

SRI GURUDATTA COACHING CENTRE (SARMA INST.)
MATHEMATICS

1. Which of the following is an integer?

- 1) 2016π 2) $\frac{1}{3+2\sqrt{2}} + \frac{1}{3-2\sqrt{2}}$ 3) $\sqrt{2015}$ 4) none of these

2. How many of the following numbers are greater than 10? $3\sqrt{11}, 4\sqrt{7}, 6\sqrt{3}, 7\sqrt{2}, \sqrt[4]{2015}$

- 1) 1 2) 3 3) 5 4) none of these

3. $A(-2,0)$ and $B(-1,5)$. There are how many points $P(x,y)$ in the same plane such that $PA + PB = 5$ where x, y are integers.

- 1) 1 2) infinitely many 3) more than 1 4) none of these

4. The hypotenuse z and one side x of a right-angled triangle are consecutive integers. The square of the third side is _____. 1) $z-x$ 2) $z+x$ 3) zx 4) none of these

5. What is $(-1)^1 + (-1)^2 + (-1)^3 + \dots + (-1)^{2016}$?

- 1) -2016 2) -1 3) 0 4) none of these

6. The point O is the center of the circle circumscribed about $\triangle ABC$ with $\angle BOC = 120^\circ$ and $\angle BOA = 140^\circ$.

What is the degree measure of $\angle CBA$

- 1) 35 2) 40 3) 45 4) 50

7. The Olympics are held for every four years, and the Holympics every six years. They were held in the same year in 1968. How many times will they be held in the same year between the years 2015 and 2200?

- (1) 11 (2) 17 (3) 13 (4) none of these

8. The perfect squares are written as a string of digits 149162536... The 65th digit in this string is

- (1) 4 (2) 5 (3) 6 (4) none of these

9. A right angled triangle has an area of 5. The altitude perpendicular to the hypotenuse has a length of 2. The perimeter of triangle is

- (1) $5\sqrt{5} + 5$ (2) $3\sqrt{5} + 5$ (3) $5\sqrt{3} + 3$ (4) $3\sqrt{5} + 5\sqrt{3}$

10. If 'M' is the product of the first 15 prime numbers then the digit in the units place of 'M' is

- (1) 0 (2) 1 (3) 4 (4) 8

11. The product of two integers is 1000. If neither of these two numbers has a zero as one of its digits, then their sum is (1) 65 (2) 254 (3) 133 (4) none of these

12. The five digit number $\overline{24x8y}$ is divisible by 4 and by 5 and by 9. The sum of digits x and y is

- (1) 13 (2) 4 (3) 10 (4) 9

13. Number of perfect squares between 2015 and 5012 is

- (1) 24 (2) 25 (3) 26 (4) none of these

14. In $\triangle ABC$, D is a point on side \overline{AC} such that $BD = DC$ and $\angle BCD = 70^\circ$ and $\angle ABD = 20^\circ$, What is the measure of $\angle CAB$?

- (1) 10° (2) 30° (3) 25° (4) none of these

15. 'Rectangle ABCD with $AB = 5$, $DA = 6$ ' and 'triangle DCE right angled at C' have the same area. They are joined to form a trapezium such that C is between B and E, then length of the line segment DE = ____.

(1) 12

(2) 13

(3) 14

(4) 15

16. If a, b and c are the sides of a triangle and $a < b < c$, then which one of the following is not true

(1) $a + b > c$

(2) $\sqrt{a} + \sqrt{b} > \sqrt{c}$

(3) $\frac{1}{a} > \frac{1}{2b} + \frac{1}{2c}$

(4) none of these

17. If $31^m \cdot 65^m = \frac{1}{2015}$ then $\frac{65^m}{31^m} =$ _____.

1) $\frac{31}{65}$

2) $\frac{65}{31}$

3) 2015

4) none of these

Space for rough work

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18. The number of real solutions (x, y) of the system $x^2 + y = 12 = y^2 + x, x = y$
 1) 1 2) 2 3) 0 4) none of these
19. Two reals x and y are such that $x - y = 4$ and $x^3 - y^3 = 28$. Compute xy .
 1) 3 2) $-\frac{1}{3}$ 3) -3 4) none of these
20. Find the smallest positive integer $n (> 1)$ such that $2015n$ has the same last two digits as n .
 1) 10 2) 5 3) 25 4) 50
21. If the median of the data 20, 15, 65, 31, x is 20 then
 1) $x > 20$ 2) $x \leq 20$ 3) x lies strictly between 20 and 31 4) None of these
22. If $\frac{x}{a} = \frac{y}{b} = \frac{z}{c}$ then each ratio equals to
 1) $\frac{x-y+z}{a-b+c}$ 2) $\frac{x-2y-3z}{-a+2b+3c}$ 3) $\frac{xyz}{abc}$ 4) all of these
23. x is a positive integer and the sum of the remainders when $x, x+4$ and $x+8$ are respectively divided by 2, 4, 5 is 0, and sum of the quotients is 14. The value of x is
 1) 8 2) 10 3) 12 4) 14
24. A person travels x km in ' a ' hours, y km in ' a ' minutes and z km in ' a ' seconds. The average speed is
 1) $\frac{(3600x + 60y + z)a}{3}$ 2) $\frac{3600x + 60y + z}{3601a}$ 3) $\frac{x+y+z}{3a}$ 4) none of these
25. ABCD is a parallelogram. If $\angle A = 150^\circ$ then $\angle B - \angle C =$ _____ taken in that order
 1) 75° 2) 100° 3) 135° 4) 150°
26. Let $\angle ABC = 20^\circ$ and $\angle ABD = 15^\circ$. What is the greatest possible degree measure for angle CBD?
 1) 5 2) $\frac{35}{2}$ 3) 35 4) 70
27. A rectangle has sides of lengths ' x ' and ' y ', where ' x ' and ' y ' are integers. If the value of the perimeter is equal to the value of the area, then a possible value of $x + y$ is
 (1) 6 (2) 7 (3) 5 (4) 9
28. The 11 numbers in a list have an average of 18. When the number 42 is added to the list, the new average of all 12 numbers is
 (1) 18 (2) 20 (3) 22 (4) 24
29. There exists an integer k such that
 a) $2015 = 7k - 1$ b) $2015 = 4k - 1$
 c) $2015 = 7k + 6$ d) $2015 = 4k + 3$ which one of these is true
 1) a, c only 2) a, b, c only 3) c, d only 4) none of these
30. A cube with 3-inch edges is made using 27 cubes with 1-inch edges. Nineteen of the smaller cubes are white and eight are black. If the eight black cubes are placed at the corners of the larger cube, what fraction of the surface area of the larger cube is white?
 1) $\frac{19}{27}$ 2) $\frac{1}{2}$ 3) $\frac{4}{9}$ 4) $\frac{5}{9}$

PHYSICS

31. 1 watt is equal to
 (1) 1 Kgms^{-2} (2) 1 Kgms^{-1} (3) 1 Nms^{-1} (4) 1 Nms^{-2}
32. A man of double the mass of a boy, is running with a velocity of half that of the boy. The ratio of Kinetic energies of the man and that of the boy will be

(1) 1:2

(2) 2:1

(3) 1:4

(4) 4:1

33. A person is standing in a lift moving up with an acceleration equal to acceleration due to gravity. The apparent weight of the person will be

(1) half his actual weight

(2) double his actual weight

(3) same as his actual weight

(4) zero

34. 1 metre is equal to

(1) 10^{-6} microns

(2) 10^6 microns

(3) 10^{-3} microns

(4) 10^3 microns

35. At which temperature the velocity of sound in air is double that at 0°C .

(1) 819°C

(2) 819K

(3) 273°C

(4) 546°C

36. Two bodies of masses in the ratio 2:3 when separated by some distance experience a force ' F '. If the masses are in the ratio 3:4, and the distance of separation is double the earlier distance, then the force between the two bodies

would be (1) F

(2) $2F$

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

(4) F^2

Space for rough work

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37. A body of mass 5kg moving with a velocity of 6m/s collides another body of mass 3kg which is at rest. After collision, if the two bodies move together, the common velocity would be
 (1) 6m/s (2) 3.75m/s (3) 3.25m/s (4) zero
38. For a freely falling body, the distance travelled by the body is proportional to the
 (1) velocity (2) time (3) acceleration due to gravity (4) $(\text{velocity})^2$
39. A body travels 4m in the first 2sec and 12m in the next 2sec . The distance travelled in the 8^{th} sec will be
 (1) 64m (2) 28m (3) 15m (4) none
40. Shrillness of sound depends on
 (1) Amplitude (2) Loudness (3) Pitch (4) all of these
41. The weight of a body is maximum
 (1) above the surface of earth (2) at the center of earth
 (3) below the surface of earth (4) on the surface of earth
42. From an elevated point ' A ', a body is projected vertically up. When the body reaches a distance ' h ' below ' A ', the velocity is double that at ' A '. The maximum height that it goes up from ' A ' would be
 (1) $\frac{h}{3}$ (2) $\frac{h}{2}$ (3) h (4) $2h$
43. Two cliffs are 742.5m apart. A person standing at some position in between gives a clap and hears the echo of it after 2secs . If the velocity of sound in air is 330m/s , he hears the next echo after
 (1) 2sec (2) 2.5sec (3) 3sec (4) 4sec
44. Sudden fall of atmospheric pressure by a large amount indicates
 (1) rain (2) cold wave (3) storm (4) fair weather
45. A body of mass 2Kg is acted upon by two forces, each 2N , making an angle 60° with each other. The net acceleration of the body will be
 (1) 2m/s^2 (2) $2\sqrt{3}\text{m/s}^2$ (3) $\sqrt{3}\text{m/s}^2$ (4) none
46. Which of the following cannot be called as a wave
 (1) Longitudinal wave (2) Transverse wave (3) Electromagnetic wave (4) Stationary wave
47. When two liquids of densities d_1 and d_2 are used in a manometer and h_1 , h_2 are their lengths respectively, to measure the same pressure
 (1) $\frac{h_1}{h_2} = \frac{d_2}{d_1}$ (2) $\frac{h_1}{h_2} = \frac{d_1}{d_2}$ (3) $h_1 + d_1 = h_2 + d_2$ (4) $h_1 + h_2 = d_1 + d_2$
48. Acceleration due to gravity on the surface of earth is ' g '. The acceleration due to gravity, at a height, above the earth, equal to radius of the earth, will be
 (1) g (2) $\frac{g}{2}$ (3) $\frac{g}{4}$ (4) none
49. External pressure, applied to an enclosed volume of fluid, is transmitted equally in all directions throughout the fluid volume is
 (1) Pascal's law (2) Archimedes' principle (3) Bernoulli's theorem (4) none
50. Velocity of sound is maximum in
 (1) solids (2) liquids (3) gases (4) vacuum
51. At sea level, atmospheric pressure is
 (1) 76cm of water column (2) 76m of Hg column
 (3) 76cm of Hg column (4) 76mm of water column

52. A body of mass ' m_1 ' and speed ' V_1 ' makes a head-on elastic collision with a body of mass ' m_2 ', initially at rest. The velocity of body of the mass ' m_1 ' after the collision is

(1) $\frac{m_1+m_2}{m_1m_2} V_1$

(2) $\frac{m_1-m_2}{m_1+m_2} V_1$

(3) $\frac{2m_1v_1}{m_1+m_2}$

(4) $\frac{2m_2v_1}{m_1+m_2}$

53. Two satellites are revolving around a planet in circular orbits in the same sense. Their periods of revolutions are $1Hr$ and $8Hr$ respectively. The ratio of their orbital radii is

(1) 1: 4

(2) 4: 1

(3) 1: 8

(4) 8: 1

54. If two points on a wave of wave length $1m$ are separated by $60cm$, the corresponding phase difference between the points will be

(1) π

(2) 1.2π

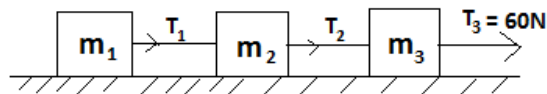
(3) $\frac{\pi}{1.2}$

(4) $\frac{1.2}{\pi}$

Space for rough work

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55. Three blocks are connected as shown in figure on a horizontal frictionless table by a thread and pulled to the right with a force $60N$. If $m_1 = 10kg$; $m_2 = 20kg$ and $m_3 = 30kg$; then the tension T_1 and T_2 respectively are

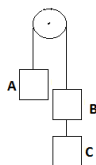


- (1) $10N, 20N$ (2) $30N, 10N$ (3) $10N, 30N$ (4) $20N, 10N$

56. A vessel is filled with a liquid of density ' ρ ' upto a height ' h '. The velocity with which the liquid emerges from a small hole at the bottom is

- (1) $\sqrt{\rho gh}$ (2) \sqrt{gh} (3) ρgh (4) $\sqrt{2gh}$

57. Three bodies A, B and C of mass $2Kg$ each are hanging on a string passing over a fixed pulley as in figure. The tension in the string connecting the weights ' B ' & ' C ' will be



- (1) $\frac{80}{3}N$ (2) $\frac{40}{3}N$ (3) $\frac{20}{3}N$ (4) $\frac{10}{3}N$

58. In which of the following device, mechanical energy is converted into electrical energy.

- (1) Electric fan (2) Electric mixer-grinder (3) Motor (4) Dynamo

59. An anchored boat is rocked by waves whose crests are $100m$ apart, and whose velocity is $25m/s$. How often do the crests reach the boat

- (1) $0.25s$ (2) $4s$ (3) $25s$ (4) $2500s$

60. A hole is drilled through the earth along a diameter and a stone is dropped into it. When the stone is at the center of the earth, it has a finite

- (1) mass (2) weight (3) acceleration (4) potential energy

CHEMISTRY

(Atomic Weight of elements: $O = 16U$, $C = 12U$, $S = 32U$, $N = 14U$, $Cu = 63.5U$, $H = 1U$, $Mg = 24U$)

61. Composition of the nuclei of two atomic species is given:

| | X | Y |
|---|---|---|
| P | 7 | 8 |
| N | 9 | 8 |

The mass number of x and Y and their relation is

- (1) 16, 16; isotopes (2) 17, 15; isotopes (3) 17, 15; isotopes (4) 16, 16; isobars

62. If isotopic distribution of C-12 & C-14 is 98% and 2% respectively, then number of C-14 atoms in 12 g of C is:

- (1) 1.24×10^{22} (2) 1.44×10^{23} (3) 3.8×10^{22} (4) 3.8×10^{22}

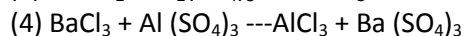
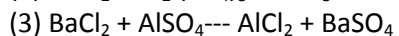
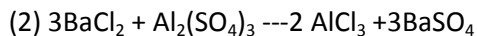
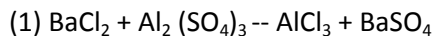
63. Which of the following is a correct statement?

- (1) Na_2S is sodium sulphide, Na_2SO_3 is sodium sulphite, Na_2SO_4 is sodium sulphate
 (2) Na_2S is sodium sulphite, Na_2SO_3 is sodium sulphide, Na_2SO_4 is sodium sulphate
 (3) Na_2S is sodium sulphide, Na_2SO_3 is sodium sulphate, Na_2SO_4 is sodium sulphite
 (4) Na_2S is sodium sulphite, Na_2SO_3 is sodium sulphite, Na_2SO_4 is sodium sulphide

64. Which of the following has the less number of molecules?

- (1) 0.1 moles of CO_2 (2) 2g of H_2 at STP (3) 16g of O_2 gas (4) 3.4g of NH_3

65 Translate the following statements into chemical equations and then balance it. Barium chloride reacts with aluminium sulphate to give aluminium chloride and a precipitate of barium sulphate.



66. Identify the type of reaction in each case.

Zinc carbonate(s) \rightarrow Zinc oxide(s) + Carbon dioxide (g)

Hydrogen (g) + Chlorine (g) \rightarrow Hydrogen chloride (g)

(1) Combination, Decomposition

(2) Double displacement, Combination

(3) Decomposition, Combination

(4) Displacement, Decomposition

67. An example of a metal which is a liquid at room temperature

(1) Zinc

(2) Copper

(3) Mercury

(4) Bromine

68. What are the ions present in Na_2O ?

(1) Na^+ , O^-

(2) Na^{2+} , O^{2-}

(3) Na^{2+} , O^-

(4) Na^+ , O^{2-}

69. The number of elements present in the 2nd, 3rd, 4th and 5th periods of the modern periodic tables are:

(1) 2, 8, 8, 18

(2) 8, 8, 18, 32

(3) 8, 8, 18, 18

(4) 8, 18, 18, 32

Space for rough work

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70. Which of the given elements A, B, C, D and E with atomic numbers 2, 4, 8, 10 and 18 respectively belong to the same period?

- (1) A, B, C (2) B, C, D (3) A, D, E (4) B, D, E

71. Which of the following is the correct order of size?

- (1) Cl < F < Br < I (2) F < Cl < Br < I (3) I < Br < Cl < F (4) Br < I < Cl < F

72. Which of the statements about the reaction below are incorrect? $\text{Fe}_2\text{O}_3(\text{s}) + 3\text{CO}(\text{g}) \rightarrow 2\text{Fe}(\text{s}) + 3\text{CO}_2(\text{g})$

- a. Iron is getting reduced. b. Carbon dioxide is getting oxidised.
c. Carbon monoxide is getting oxidised. d. Iron oxide is getting reduced.

- (1) a & b (2) a & c (3) c & d (4) all

73. A calcium compound reacts with dilute hydrochloric acid to produce effervescence.

The gas evolved extinguishes a burning candle. Identify the compound and the gas evolved.

- (1) Calcium Carbonate, Carbon dioxide (2) Calcium chloride, carbon dioxide
(3) Calcium oxide, hydrogen (4) Calcium carbonate, hydrogen

74. The balancing of chemical equations is in accordance with:

- (1) Law of combining volumes (2) Law of constant proportions
(3) Law of conservation of mass (4) Both 2 and 3

75. An element X has valency equal to 3. What will be its formula with carbonate ions?

- (1) X_2CO_3 (2) XCO_3 (3) $\text{X}_2(\text{CO}_3)_3$ (4) $\text{X}(\text{CO}_3)_3$

76. Molecular weight of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ is equal to:

- (1) 249.5u (2) 159.5u (3) $(159.5 + 10 + 16)\text{u}$ (4) none of these

77. Out of 1 g of oxygen gas, 1 g of oxygen atoms and 1g of ozone, maximum number of atoms are present in:

- (1) 1g of oxygen gas (2) 1g of oxygen atoms (3) 1 g of ozone (4) All have equal number of atoms

78. The number of valence electrons determines:

- (1) Physical properties of elements (2) Chemical properties of elements
(3) Both physical and chemical properties of elements (4) Neither physical nor chemical properties of elements

79. The sequence of steps for separating a mixture of salt, sand and camphor is:

- (1) Adding water, filtration, evaporation, sublimation
(2) Adding water, filtration, sublimation, evaporation
(3) Sublimation, adding water, filtration, evaporation
(4) Sublimation, adding water, evaporation, filtration

80. As solid melts to form liquid:

- (1) Inter particle distance increases (2) Inter molecular forces of attraction decreases
(3) Compressibility increases (4) All of the above

81. We get the smell of hot food in the kitchen outside the house because of

- (1) Boiling (2) Evaporation (3) Sublimation (4) Diffusion

82. When we blow air into the balloon it inflates because:

- (1) Air particles diffuse into the balloon

- (2) Air particles collide with the walls of the balloon and exert pressure on them
(3) Rubber is elastic in nature
(4) The temperature of air in the balloon increases
83. Which of the following statements does not belong to Bohr's model of atom?
(1) Energy of the electrons in the orbit is quantized
(2) The electrons in the orbit nearest to the nucleus have the lowest energy
(3) Electrons revolve around the nucleus in different orbits having fixed energies
(4) The electrons radiate energy during revolution due to force of attraction between nucleus and electrons
84. Which of the following represents a chemical change?
(1) Extraction of copper from copper pyrites (2) Distillation of water
(3) Melting of wax (4) Dissolution of salt in water
85. When a gold foil is bombarded by a beam of α particle, only a few of them get deflected whereas most go straight undeflected. This is because
(1) The force of attraction exerted on α particles by the electrons is insufficient
(2) The volume of nucleus is much smaller than that of the atom
(3) The force of repulsion acting on the fast moving α particles is very small
(4) The neutrons have no effect on α particles
86. Where would you locate an element with electronic configuration 2, 8, 7 in the modern periodic table?
(1) Group 7 and period 2 (2) Group 7 and period 3
(3) Group 17 and period 3 (4) Group 17 and period 2
87. The mass of a single atom of an element X is 2.65×10^{-23} g. The atomic mass and name of the element is:
(1) 16u, oxygen (2) 16u, Sulphur (3) 32u, oxygen (4) 32u, Sulphur
88. The number of atoms present in 0.5 moles of Nitrogen atoms is same as in:
(1) 12 g of C (2) 24 g of Mg (3) 8 g of O (4) 32 g of S
89. When a bottle of soda water is opened, carbon dioxide escapes, producing a fizz. This is due to:
(1) Decrease in solubility on decreasing temperature
(2) Decrease in solubility on increasing temperature
(3) Decrease in solubility on decreasing pressure
(4) Decrease in solubility on increasing pressure
90. A student weighs 30kg. Suppose his body is entirely made of electrons. How many electrons are there in his body? Mass of an electron = 9.1×10^{-31} kg
(1) 3.29×10^{31} (2) 3.29×10^{30} (3) 3.29×10^{23} (4) 3.29×10^{32}