STUDY VAULT
committed to excellence

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 Shee t 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.

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 ÷, – means ×, × means +, ÷ means –, give the value for

45 + 9 – 3 × 15 ÷ 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

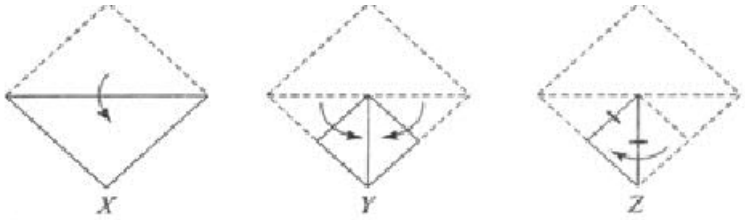
28.

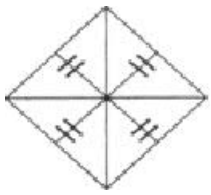
3	4	5
6	7	8
9	1	2
57	11	?

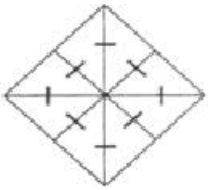
(a) 42 (b) 21 (c) 11 (d) 18

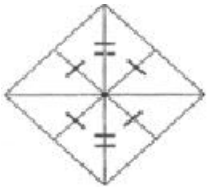
Directions: (Q. Nos. 29-30) Choose a figure out of (a), (b), (c) and (d) which would more closely resemble the unfolded form of figure Z.

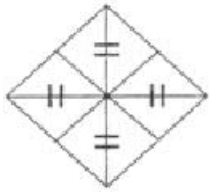
29.



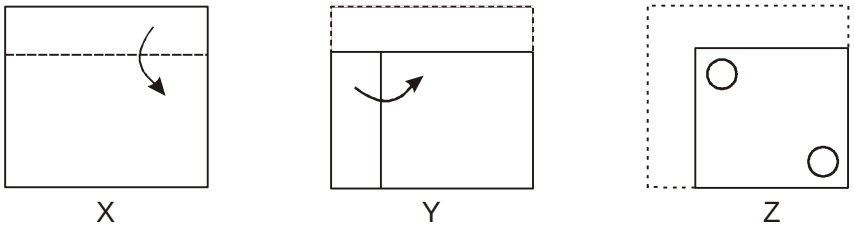
(a) 

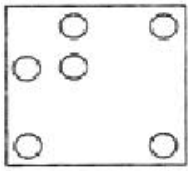
(b) 

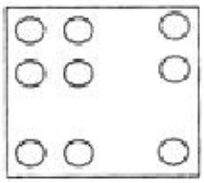
(c) 

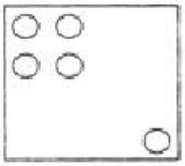
(d) 

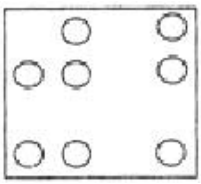
30.



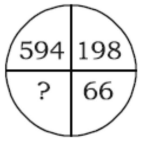
(a) 

(b) 

(c) 

(d) 

31. Insert the missing number.

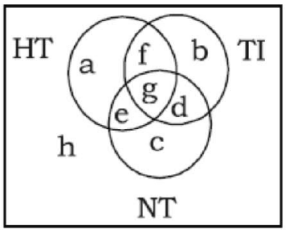


(a) 22 (b) 33 (c) 11 (d) 44

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 → 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) ƎTIHW (b) ƎTIHM (c) ƎTIHW (d) ETIHW

48. BRISK

(a) ꓘSIRB (b) ꓘSIRB (c) KSIRB (d) ꓘSIRB

49. PAINTED

(a) ᗡETNIAꟼ (b) ᗡETNIAꟼ (d) ᗡETNIAꟼ (d) ᗡETNIAꟼ

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 ?

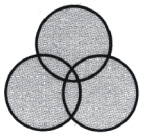
(a) C (b) A (c) B (d) D

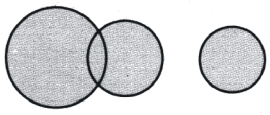
51. Six students including P are sitting on two benches in two rows, three in each as the following:

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.

(a) 

(b) 

(c) 

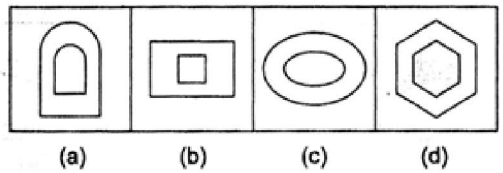
(d) 

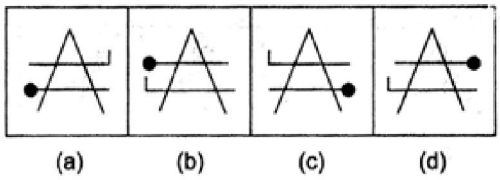
52. Table, Chair, Furniture

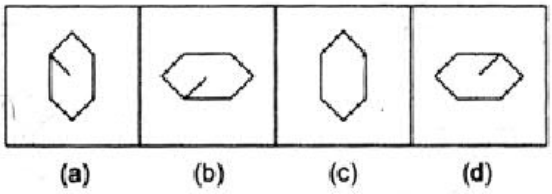
53. Husbands, Brothers, Fathers

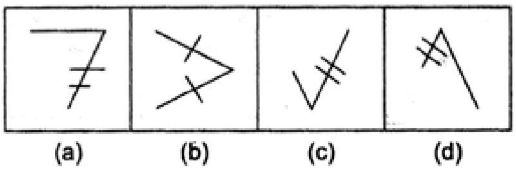
54. Letter, Sentence, Word

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

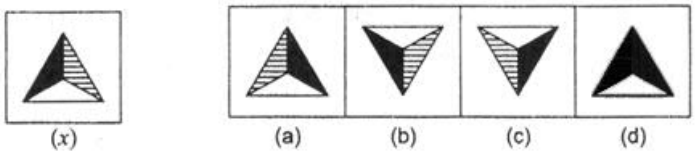
55. 

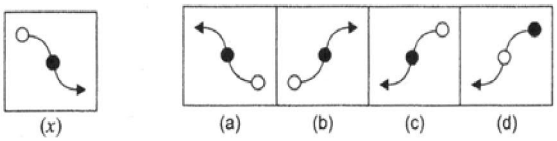
56. 

57. 

58. 

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).

59. 

60. 

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:

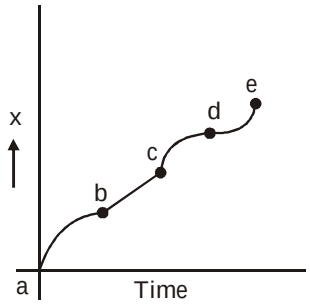
(a) $\left(\frac{\alpha+\beta}{\alpha\beta}\right)t$ (b) $\left(\frac{\alpha\beta}{\alpha+\beta}\right)t$

(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 north, 300 meters towards west and then 1200 m vertically upwards, then its displacement from the initial position is:

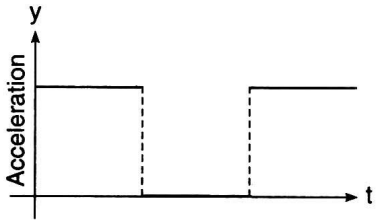
(a) 1400 m (b) 1500 m (c) 1300 m (d) 1600 m

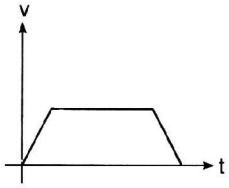
63. The displacement versus time graph for a body moving in a straight line is shown in figure. Which of the following regions represents the motion when no force is acting on the body?

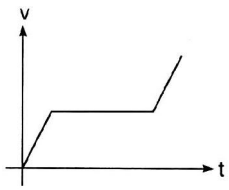


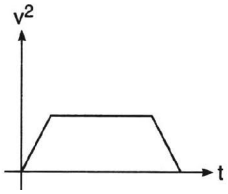
(a) ab (b) bc (c) cd (d) de

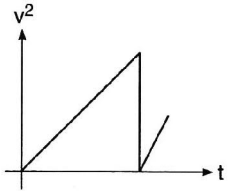
64. Which of the following represents the v – t graph corresponding to the a – t graph shown in figure?



(a) 

(b) 

(c) 

(d) 

65. A car starts from rest and attains a speed of 8 m/sec in 2 seconds. It travels with uniform speed for the 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 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) $5\sqrt{\frac{2}{3}}\,\text{sec}$ (b) 4 sec (c) 2 sec (d) 6 sec

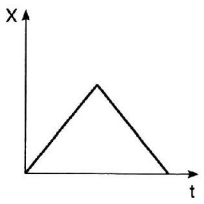
67. A rifle bullet loses 1/20th of its velocity in passing through a plank. The least number of such planks required just to stop the bullet is:

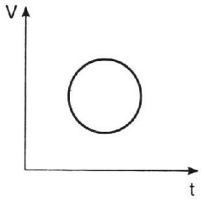
(a) 5 (b) 10 (c) 11 (d) 20

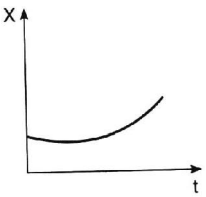
68. A stone is dropped from the top of the tower and travels 24.5 m in the last second of its journey. The height of the tower is:

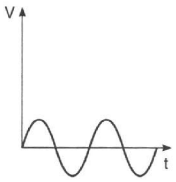
(a) 42.5 m (b) 49 m (c) 78.4 m (d) 72 m

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

(a) 

(b) 

(c) 

(d) 

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

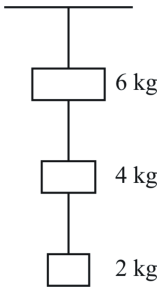
72. The circular orbits of two satellites around earth have radii r_1 and r_2 respectively ($r_1 < r_2$). If angular velocities are same then their centripetal accelerations are related as:

(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.

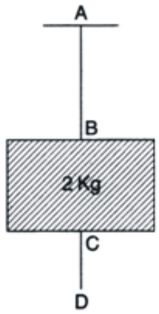
A sudden jerk is given to the end D of the string, then :

(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:

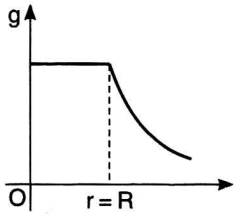
(a) x = h (b) x = 2h (c) x = h/2 (d) $x = h^2$

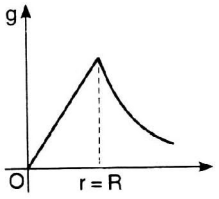
83. The period of a satellite in a circular orbit near a planet is independent of:

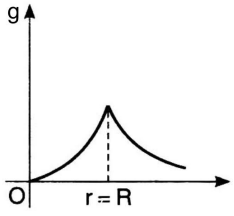
(a) the mass of the planet. (b) the radius of the planet.

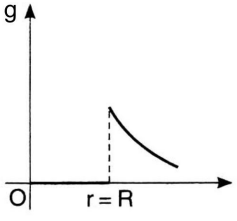
(c) the mass of the satellite. (d) all the three parameters (a), (b) and (c).

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?

(a) 

(b) 

(c) 

(d) 

85. An object is dropped from some height. Find distance travelled by it in 10th second.

(a) 0 m (b) 500 m (c) 400 m (d) 95 m

CHEMISTRY

86. 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

87. 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) $\frac{16}{3.0} \times 10^{23}$

88. The particle which cannot be deflected under the presence of electric field is :

(a) electron (b) proton (c) neutron (d) α particle

89. The number of molecules contained in 2 g of H_2 is the same as the number of atoms in:

(a) 1g of H_2 (b) 2g of H_2 (c) 71 g of Cl_2 (d) 28 g of N_2

90. Which of the following elements has least number of electrons in its M shell?

(a) K (b) Mn (c) Ni (d) Sc

91. A gas which diffuses 4 times slowly than H_2 gas is:

(a) H_2S (b) O_2 (c) CH_4 (d) SO_2

92. 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

93. 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

94. Which among the following is used to produce artificial rain ?

(a) Copper oxide (b) Carbon monoxide (c) Silver iodide (d) Silver nitrate

95. 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

96. When a neutral atom is converted into anion its :

(a) size increases (b) size decreases

(c) atomic number increases (d) atomic number decreases

97. Which of the following species are isoelectronic?

(a) CO and CN^- (b) CO_3^{2-} and SO_3 (c) NO_3^- and NH_4^+ (d) HCl and SO_4^{2-}

98. Which of the following electronic configurations belong to Chromium atom?

(a) [Ar] $3d^5\ 4s^1$ (b) [Ar] $3d^4\ 4s^2$ (c) [Ar] $3d^{10}\ 4s^1$ (d) [Ar] $3d^9\ 4s^2$

99. 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

100. 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

101. 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

102. 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

103. Identify a physical change among the following :

(a) Respiration (b) Digestion of food

(c) Burning of wax (d) Glowing of an electric bulb

104. Which of the following cannot be a pure substance ?

(a) Mercury (b) Sugar (c) Blood (d) Glucose

105. 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

106. Arrange the following statements in a sequence which involves the calculation of the atomic number and mass number for an atom of an element with 15 electrons and 16 neutrons.

(1) A = Number of protons + Number of neutrons

A = Z + Number of neutrons

A = 15 + 16 = 31

(2) Number of protons and number of electrons are equal in a neutral atom. Hence, the atomic number Z is equal to 15.

(3) Mass number is equal to the total number of protons and neutrons.

(4) Atomic number is 15 and mass number is 31.

(a) 2 4 3 1 (b) 2 3 1 4 (c) 3 2 1 4 (d) 3 2 4 1

107. Silver, gold and platinum are called noble metals because _____ .

(a) these are costly (b) these are precious

(c) these have very less reactivity (d) All of these

108. The order of vapour pressures of four solids is P << R < Q < S. Which of the following has the maximum tendency to sublime?

(a) P (b) Q (c) R (d) S

109. $^{15}_{7}X$ and $^{11}_{7}X$ are two naturally occuring isotopes of an element X. What is the percentage of each isotope of X if the average atomic mass is 14u ?

(a) 95, 5 (b) 80, 20 (c) 75, 25 (d) 65, 35

110. Some of the elements have fractional atomic masses. The reason for this could be :

(a) the existence of isobars. (b) the existence of isotopes.

(c) the nuclear reactions. (d) the presence of neutrons in the nucleus.

BIOLOGY

111. 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

112. 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

113. Detoxification site in the liver cell is :

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

114. Cardiac muscles are :

(a) Smooth, spindle shaped and involuntary (b) Striated, syncytial and involuntary

(c) Striated, syncytial and voluntary (d) Striated, cross connected and involuntary

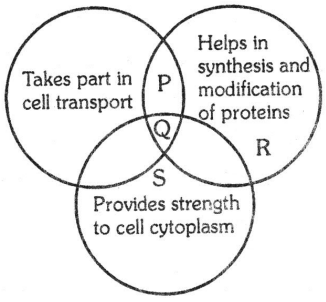
115. The plastids which make flowers and fruits conspicuous to animals for pollination and dispersal are :

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

116. Muscles are connected to bones by :

(a) Ligaments (b) Tendons (c) Sarcolemma (d) Myofibrils

117. Refer the given Venn diagram and select the correct option :



(a) P - Golgi apparatus; R - Microtubules (b) Q - Endoplasmic reticulum; R - Ribosomes

(c) S - Microtubules; Q - Ribosomes (d) S - Golgi apparatus; P - Lysosomes

118. 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

119. Cell organelle that is involved in autophagy is:

(a) Golgi apparatus (b) Lysosomes (c) Chromosomes (d) Ribosomes

120. Sprain is caused by excessive pulling of:

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

MATHEMATICS

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

(a) 1 (b) 0

(c) a prime number (d) a composite number

122. 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

123. 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) $\frac{1}{3}$

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

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

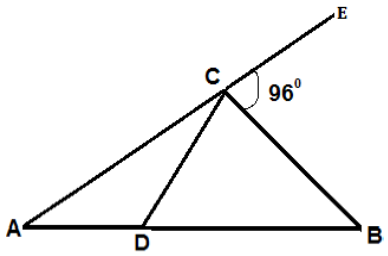
125. The sum of all coefficients of the polynomial $\left(x^{2017} - 1\right)^4$ is :

(a) 2017 (b) 1 (c) 0 (d) –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 ∠BCE = 96° then find ∠DBC.



(a) 36° (b) 32° (c) 64° (d) 72°

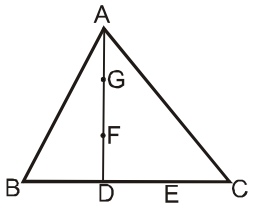
128. The value of $\sqrt{1 + 2008\sqrt{1 + 2009\sqrt{1 + 2010\sqrt{1 + 2011 \times 2013}}}}$ is :

(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 ΔABC, D and E are points of trisection of BC. Also, F and G are points of trisection of AD. If area ΔABC = 900 m^2, then area ΔBFG 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 || 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°, $\angle$B = 50°, AD, BE and CF are altitudes and H is the orthocentre, then $\angle$ AHB =

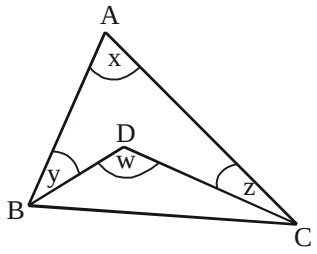
(a) 125° (b) 110° (c) 140° (d) 130°

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) $180^0 - w - y - z$

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.

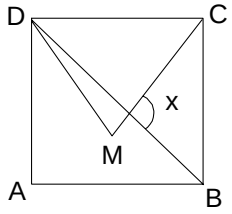
(a) A-T, B-S, C-R, D-P, E-Q (b) A-P, B-Q, C-R, D-S, E-T

(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 :

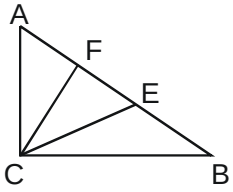
(a) – 6 (b) 0 (c) – 9 (d) – 15

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°, Points E and F lie on the hypotenuse AB such that AE = AC and BF = BC, then $\angle$ECF is equal to :



(a) 45^0 (b) 60^0 (c) 30^0 (d) 15^0

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. 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

147. 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) $\frac{10+4\sqrt{6}}{3}$

148. 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) $\frac{5}{8}$

149. The value of $\frac{817\times817\times817-98\times98\times98}{817\times817+98\times98+817\times98}$ is :

(a) 715 (b) 719 (c) 1329 (d) 915

150. 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

ROUGH WORK