

## SRI GURUDATTA COACHING CENTRE (SARMA INST.) MATHEMATICS

1. On a line segment with the points S, G, E and D, in the indicated order, the ratio  $SG : GE = 1 : 3$  and  $GE : ED = 5 : 3$ . The ratio  $SG : ED$  is (1) 1 : 2 (2) 1 : 3 (3) 3 : 5 (4) none of these  
 (1) 1 : 2 (2) 1 : 3 (3) 3 : 5 (4) 5 : 6
2. The digits from 1 to 9 added, in order, over and over again until the total is 2016.  
 $1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 1 + 2 + \dots + 9 + 1 + 2 + \dots$ . The last digit that was added is \_\_\_\_\_.  
 (1) 9 (2) 8 (3) 3 (4) 1
3. For an arbitrary real number  $x$ , we define  $[x]$  to be the greatest integer less than or equal to  $x$  (example  $[\sqrt{15}] = 3$ ). Let 'a' be positive real number such that  $a.[a] = 17$ . Then  $(476a - 5) =$  \_\_\_\_\_.  
 (1) 2015 (2) 2017 (3) 2019 (4) 2016
4. Find the smallest number  $n$  such that  $n!$  is divisible by 2016. Where  $n! =$  product of  $1^{\text{st}}$   $n$  positive integers.  
 (1) 6 (2) 7 (3) 8 (4) 9
5. In a trapezium ABCD,  $AB \parallel CD$  & M & N are mid-point of diagonals AC & BD respectively. Also  $AB = 20$  cm &  $DC = 16$  cm, then  $MN =$   
 (1) 4 cm (2) 2 cm (3) 1 cm (4) 3 cm
6. The base of an isosceles triangle is 24 cm and its area is  $192 \text{ cm}^2$ . Its perimeter is ---- cm  
 (1) 64 (2) 68 (3) 66 (4) 60
7. Let  $f(x) = ax^2 + bx - 6$  and  $\phi(x) = bx^2 + ax$ . If  $x - 2$  divides  $f(x)$ , and  $\phi(x)$  leaves a remainder -12 when divided by  $x - 2$ , then one of the factors of  $f(x) + \phi(x) - 2x^2$  is  
 (1)  $x - 2$  (2)  $x + 2$  (3)  $x + 3$  (4) None of these
8. The diagonals of a cyclic quadrilateral are diameters of the circle through the vertices of the quadrilateral, then the quadrilateral is a  
 (1) Rhombus (2) Square (3) Kite (4) None of these
9. If  $\bar{x}$  is the mean of the data  $x_1, x_2, x_3, \dots, x_n$  &  $a$  is a non-zero number then the mean of  $x_1 + a, x_2 + a, x_3 + a, \dots, x_n + a$  is  
 (1)  $\bar{x} + a$  (2)  $\bar{x} + na$  (3)  $n\bar{x} + a$  (4) None of these
10. A die having six faces is tossed 80 times and the data is as below
- |           |    |    |    |    |   |   |
|-----------|----|----|----|----|---|---|
| Out come  | 1  | 2  | 3  | 4  | 5 | 6 |
| Frequency | 10 | 20 | 10 | 28 | 8 | 4 |
- The probability of getting a composite number is  
 (1)  $\frac{42}{80}$  (2)  $\frac{52}{80}$  (3)  $\frac{32}{80}$  (4) None of these
11. If  $2^x = 10^y = 6^{-z}$  then  $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} =$   
 (1)  $\frac{20}{6}$  (2) 3 (3) -120 (4) 1
12. If the roots of the quadratic equation  $ax^2 + 16x + c = 0$  are reciprocal to each other then  $a =$  ----  
 (1) -16 (2) 16 (3)  $c$  (4)  $-c$
13. The base radius of a cylinder whose lateral surface area is  $704 \text{ cm}^2$  and height 8 cm is ----  
 (1) 6 cm (2) 4 cm (3) 8 cm (4) 14 cm

14. The cost price of 20 books is equal to the selling price of 16 books, then which of the following is true  
(1) gain = 25%                      (2) loss = 25%                      (3) No loss no gain                      (4) None of these

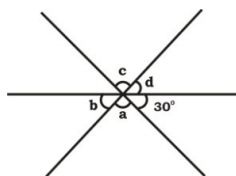
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15.  $(ab - ac - bc)^2 + 4abc(a + b)$  = square of \_\_\_\_\_.  
(1)  $ab + bc + ca$                       (2)  $ab - bc - ca$                       (3)  $abc(a + b)$                       (4) None of these
16. If the mean of 20 observations is 18 and the mean of another 16 observations is 9, then the mean of all the 36 observations is ----  
(1) 28                      (2) 27                      (3) 16                      (4) 14
17. If  $x^2 + xy + x = 14$  and  $y^2 + xy + y = 28$  then the greatest possible value of  $(x + y)$  is \_\_\_\_\_.  
(1) 7                      (2) 1                      (3) 14                      (4) 6

18. The cost of an article is Rs. 75. The cost was first increased by 20% and later on it was reduced by 20%. The present cost of the article is \_\_\_\_\_  
 (1) Rs. 60 (2) Rs. 72 (3) Rs. 90 (4) Rs. 75

19. If  $a + c + e = 20$  and  $b + d = -16$ , then which of the following is a factor of the polynomial  $ax^4 + bx^3 + cx^2 + dx - 4 + e$   
 (1)  $x - 1$  (2)  $x + 1$  (3) both 1 and 2 (4) None of these

20. The diagram shows three intersecting st.line segments. The average of a,b,c and 'd' is



- (1)  $45^\circ$  (2)  $75^\circ$  (3)  $55^\circ$  (4)  $65^\circ$
21. How many different rectangles with natural numbers as side lengths in cm. can be constructed so that the perimeter of each rectangle is 16 cm  
 (1) 7 (2) 5 (3) 4 (4) 3
22. The units digit of  $2^{20} + 3^{16}$  is  
 (1) 3 (2) 1 (3) 5 (4) 7
23. If  $\frac{4}{5}$  of a number is 16, then the number is  
 (1) 15 (2) 25 (3) 30 (4) 20
24. A boy started counting backward from 100 and reducing by 7's. He begins 100, 93, 86 ..... which numbers will not come in his count down  
 (1) 65 (2) 30 (3) 23 (4) 15
25. The thousands digit in the multiplication of  $11111 \times 11111$  is  
 (1) 1 (2) 2 (3) 3 (4) 4
26. The exterior angle of a regular polygon of 16 sides is equal to  $x^\circ$ . Then  $4x^\circ$  is an interior angle of \_\_\_\_\_  
 (1) an equilateral triangle (2) a triangle with sides  $1, \sqrt{3}, 2$   
 (3) a rhombus ABCD such that  $AC \neq BD$  (4) None of these
27. Let m be a constant. The graphs of the lines  $y = x - 2$  and  $y = mx + 3$  intersect at a point whose x-coordinate and y-coordinate are both positive if and only if  
 (1)  $m < 1$  (2)  $m > -3/2$  (3)  $-3/2 < m < 0$  (4)  $-3/2 < m < 1$
28. A rectangle has perimeter 16 and diagonal  $\sqrt{20}$ . What is its area?  
 (1) 22 (2) 44 (3) 20 (4) none of these
29. How many subsets of two elements can be removed from the set  $\{1, 2, 3, 4, 5, 6, 7, 8, 9\}$  so that the mean (average) of the remaining numbers is 5?  
 (1) 2 (2) 3 (3) 4 (4) 5
30. The 7-digit numbers 74A52B1 and 326AB4C are each multiples of 3. Which of the following could be the value of C?  
 (1) 1 (2) 2 (3) 3 (4) 5

Space for rough work

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**PHYSICS**

31. A body projected up from the top of a tower with some velocity reaches the ground in  $t_1$  sec. Another body thrown down from the same point with the same velocity reaches the ground in  $t_2$  sec. The height of the tower is .....
- (1)  $\frac{g(t_1 + t_2)}{2}$                       (2)  $\frac{g t_1 t_2}{2}$                       (3)  $\frac{g(t_1 - t_2)}{2}$                       (4) None
32. An escalator is used to move 20 passengers every minute from the 1<sup>st</sup> floor to the 2<sup>nd</sup> floor of a building. The second floor is located 5m above the 1<sup>st</sup> floor. The average mass of each passenger is 60 kg. The power of the escalator is
- (1) 1 KW                      (2) 3 KW                      (3) 6 KW                      (4) None of these

33. Two identical metal spheres of same material and radius 'r', are placed in contact with each other. The force between the two spheres is proportional to  
 (1) r (2)  $r^2$  (3)  $r^3$  (4)  $r^4$
34. The characteristic of sound which depends on harmonics is  
 (1) Pitch (2) Loudness (3) Quality (4) All of these
35. A solid weigh 50 N in air, 40 N in water and 38 N in some liquid. The specific gravity of the liquid is  
 (1) 1.2 (2) 0.8 (3) 0.6 (4) 0.2
36. A body moving with uniform acceleration travels 65m in the 5<sup>th</sup> second and 105m in the 9<sup>th</sup> second. The initial velocity of the body will be  
 (1) 10 m/s (2) 20 m/s (3) 25 m/s (4) zero
37. The wave length of a wave is ' $\lambda$ '. The path difference of a particle (x) and its phase difference ( $\delta$ ) are related by  
 (1)  $\frac{\lambda}{x} = \frac{\delta}{2\pi}$  (2)  $\frac{x}{\lambda} = \frac{\delta}{2\pi}$  (3)  $\delta x = 2\pi\lambda$  (4)  $x\lambda = 2\pi\delta$
38. A solid floats in a liquid in a partially dipped position. Choose the wrong statement of the following  
 (1) The solid exerts a force equal to its weight, on the liquids  
 (2) The liquid exerts a force of buoyancy on the solid which is equal to the weight of the liquid  
 (3) The weight of the displaced liquid equals the weight of the solid  
 (4) The weight of the dipped part of the solid is equal to the weight of the displaced liquid.
39. During an elastic collision  
 (1) The total K.E. is conserved (2) Total momentum is conserved  
 (3) Both K.E. and momentum are conserved (4) None of the above
40. The velocity of sound in a gas at 1 atm. Pressure and temperature  $t^{\circ}\text{C}$  is V m/s. The velocity of sound in the same gas at the same temperature and 2 atm pressure is  
 (1)  $\frac{V}{2}$  m/s (2) V m/s (3)  $\frac{3V}{2}$  m/s (4) 2V m/s
41. If 'g' is the acceleration due to gravity on the earth's surface, the acceleration due to gravity at an altitude equal to seven times the radius of earth will be  
 (1) 7g (2)  $\frac{g}{7}$  (3)  $\frac{g}{64}$  (4) 64 g
42. A stone is released from an elevator going up with an acceleration 'a'. The acceleration of the stone after release is  
 (1) 'a' upward (2) (g-a) upward (3) (g-a) downward (4) 'g' downward
43. Ice floats on oil held in a vessel. When the ice melts, the level of oil  
 (1) Remains unchanged (2) Goes up  
 (3) Goes down (4) Nothing can be asserted
44. Which of the kepler's laws of planetary motion follows as a consequence of law of conservation of angular momentum  
 (1) First law (2) Second law (3) Third law (4) All the laws
45. Two cars of unequal masses use similar tyres. If they are moving at the same initial speed, the minimum stopping distances  
 (1) Is smaller in heavier car (2) is smaller for lighter car  
 (3) Is same for both the cars (4) Depends on the volume of the cars

Space for rough work

46. A cylindrical tube, open at both ends has a fundamental frequency  $v$ . The tube is dropped vertically in water, so that half of its length is inside the water. The new fundamental frequency is
- (1)  $\frac{v}{4}$                       (2)  $\frac{v}{2}$                       (3)  $v$                       (4)  $2v$
47. The gravitational force acting on a particle of 1 gm due to a similar particle is equal to  $6.67 \times 10^{-17} \text{ N}$ . The separation between the particles will be
- (1) 1 cm                      (2) 10 cm                      (3) 1 m                      (4) 10 m

48. Velocity of sound is maximum in  
 (1) Oxygen (2) Hydrogen (3) Nitrogen (4) Air
49. Consider a person moving 6 km A to B towards east and then turns towards south. He then moves 8 km from B to C. If he takes a total time of 2 hrs, the ratio of velocity of the person to the speed of the person is  
 (1) 5 : 7 (2) 7 : 5 (3) 1 : 1 (4) 3 : 4
50. In a tug of war contest two groups of people pull on a horizontal rope from the two ends. The winning group will be one which  
 (1) Exerts greater force on the rope.  
 (2) Exert a force on the rope which is greater than the tension in it.  
 (3) Exerts greater force on the ground (4) Makes greater angle with the horizontal.
51. A person stands in between two cliffs separated by some distance. He produces the sound of a clap and hears one echo after 1.5 sec and another echo after 2 sec. If the velocity of sound in air is 340 m/s, the distance between the two cliffs will be  
 (1) 255 m (2) 680 m (3) 935 m (4) None of these
52. A player wishes to cross 4.9m high pole vault. The minimum velocity with which he should run is  
 (1) 4.9 m (2) 9.8 m/s (3) 14.7 m/s (4) 19.6 m/s
53. Two stones are thrown from the top of a tower one straight upward the other straight down, both with same speeds. Neglecting air resistance it follows that  
 (1) The two stones reach the ground simultaneously  
 (2) The two stones reach the ground with same velocity  
 (3) The two stones collide with each other at some point  
 (4) After the two stones reach the ground, their displacements are different.
54. A person rests on a smooth, frictionless horizontal ice berg. In the absence of all external forces he can get out of it by  
 (1) Jumping (2) Running along the surface  
 (3) Spitting or sneezing (4) By lying down and rolling
55. When we consider the voices of a man and woman, in general  
 (1) Voice of man is of more frequency (2) Voice of women is of more frequency  
 (3) Both the voice will have same frequency (4) Cannot be assisted.
56. The total work done on a particle is equal to change in its kinetic energy  
 (1) Always (2) Never  
 (3) Only when no internal force acts on it. (4) Only when no external force acts on it.
57. Which of the following is not a wave.  
 (1) Longitudinal wave (2) Transverse wave (3) Electromagnetic wave (4) Stationary wave
58. A piece of copper weighing 212 gm is dipped in a measuring jar containing water up to the mark of 50 ml. If water level rises to 74 ml mark, the density of copper  
 (1) 2.86 gm/cc (2) 4.24 gm/cc (3) 3.86 gm/cc (4) 1.86 gm/cc
59. A hose pipe directs a horizontal jet of water moving with a velocity of 20 m/s onto a vertical wall. The area of cross section of jet is  $5 \times 10^{-4} \text{ m}^2$ . The force with which the hose pipe is to be held is —  
 (1) 200 N (2) 100 N (3) 150 N (4) None of the above
60. The force between two charges when they are separated by a distance 30 cm in air is 64 N. The force when they are separated by a distance 20 cm is  
 (1) 64 N (2) 144 N (3) 128 N (4) 43 N

## CHEMISTRY

**Note: (Atomic mass of elements: H = 1, C = 12, Na = 23, O = 16)**

61. Choose the correct statement among the following  
 (1) Rate of diffusion of gases is higher than that of liquids.  
 (2) Humidity is the amount of water vapour present in air  
 (3) Particles in water at 0°C have more energy as compared to particles in ice at the same temperature  
 (4) All the above.
62. A solution contains 50 grams of salt in 200 grams of water. Mass percentage of the solution is  
 (1) 2 (2) 20 (3) 10 (4) None of these

Space for rough work

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63. Choose the incorrect statement among the following  
(1) Number of particles present in one mole of any substance is called Avogadro's constant ( $N_A$ )  
(2) Molecular formula of potassium manganate is  $KMnO_4$   
(3) Formula of phosphate ion is  $PO_4^{3-}$  (4) The symbol of the element Barium is Ba
64. The average atomic mass of an element 'X' is 35.5 U. Element 'X' occurs in nature in two isotopic forms, with masses 35.0 U and 37.0 U. The percentage abundance of the heavier isotope is  
(1) 75 (2) 25 (3) 100 (4) None of these
65. Choose the correct statement among the following statements  
(1) Valency is the combining capacity of an atom  
(2) Neutron, an uncharged particle is the part of atomic nucleus  
(3) The isotope of uranium is used as a fuel in nuclear reactors (4) All the above



66. The maximum number of electrons in N-shell is  
 (1) 32 (2) 18 (3) 8 (4) None of these
67. Number of nucleons in the atom of deuterium is  
 (1) 1 (2) 2 (3) 3 (4) None of these
68. Plum pudding atomic model was proposed by  
 (1) J.J. Thomson (2) Newton (3) Niels Bohr (4) Rutherford
69. Molecular mass of sodium bicarbonate is  
 (1) 106 U (2) 84 U (3) 53 U (4) None of these
70. The formula of chloride of bivalent metal is  $MCl_2$ . The formula of the metal phosphate is  
 (1)  $M_3(PO_4)_2$  (2)  $MPO_4$  (3)  $M_2PO_4$  (4) None of these
71. Mass of 0.02 moles of dioxygen gas is  
 (1) 0.64g (2) 64g (3) 64 mg (4) None of these
72. Mass of products formed when 200g of 80% pure  $CaCO_3$  is strongly heated, is  
 (1) 160g (2) 200g (3) 100g (4) None of these
73. Molecular formula of trivalent metal sulphate is  
 (1)  $MSO_4$  (2)  $M_2SO_4$  (3)  $M_2(SO_4)_3$  (4) None of these
74. A mixture of oil in water is called  
 (1) Suspension (2) Emulsion (3) Sublimation (4) None of these
75. Lemonade is a mixture of salt and  
 (1) Water (2) Sugar (3) Lemon juice (4) All
76. Ice cream is  
 (1) Colloid (2) Suspension (3) True solution (4) None of these
77. The separation method used, if the boiling points of the two liquids are close to each other is  
 (1) Distillation (2) Sublimation (3) Fractional distillation (4) None of these
78. One mole of water  
 (1) has two mole atoms of hydrogen (2) One mole atoms of oxygen  
 (3) has molecular mass 18 U (4) All the above
79. The percentage by mass of carbon in glucose ( $C_6H_{12}O_6$ ) is  
 (1) 20 (2) 40 (3) 18 (4) None of these
80. The valency of cation present in cuprous bromide is  
 (1) 1 (2) 2 (3) 3 (4) None of these
81. Number of electrons present in  $\alpha$ -particle is  
 (1) 2 (2) 1 (3) zero (4) None of these
82. Nuclear model of atom was proposed by  
 (1) J.J.Thomson (2) Rutherford (3) Niels Bohr (4) None of these
83. The valency of carbon in carbon dioxide, is  
 (1) 1 (2) 2 (3) 4 (4) None of these
84. The process of changing solid to liquid is known as  
 (1) Fusion (2) Boiling (3) Sublimation (4) None of these
85. The amount of heat energy needed to change one kg of a solid completely into liquid at atmospheric pressure at its fusion point is called  
 (1) Latent heat of fusion (2) Boiling point  
 (3) Evaporation (4) None of these
86. The melting point of ice on Kelvin scale is  
 (1) 273 K (2) -273 K (3) 373 K (4) None of these
87. The particles in a colloidal solution can easily scatter a beam of visible light, this phenomenon is called  
 (1) Compton effect (2) Stark effect (3) Tyndall effect (4) None of these
88. Mass of  $CO_2$  formed, when 2 moles of each C &  $O_2$  are reacted, is  
 (1) 88g (2) 44g (3) 22g (4) None of these
89. Volume occupied by 3.2g  $CH_4$  at STP is  
 (1) 1.12 L (2) 2.24 L (3) 4.48 L (4) None of these
90. Mass of water formed, when 8g of each dihydrogen and dioxygen are reacted, is  
 (1) 18g (2) 9g (3) 36g (4) None of these

Space for rough work