SRI GURUDATTA COACHING CENTRE(SARMA INST.)

MATHEMATICS

1. Two congruent circles centered at points A and B each pass through the other circle's center. The line containing both A and B is extended to intersect the circles at points C and D. The circles intersect at two points, one of which is E. What is the degree measure of ∠CED?

   (1)90   (2) 105   (3) 120   (4) 135

2. A triangle with vertices as A=(1,3), B=(5,1), and C=(4,4) is plotted on a 6X5grid. What fraction of the grid is covered by the triangle?
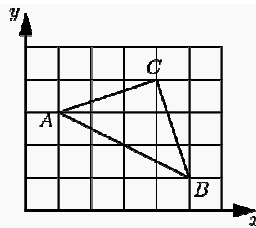
   (1) $\frac{1}{6}$ (2) $\frac{1}{5}$ (3) $\frac{1}{4}$ (4) $\frac{1}{3}$

3. The ages of A and B are in the ratio a:b . After 17years the ages of A and B will be in the ratio a:b. Then the value of a – b :a+bis

   (1) 0   (2) 1   (3) 2   (4) 4

4. If for each real number x, $*(x)$ denotes $2017 - x$ then $*\left(*\left(*\left(*\left(*\left(*(x)\right)\right)\right)\right)\right) =$

   (1) $6(2017 - x)$ (2) $2017 - x$ (3) x (4) None of these

5. A teams record is 20 wins and 25 losses. To qualify for the finals a team has to win 60% of the games played. The number of wins of the remaining 15 games necessary for the team to qualify is

   (1) 4   (2) 10   (3) 15   (4) Impossible to achieve

6. The surface of a cube is to be painted so that any two faces having a common edge must be differently coloured. The minimum number of colors needed is

   (1) 1   (2) 2   (3) 3   (4) 6

7. Each of the numbers 1,9,8 and 9 is represented by the letters A,B,D and M (not necessarily in that order). The largest possible sum of the three 3-digit numbers BAD, DAM and MAD is

   (1) 2159   (2) 2656   (3) 2657   (4) None of these

8. 'a' is the average of 10 positive numbers $a_1, a_2, \ldots\ldots, a_{10}$ satisfying $a_1 \le a_2 \le a_3 \le \ldots\ldots \le a_{10}$. If $a_{10} \le a$ then $\sqrt[10]{a_1 \times a_2 \times a_3 \times \ldots\ldots \times a_{10}} \ne$

(1) 0   (2) a_1 (3) a_{10} (4) $\dfrac{a\,a_1}{a_n}$

9. $a_1, a_2, a_3, \ldots\ldots$ is a sequence of real numbers such that the sum $S_n = a_1 + a_2 + \ldots\ldots + a_n$ is given by the

formula $S_n = \dfrac{n-2}{2n}$. Then $a_{17} =$

(1) $\dfrac{1}{17}$ (2) $\dfrac{1}{34}$ (3) $\dfrac{1}{289}$ (4) $\dfrac{1}{272}$

10.   Consider the following statements:

A: If p, q are primes and $p \neq q$ then the greatest common factor of p and q is 1

B: If p, q are natural numbers whose greatest common divisor is '1' then p, q are primes

(1) A is true but B is false   (2) A and B are both true

(3) A is false but B is true   (4) A and B are both false

11.   The average score of ram in the first four tests was 6.5. The average score of ram in the next five tests

was 6.4. His score was 9 in the tenth test. The average of scores in the ten tests is

(1) 6.5   (2) 6.7   (3) 6.9   (4) 7

12.   Two vertical poles, 10m and 15m high, stand 12m apart. The distance between the tops of the poles is

(1) 20 m   (2) 15 m   (3) 13 m   (4) 16m

13.   Starting at 2017 and counting backwards by 7's, a student counts 2017, 2010, 2003, etc. A number that will

be counted is

(1) 17   (2) 27   (3) 2   (4) 71

14.   The real value of x in $\dfrac{1}{2^{2016}} - \dfrac{1}{2^{2017}} = 2^x$ is

(1) 2016   (2) 2017   (3) – 2017   (4) – 2016

15.   The number of positive factors of 17^{20} is

(1) infinitely many   (2) 2017   (3) 21   (4) 20

16.   In each of three successive years, the cost of living increases by 10%. The percentage increase in the

three years is

(1) 30   (2) 130   (3) 33.1   (4) 133.1

17.   The 6-digit number 2a017b is divisible by 11 and also by 9. The value of a+b =_____

(1) 17   (2) 9   (3) 10   (4) None of these

18. $\dfrac{x+4}{2x-5} \leq 0$ if and only if

(1) $x \leq -4 \ or \ x > 5/2$ (2) $x \leq 5/2$

(3) $x \geq 5/2$ (4) none of these

19. If n is the number of integers in the set { 10, 11, 12, ………99} that increase in value when the order of their digits is reversed then n = _____

    (1) 20   (2) 30   (3) 36   (4) 46

20. The number of solutions of the pair of equations $x^2 - xy + 8 = 0$, $x^2 - 8x + y = 0$ is _____

    (1) 4   (2) 3   (3) 2   (4) 1

21. In triangle ABC, AB = BC = 29 , and AC = 42 . What is the area of triangle ABC ?

    (1) 100   (2) 420   (3) 500   (4) 609

22. The sum of two prime numbers is 2019. What is the product of these two prime numbers?

    (1) 38000   (2) 12078   (3) 8060   (4) 4034

23. A fair coin is tossed 3 times. What is the probability of at least two consecutive heads?

    (1) $\frac{1}{8}$ (2) $\frac{1}{4}$ (3) $\frac{3}{8}$ (4) $\frac{1}{2}$

24. If $\log(xy^3) = 1$ and $\log(yx^2) = 1$, what is $\log(xy)$?

    (1) -1/2   (2) 0   (3) 1/2   (4) 3/5

25. x and y are positive integers, then the number of primes x such that xy = 2016 is _____.

    (1) 32   (2) 9   (3) 7   (4) 3

26. The value of 0.0032×0.063 is

    (1) 0.000000002016   (2) 2.016   (3) 0.00000002016   (4) 0.0002016

27. The value of $\left(1 - \frac{1}{3}\right)\left(1 - \frac{1}{4}\right)\left(1 - \frac{1}{5}\right)\left(1 - \frac{1}{6}\right) \ldots \ldots \left(1 - \frac{1}{n}\right)$ is _____.

    (1) $\frac{1}{n}$ (2) $\frac{2}{n}$ (3) $\frac{n-1}{2}$ (4) $\frac{2}{n(n-1)}$

28. The sum of '4' consecutive integers is 2018. Then the greatest among them is _____.

    (1) 510   (2) 508   (3) 506   (4) 503

29. The value of 'x' if $x - (20\% \text{ of } x) = 16$ is

    (1) 16   (2) 24   (3) 20   (4) 18

30. Consider a triangle with sidelengths 20, 17, 10 ; what can you say about this triangle ?

    (1) acute triangle   (2) right triangle   (3) obtuse triangle   (4) no such triangle

PHYSICS:

31. The rectilinear motion of a body is as shown. The displacement and distance of the body in $5\ sec$ is,
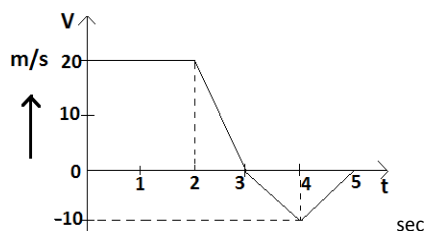
(1) $40m, 30m$ (2) $30m, 45m$ (3) $40m, 60m$ (4) $20m, 10m$

32. A particle moves along the sides of square of length l' and completes one round in time T'. If it starts from one corner of a square and reaches the other end of a diagonal, the average velocity is

(1) $\sqrt{2}\frac{l}{T}$ (2) $2\sqrt{2}\frac{l}{T}$ (3) $\frac{l}{T}$ (4) $\frac{2l}{T}$

33. A $0.1Kg$ bullet acquired a speed of $840m/s$ on exiting a gun barrel $1.5m$ long. The average force exerted on the bullet is

(1) $52305N$ (2) $20000\ N$ (3) $23000\ N$ (4) $23520\ N$

34. A$1\ Kg$ ball drops vertically on to the floor with a speed of $25m/s$. It rebounds with an initial speed of$10m/s$. The impulse acting on the ball during contact is

(1) $35\ Kgm/sec$ downward (2) $53\ Kgm/sec$ upward

(3) $35\ Kgm/sec$ upward (4) $53\ Kgm/sec$ downward

35. From figure, If$m_1 = 20Kg, m_2 = 30Kg, m_3 = 50Kg\ \&F = 200N, T_1\&T_2$ are

(1) $160N, 130N$ (2) $100N, 400N$ (3) $40N, 50N$ (4) $100N, 160N$

36. A bullet of mass $50g$ is firedfrom a $5Kg$ gun with a speed of $500m/s$. The velocity of recoil of the gun is

(1) $5m/s$ (2) $6m/s$ (3) $4m/s$ (4) 0

37. The weight of the body at the centreof the earth is_____ , (given it weighs $40Kg$ on the surface of the earth)

(1)$15Kgf$ (2) $40Kgf$ (3) $30Kgf$ (4) zero

38. The pressure $200m$ below the surface of the ocean is _____, if the specific gravity of sea water is 1.03, and Atmospheric pressure is $1.03 \times 10^5 N/m^2$

(1) $2.12 \times 10^5 N/m^2$ (2) $21.2 \times 10^5 N/m^2$ (3) $212 \times 10^5 N/m^2$ (4) $10^5 N/m^2$

39. A solid glass sphere weighs $10N$ in air, $6N$ when immersed in water. The specific gravity of glass is

(1) 5.2 (2) 2.5 (3) 4.5 (4) none

40. The sound produced by a tuning fork has a wavelength of $1.4m$ in air. The wavelength in water is

    ($v_{air} = 330\text{m/s}$; $v_{water} = 1400\text{m/s}$)

    (1) $5m$ (2) $4.94m$ (3) $3.94m$ (4) $5.94m$

41. A candle is held at $10cm$ from the Concave mirror of focal length $50cm$. The position of the image will be

    at____

    (1) $12.5cm$ infront of the mirror   (2) $12.5\ cm$ behind the mirror

    (3) $14cm$ infront of the mirror   (4) $20cm$ behind the mirror

42. The minimum distance between an object and its real image formed by a converging lens is $1m$. The power

    of the lens is

    (1) $4D$ (2) $5D$ (3) $1D$ (4) $2D$

43. A person shot a gun near a cliff and heard the echo after $5 seconds$. What is the distance of the cliff from

    the person, if the speed of the sound is $346m/s$.

    (1) $650m$ (2) $742m$ (3) $865m$ (4) $625m$

44. Out of three bulbs of $25W$, $40W$ and $60W$, the one with lowest resistance is

    (1) $25W$ bulb   (2) $60W$ bulb   (3) $40W$ bulb   (4) cannot be estimated

45. Magnetism in the middle of a bar magnet is

    (1) zero   (2) high   (3) minimum   (4) none

46. Which one of the following doesnot represent the unit of length

    (1) angstrom   (2) micron   (3) parsec   (4) radian

47. For a freely falling body the quantity that remains constant is

    (1) displacement   (2) velocity   (3) acceleration   (4) none

48. A body is dropped from a height $240m$ to the ground. At the same time another body is projected

    vertically upwards with a velocity $60m/s$ from the same ground. They will meet after

    (1) $4\ sec$ (2) $10\ sec$ (3) $6\ sec$ (4) $12\ sec$

49. A machine gun fires 90 bullets in one minute. If mass of each bullet is $30g$ and velocity is $100m/s$ then the

    force required to hold the gun is

    (1) $270N$ (2) $27N$ (3) $4.5N$ (4) $33.3N$

50. A bomb of mass $12Kg$ explodes into two pieces of masses $4Kg$ and $8Kg$. The velocity of $8Kg$ mass is

    $6m/s$. The Kinetic Energy of the other mass is

    (1) $48J$ (2) $32J$ (3) $24J$ (4) $288J$

51. Two bodies of masses $24Kg$ and $36Kg$ are connected by a string passing over a frictionless fixed pulley. The

    tension on the string is

    (1) $17.28N$ (2) $30N$ (3) $120N$ (4) none of these

52. Sand drops fall vertically at the rate of $2 Kg/s$ on to a conveyor belt moving horizontally with a velocity of $0.1 m/s$. Calculate the extra power in watt needed to keep the belt moving is

    (1) $0.01\ watt$ (2) $0.02\ watt$ (3) $0.03\ watt$ (4) $0.04\ watt$

53. The weight of a body on the earth is $900 N$. Find weight of the body on the planet whose mass is 4 times and radius is 3 times that of the earth.

    (1) $400 N$ (2) $900 N$ (3) $1200 N$ (4) $450 N$

54. The relation between acceleration due to gravity $'g'$ and universal gravitational constant $'G'$ is ($'R'$ is radius of the earth and $'M'$ is mass of the earth)

    (1) $g = \dfrac{GM^2}{R^2}$ (2) $g = \dfrac{GM}{R^2}$ (3) $G = \dfrac{gM}{R^2}$ (4) $g = \dfrac{GM}{R}$

55. At what temperature the velocity of sound at $0^0 C$ will be doubled?

    (1) $1092^0 C$ (2) $819^0 C$ (3) $273 K$ (4) none of these

56. What is the minimum distance an observer should stay away from an obstacle to receive an echo?
    (velocity of sound in air$= 330 m/s$)

    (1) $17 m$ (2) $16.5 m$ (3) $33 m$ (4) $25 m$

57. The ratio of the densities of oxygen and nitrogen is $16 : 14$. At what temperature is the speed of sound will be the same as in nitrogen at $14^0 C$?

    (1) $35^0 C$ (2) $45^0 C$ (3) $55^0 C$ (4) $65^0 C$

58. A coin is placed at the bottom of a trough completely filled with water, the coin appears to be raised by $4 cm$. What is the refractive index of water?

    (1) $4/3$ (2) $5/3$ (3) $7/3$ (4) $3/2$

59. It is possible to observe total internal reflection when a ray travels from

    (1) air into water   (2) air into glass   (3) water into glass   (4) glass into water

60. A bar magnet of length $88 cm$ and polestrngth $20 Am$ is bent into a semicircular form. The new magnetic moment is

    (1) $11.2 Am^2$ (2) $22.6 Am^2$ (3) $10 Am^2$ (4) none of these

CHEMISTRY:

   Note:$Atomic\ mass\ in\ amu: Al = 27,\ O = 16,\ S = 32, Cl = 35.5, H = 1, Ca = 40,\ N = 14$

61. Which one of the following is not a mixture?

    (1) Distilled water   (2) Sugar dissolved in water

    (3) Liquefied petroleum gas   (4) Gasoline

62. Which one of the following is not a chemical change?

    (1) Sublimation   (2) Combustion   (3) Electrolysis   (4) Rusting

63. A pure substance can only be

    (1) compound   (2) an element

    (3) an element (or) compound   (4) a heterogeneous mixture

64. Which of the properties of the elements is a whole number?

    (1) Atomic mass   (2) Atomic number   (3) Atomic radius   (4) Atomic volume

65. Which of the following pair of elements show variable valency?

    (1) Iron, Sodium   (2) Copper, Zinc   (3) Copper, Iron   (4) Calcium, Sodium

66. Find the percentage by mass of nitrogen in calcium nitrate.

    (1) 24   (2) 17   (3) 59   (4) none of these

67. How many moles of NH_3 are there in $250 cm^3$ of a 30% solution, the specific gravity of which is 0.90?

    (1) 3.97 (2) 0.397 (3) 39.7 (4) none of these

68. The number of phases present in colloidal solution is

    (1) 2   (2) 4   (3) 3   (4) 1

69. Which of the following is not a colloidal system?

    (1) Bread   (2) Muddy water   (3) Concrete   (4) Sugar solution

70. What is the Greek name for sun?

    (1) Hydro   (2) Oxy   (3) Helio   (4) Fermi

71. What is the mass of half a mole of $Na_2SH_{20}O_{14}$?

    (1) $333g$ (2) $322g$ (3) $161g$ (4) none of these

72. Which of the following equations is not balanced?

    (1) $2FeS_2 + 11O_2 \rightarrow 2Fe_2O_3 + 4SO_2$ (2) $CO + Fe_3O_4 \rightarrow 3FeO + CO_2$

    (3) $2KI + 2H_2SO_4 \rightarrow K_2SO_4 + I_2 + SO_2 + 2H_2O$ (4) none of these

73. The density of the solution of salt is $1.15 g/mL$. $20mL$ of the solution when completely evaporated gave a residue of $4.6g$ of the salt. Find the mass percentage of the solute in solution.

    (1) 20   (2) 80   (3) 15.625   (4) none

74. Which of the following statement(s) is/are correct?

    (A) particles in water at 0^0C have more energy as compared to particles in ice at the same temperature.

    (B) The boiling point of water is $273K$ (C) Solid CO is known as dry ice   (D) CNG is used in automobiles

    (1) AB   (2) AC   (3) BD   (4) AD

75. Total number of electrons present in $K\&L$ shells of an atom is

    (1) 2   (2) 8   (3) 10   (4) 18

76. Which one of the following is a correct electronic configuration of Sodium?

(1) 2, 8   (2) 2, 1, 8   (3) 2, 8, 1   (4) 2, 2, 8

77. The number of atoms constituting a molecule is called

(1) Molecularity   (2) Specific gravity   (3) Atomicity   (4) none of these

78. The dispersed phase in aerosol is

(1) liquid   (2) solid   (3) gas   (4) liquid or solid

79. Which of the following statements is false?

(1) Fractional distillation process is used when the difference in the boiling points of two liquids is less than 25^0C

(2) Distillation is used if the difference in Boiling point between two liquids is greater than 25^0C

(3) NH_4Cl is purified by sublimation process

(4) Ice cream is a true solution

80. Choose the correct statement among the following.

(1) Colloids are heterogeneous mixtures   (2) Sugar solution is a heterogeneous mixture

(3) The formula of Sulphide ion is S_2^- (4) The formula of sodium bicarbonate is Na_2CO_3

81. Which one of the following pair is correct?

(1) $Al_2(SO_4)_3 - 342U$ (2) $H_2SO_4 - 90U$ (3) $O_2 - 16U$ (4) $HCl - 35.5U$

82. Mass of 6.023×10^{22} atoms of Calcium is

(1) $20g$ (2) $24g$ (3) $40g$ (4) $4.0g$

83. $_1H^1$, $_1H^2$ & $_1H^3$ are the three isotopes of Hydrogen. How many neutrons are there in all the three isotopes?

(1) zero   (2) 5   (3) 3   (4) 6

84. A solution contains $20g$ of sugar in $80ml$ of solution. What is the mass by volume percentage of the solution?

(1) 25   (2) 20   (3) 80   (4) none of these

85. Which of these factors affect the rate of the solubility of a solute?

(1) Temperature   (2) Size of solute particles

(3) stirring of solution   (4) all of these

86. Which of the following is used to separate the mixtures into their respective constituents?

(1) Sublimation   (2) Evaporation   (3) Distillation   (4) all of these

87. Which of the following set represents monoatomic, triatomic and diatomic respectively?

(1) Helium, Phosphorus, Ozone   (2) Sodium, Iron, Hydrogen

(3) Aluminium, Ozone, Nitrogen   (4) none of these

88. The formula of a metal iodide is MI_3 , then the formula of its carbonate is

(1) MCO_3 (2) M_2CO_3 (3) $M_2(CO_3)_3$ (4) none of these

89. Which of the following represents advanced atomic model with more merits?

(1) Thomson's model　　　　　　　　(2) Nuclear model of atom

(3) Bohr model of atom　　　　　　　(4) none of these

90. Which of the following metals has Latin name natrium ?

(1) Silver　　　　　(2) Tungsten　　　　　(3) Lead　　　　　(4) Sodium