

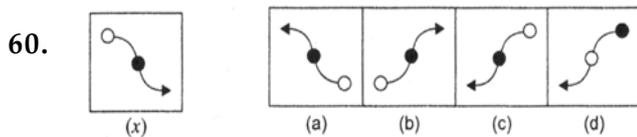
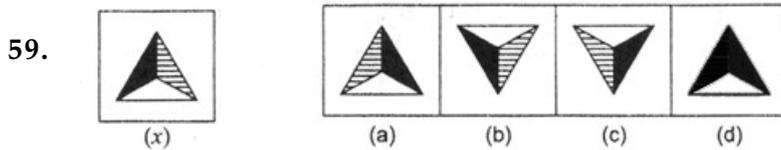


52. Table, Chair, Furniture
 53. Husbands, Brothers, Fathers
 54. Letter, Sentence, Word

Directions : (Q. Nos. 55-58): Find the odd-one-out.



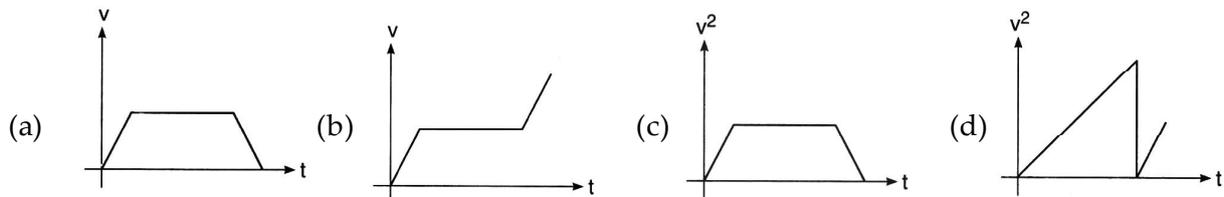
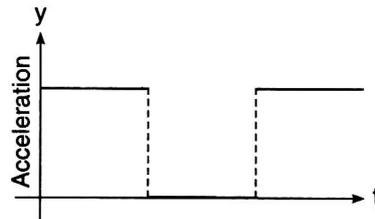
Directions : (Q. Nos. 59-60) In each of the following questions, choose the correct mirror image of the figure (x) from amongst the four alternatives (a), (b), (c) and (d).



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. An aeroplane moves 400 m towards north, 300 meters 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 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. Which of the following represents the $v - t$ graph corresponding to the $a - t$ graph shown in figure?



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. Two trains each 50m long are moving parallel towards each other at speed 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 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 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) 42.5 m (b) 49 m (c) 78.4 m (d) 72 m

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 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

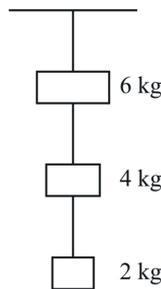
72. The circular orbits of two satellites around earth have radii r_1 and r_2 respectively ($r_1 < r_2$). If angular velocities are same then their centripetal accelerations are related as:

- (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) $m_1 r_1 : m_2 r_2$

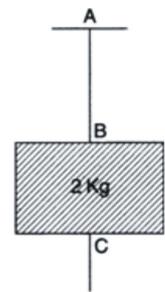
74. Three masses of 6 kg, 4 kg and 2 kg are attached to a rigid support as shown in figure. If the string attached to the support breaks and the system falls freely then the tension in the string connecting 4 kg and 2 kg mass is :



- (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

CHEMISTRY

81. The number of valence electrons in Magnesium is :
 (a) 7 (b) 9 (c) 5 (d) 2
82. 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) $\frac{16}{3.0} \times 10^{23}$
83. The particle which cannot be deflected under the presence of electric field is :
 (a) electron (b) proton (c) neutron (d) α particle
84. ${}^y_x A, {}^{y+1}_x A$ 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) $2x-1$
85. Which of the following elements has least number of electrons in its M shell?
 (a) K (b) Mn (c) Ni (d) Sc
86. 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
87. 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
88. Calculate the weight in gram of 0.9 gram atoms of zinc. [Atomic weight of Zn = 65]
 (a) 50.5 g (b) 58.5 g (c) 56.3 g (d) 52.3 g
89. Which among the following is used to produce artificial rain ?
 (a) Copper oxide (b) Carbon monoxide (c) Silver iodide (d) Silver nitrate
90. A sample of ammonium phosphate, $[(NH_4)_3 PO_4]$, contains 6 moles of hydrogen atoms. The number of moles of oxygen atoms in the sample is :
 (a) 1 (b) 2 (c) 4 (d) 6
91. 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
92. Which of the following species are isoelectronic?

- (a) CO and CN⁻ (b) CO₃²⁻ and SO₃ (c) NO₃⁻ and NH₄⁺ (d) HCl and SO₄²⁻
93. Which of the following electronic configurations belong to Chromium atom?
 (a) [Ar] 3d⁵ 4s¹ (b) [Ar] 3d⁴ 4s² (c) [Ar] 3d¹⁰ 4s¹ (d) [Ar] 3d⁹ 4s²
94. Elements X and Y forms a compound in which there is one atom of X for every four atoms of Y. When these elements react, it is found that 1.00 g of X combines with 5.07 g of Y. When 1.00 g of X combines with 1.14 g of oxygen, it forms a compound containing two atoms of oxygen for each atom of X. Calculate the atomic mass of Y.
 (a) 35.5 u (b) 42.5 u (c) 356 u (d) 425 u
95. How many grams of NaOH would need to be dissolved in 250.0 mL of solution to produce a 1.25 M solution?
 (a) 12.5 g (b) 20.4 g (c) 40.00 g (d) 1.25 g
96. Rutherford's α -ray scattering experiment led to the discovery of the nucleus and to the conclusion that an atom consists of large empty space. Arrange the following steps in a sequence which explains the experiment and also the above mentioned conclusion.
 (1) To make out the observations a spherical ZnS screen was placed surrounding the gold foil.
 (2) The substance which acts as a source of α -particles is taken in a lead container and made to pass through a slit between like charged positive plates.
 (3) It was observed that most of the particles passed straight through the gold foil, few were deflected through small angles and very few through large angles. However, very few completely rebounded.
 (4) A narrow, condensed beam consisting of α -particles is made to bombard on a thin gold foil.
 (a) 1 3 2 4 (b) 2 3 1 4 (c) 4 2 1 3 (d) 2 4 1 3
97. The process of phase transition from solid to liquid involves the following steps. Arrange them in a proper sequence.
 (1) Molecules become free to move and thus, attain molecular arrangement of liquid.
 (2) The energy supplied makes the molecules to vibrate more.
 (3) During melting, the molecules overcome the forces of attraction between them.
 (4) The molecules acquire rotatory motion, translatory motion in addition to vibratory motion.
 (a) 3 4 1 2 (b) 2 3 4 1 (c) 2 3 1 4 (d) None of these
98. Identify a physical change among the following :
 (a) Respiration (b) Digestion of food
 (c) Burning of wax (d) Glowing of an electric bulb
99. Which of the following cannot be a pure substance ?
 (a) Mercury (b) Sugar (c) Blood (d) Glucose
100. The ratio of the number of electrons in the N-shell of A and the M-shell of B with atomic numbers 40 and 32 respectively is :
 (a) 5 : 3 (b) 9 : 5 (c) 5 : 9 (d) 5 : 4

BIOLOGY

101. If you are provided with root-tips of onion in your class and are asked to count the chromosomes,

which of the following stages can you most conveniently look into?

- (a) Metaphase (b) Telophase (c) Anaphase (d) Prophase

102. 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

103. Detoxification site in the liver cell is :

- (a) Golgi apparatus (b) Free Ribosomes (c) RER (d) SER

104. Cardiac muscles are :

- (a) Smooth, spindle shaped and involuntary (b) Striated and involuntary
(c) Striated and voluntary (d) Striated and involuntary

105. The plastids which make flowers and fruits conspicuous to animals for pollination and dispersal are :

- (a) Chloroplast (b) Chromoplast (c) Leucoplast (d) None of these

106. *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

107. Smooth muscle cells are _____ .

- (a) non-striated and under voluntary control
(b) striated and not under voluntary control
(c) non-striated and not under voluntary control
(d) striated and under voluntary control

108. 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

109. Mammalian erythrocytes are _____ .

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

110. Sprain is caused by excessive pulling of:

- (a) Nerves (b) Tendons (c) Muscles (d) Ligaments

111. Which one of the following is living but non-nucleated?

- (a) Sieve tube (b) Companion Cell
(c) Phloem fibre (d) Phloem parenchyma

112. Which one of the following is a simple permanent tissue found in the mesophyll of leaves?

- (a) Aerenchyma (b) Collenchyma (c) Chlorenchyma (d) Sclerenchyma

113. Xylem and phloem occur in

- (a) Conjunctive tissue (b) Vascular bundle (c) Periderm (d) Cortex

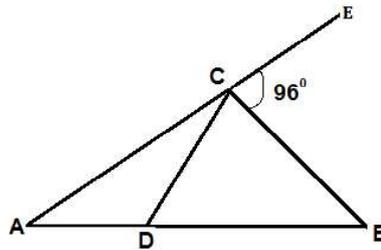
114. Which one of the following contains dead cells?

- (a) Meristematic tissue (b) Xylem (c) Parenchyma (d) Collenchyma
115. What constitute thickening in collenchyma?
 (a) Lignin (b) Cellulose (c) Pectin (d) Both b & c
116. Cork is impervious to water because it has deposition of :
 (a) Lignin (b) Pectin (c) Suberin (d) All of these
117. Which of the following conducts water and minerals in plants?
 (a) Xylem (b) Phloem (c) Fibres (d) Both (a) and (b)
118. Which of the following conducts food in plants?
 (a) Xylem (b) Phloem (c) Fibres (d) Both (a) and (b)
119. The growth in plants is :
 (a) Caused by each and every cell of the body (b) Uniform
 (c) Caused by non-dividing regions (d) Limited to certain regions
120. One of the following tissue is responsible for cell division in plants :
 (a) Meristematic tissue (b) Xylem (c) Phloem (d) Sclerenchyma

MATHEMATICS

121. A sphere of radius r has the same volume as that of a cone with a circular base of radius r . The height of the cone is:
 (a) r (b) $2r$ (c) $3r$ (d) $4r$
122. The fraction $\frac{2}{3} \times \frac{\sqrt{2} + \sqrt{3}}{\sqrt{3} - \sqrt{2}}$ is equal to :
 (a) $\frac{2\sqrt{2}}{3}$ (b) $\frac{2\sqrt{3} + 2}{3}$ (c) $\frac{6\sqrt{2}}{5}$ (d) $\frac{10 + 4\sqrt{6}}{3}$
123. If $a + 1 = b + 2 = c + 3 = d + 4 = a + b + c + d + 5$, then $a + b + c + d =$
 (a) -5 (b) $-\frac{10}{3}$ (c) $-\frac{7}{3}$ (d) $\frac{5}{8}$
124. The value of $\frac{817 \times 817 \times 817 - 98 \times 98 \times 98}{817 \times 817 + 98 \times 98 + 817 \times 98}$ is :
 (a) 715 (b) 719 (c) 1329 (d) 915
125. The heights of two solid cylinder are in ratio 3 : 2 and radii in 2 : 1 respectively. Find the ratio of their volume :
 (a) 3 : 2 (b) 4 : 2 (c) 3 : 1 (d) 6 : 1
126. If $a + b + c = 0$ (where a, b, c are real numbers) then $\frac{a^2 + b^2 + c^2}{b^2 - ac} =$
 (a) 0 (b) 1 (c) 2 (d) 3

127. In the given figure, $AD = CD = BC$ and $\angle BCE = 96^\circ$ then find $\angle DBC$.



- (a) 36° (b) 32° (c) 64° (d) 72°

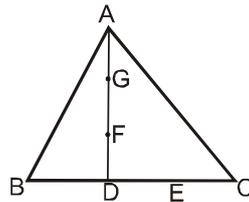
128. The value of $\sqrt{1+2008\sqrt{1+2009\sqrt{1+2010\sqrt{1+2011\times 2013}}}}$ is :

- (a) 2008 (b) 2009 (c) 2010 (d) 2013

129. If $x = 9 + 4\sqrt{5}$ and $xy = 1$ then $\frac{1}{x^2} + \frac{1}{y^2} =$

- (a) 81 (b) 322 (c) 97 (d) 2

130. In $\triangle ABC$, D and E are points of trisection of BC. Also, F and G are points of trisection of AD. If area $\triangle ABC = 900 \text{ m}^2$, then area $\triangle BFG$ will be :



- (a) 400 m^2 (b) 100 m^2 (c) 200 m^2 (d) 300 m^2

131. If $\frac{x}{y} + \frac{y}{x} = -1$ ($x, y \neq 0$), then the value of $x^3 - y^3$ is :

- (a) 1 (b) -1 (c) 0 (d) 3

132. In a trapezium ABCD, $AB \parallel CD$ and $\angle D = 2\angle B$. If $DC = p$ and $AD = q$, then $AB =$

- (a) $p + q$ (b) $2p + q$ (c) $2p + 2q$ (d) $3p - 2q$

133. A rhombus has one diagonal double the other. If area of the rhombus is k , then the length of its side is :

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

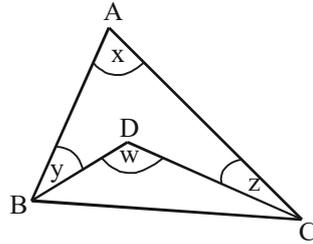
134. In triangle ABC, $\angle A = 80^\circ$, $\angle B = 50^\circ$, AD, BE and CF are altitudes and H is the orthocentre, then $\angle AHB =$

- (a) 125° (b) 110° (c) 140° (d) 130°

135. The points $(-4, 0)$, $(4, 0)$, $(0, 3)$ are the vertices of a :

- (a) Right angled triangle (b) Isosceles triangle
(c) Equilateral triangle (d) Scalene triangle

136. D is an interior point of triangle ABC and x, y, z and w are the measures of the angles in degrees, as shown in the figure. An expression for x in terms of y, z and w is :



- (a) $w - y - z$ (b) $w - 2y - 2z$ (c) $2w - y - 2z$ (d) $180^\circ - w - y - z$

137. It is given that $a + \frac{1}{a} = -2$, $a \neq 0$. What is the value of $a^2 - 3a + 2$?

- (a) 0 (b) 2 (c) 6 (d) 8

138. It is given that a, b, and c are any positive real numbers such that $abc = 1$. What is the value

of the following $\frac{a}{ab+a+1} + \frac{b}{bc+b+1} + \frac{c}{ca+c+1} = ?$

- (a) -1 (b) 1 (c) 0 (d) None of these

139. Which among the following options is the proper match of different quadrilaterals and their respective properties?

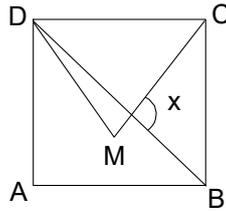
Column I		Column II	
(A)	Rectangle	(P)	A quadrilateral having its opposite sides equal and parallel.
(B)	Square	(Q)	A parallelogram with each of the angle as right angle.
(C)	Parallelogram	(R)	A parallelogram having all sides equal and each of the angle is a right angle.
(D)	Rhombus	(S)	A quadrilateral in which a pair of opposite sides are parallel.
(E)	Trapezium	(T)	A parallelogram having all sides equal.

- (a) A-T, B-S, C-R, D-P, E-Q (b) A-P, B-Q, C-R, D-S, E-T
(c) A-R, B-Q, C-T, D-P, E-S (d) A-Q, B-R, C-P, D-T, E-S

140. If $f(x) = ax^7 + bx^5 + cx^3 - 6$ and $f(-9) = 3$, then $f(9)$ is equal to :

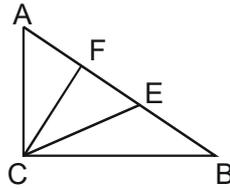
- (a) -6 (b) 0 (c) -9 (d) -15

141. In the figure below, ABCD is a square, MDC is an equilateral triangle. Find the value of x.



- (a) 75° (b) 90° (c) 105° (d) 60°

142. In a triangle ABC, $\angle BCA = 90^\circ$, Points E and F lie on the hypotenuse AB such that $AE = AC$ and $BF = BC$, then $\angle ECF$ is equal to :



- (a) 45° (b) 60° (c) 30° (d) 15°

143. If $a + b = 5$ and $ab = 2$, then $a^4 + b^4 = ?$

- (a) 433 (b) 437 (c) 609 (d) 641

144. The least number which is a perfect square and is divisible by each of 16, 20 and 24 is :

- (a) 3844 (b) 1024 (c) 4000 (d) 3600

145. If in a triangle ABC, perimeter = 30 cm, then the length of median AD is :

- (a) > 30 (b) < 15 (c) > 15 (d) 15

146. Given positive integers a, b and distinct positive prime numbers c and d. If $a^4 - b^4 = c \cdot d$ then $a - b =$

- (a) 1 (b) 0
 (c) a prime number (d) a composite number

147. If $a = 2$, $b = 3a + 4$ and $c = 3b$, (a, b, c are real numbers) then $b - c =$

- (a) 30 (b) 20 (c) -20 (d) -22

148. If $2^a \times 3^b = 576$, (a and b are natural numbers) then $\frac{a}{b} =$

- (a) 2 (b) 3 (c) $\frac{1}{2}$ (d) $\frac{1}{3}$

149. What is half of 4^{2014} ?

- (a) 2^{1007} (b) 2^{2014} (c) 4^{1007} (d) none of these

150. The sum of all coefficients of the polynomial $(x^{2017} - 1)^4$ is :

- (a) 2017 (b) 1 (c) 0 (d) -1

ROUGH WORK
