NATIONAL TALENT SEARCH EXAMINATION,

2019-20
(STATE LEVEL)

(FOR STUDENTS STUDYING IN CLASS X)

Scholastic Aptitude Test (SAT)

Time: 120 Minutes   *Full Marks: 100*

INSTRUCTIONS TO CANDIDATES

➢ The question paper consists of **100** multiple choice questions divided into five sections.

   Section – I contains **20** questions of **Mathematics.**

   Section – II contains **13** questions of **Physics.**

   Section – III contains **13** questions of **Chemistry.**

   Section – IV contains **14** questions of **Biology.**

   Section – V contains **40** questions of **SST.**

➢ Each question carries **+1** marks.

➢ There is **No negative** marking.

➢ Attempt **All** questions.

➢ Use of Calculator is **NOT PERMITTED**.

➢ All symbols have their usual meanings, if not mentioned in the question.

➢ The Question Paper contains blank spaces for your rough work.


Enrollment No. : ⬜⬜⬜⬜ ⬜⬜ ⬜⬜⬜ ⬜⬜   **Batch :** _____

Name : _____

Candidate's Signature _____   **Invigilator's Signature:** _____

1. If $23x - 29y = 98$ and $29x - 23y = 110$, then the value of $\sqrt{x^2 + y^2}$ is

   (a) $\sqrt{10}$ (b) $\sqrt{5}$ (c) 10   (d) 7

2. If $x = \dfrac{y}{y+1}$ and $y = \dfrac{a-2}{2}$, then the value of $x(y + 2) + \dfrac{x}{y} + \dfrac{y}{x}$ is

   (a) 1   (b) 0   (c) −1   (d) a

3. If $\sin\theta + \sin^3\theta = \cos^2\theta$, then the value of $\cos^6\theta - 4\cos^4\theta + 8\cos^2\theta$ is

   (a) 1   (b) 4   (c) 2   (d) 0

4. If $x^2 + y^2 = 2\sqrt{2}x + 4\sqrt{2}y - 10$, then the value of $\dfrac{x}{y}$ is

   (a) $\dfrac{1}{2}$ (b) $\dfrac{1}{4}$ (c) 2   (d) 4

5. If $x + y = 12$, then the maximum value of xy will be

   (a) 20   (b) 30   (c) 36   (d) 40

6. If $\dfrac{4+\sqrt{5}}{2}$ and $\dfrac{4-\sqrt{5}}{2}$ be the roots of a quadratic equation, then the quadratic equation will be

   (a) $4x^2 - 17x - 9 = 0$ (b) $6x^2 - 16x - 9 = 0$ (c) $x^2 - 5x + 8 = 0$ (d) $4x^2 - 16x + 11 = 0$

7. If $\sin^4 x + \sin^2 x = 1$, then the value of $\cot^4 x + \cot^2 x$ will be

   (a) 0   (b) 1   (c) 2   (d) 4

8. $\sqrt{a\sqrt{b\sqrt{c\sqrt{d}}}} =$

   (a) $a^{1/2}b^{1/4}c^{1/8}d^{1/16}$ (b) $(abcd)^{1/16}$ (c) $(abcd)^{1/8}$ (d) $a^{1/2}b^{1/2}c^{1/2}d^{1/2}$

9. A train goes from Sealdah to Rannghat with velocity 60 km/hr and return from Rannghat to Sealdah with velocity 80 km/hr. The average velocity of the train will be

   (a) 70 km/hr   (b) $68\dfrac{4}{7}$ km/hr   (c) $70\dfrac{4}{7}$ km/hr   (d) 68 km/hr

10. The triangle formed by the points (7, 9), (3, −7) and (−3, 3) is

    (a) Equilateral   (b) Isosceles   (c) Scalene   (d) Right angled and Isosceles

11. In a cuboid the length of the diagonal is p, the sum of areas of all the surfaces is q and the sum of lengths of coinitial edges is r. Then which one of the following relations is true ?

    (a) $r = 4\sqrt{p^2 + q^2}$ (b) $r = \sqrt{4(p^2 + q)}$ (c) $r = \sqrt{p^2 + q}$ (d) $r = 4\sqrt{p^2 - q}$

12. If a cube has surface area s and volume v, then the volume of the cube with surface area 2s will be

(a) 2v (b) $2\sqrt{2}v$ (c) 4v (d) $\sqrt{2}v$

13. Average of 1st 100 natural numbers is

(a) 50 (b) 50.5 (c) 505 (d) 51.5

14. In the figure given below, ABCD is a quadrilateral and if $\overline{AB} = 5cm$, $\overline{AD} = 12cm$, $\overline{BC} = \overline{CD} = 13cm$, then the area of the quadrilateral ABCD is
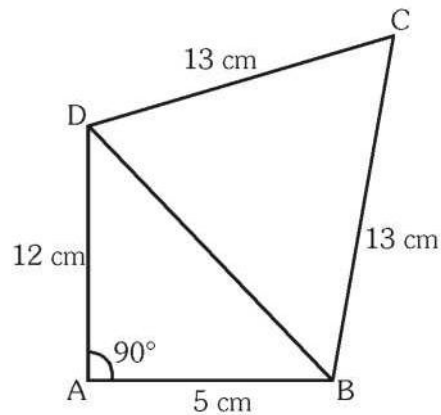
(a) $\frac{1}{4}\left(120 + 169\sqrt{3}\right)$ sq.cm

(b) $\frac{1}{4}\left(120 - 169\sqrt{3}\right)$ sq.cm

(c) $\frac{1}{2}\left(60 + 169\sqrt{3}\right)$ sq.cm

(d) $\frac{1}{2}\left(60 - 169\sqrt{3}\right)$ sq.cm

15. Area of a triangle whose lengths of medians are 9 cm, 12 cm and 15 cm will be

(a) 72 sq. cm (b) 36 sq. cm (c) 154 sq. cm (d) 108 sq. cm

16. The relation which will be obtained by eliminating θ from $x = a \sec^n \theta$ and $y = b \tan^n \theta$ is

(a) $\left(\frac{x}{a}\right)^{1/n} + \left(\frac{y}{b}\right)^{1/n} = 1$

(b) $\left(\frac{x}{a}\right)^{2} - \left(\frac{y}{b}\right)^{2} = 1$

(c) $\left(\frac{x}{a}\right)^{1/n} - \left(\frac{y}{b}\right)^{1/n} = 1$

(d) $\left(\frac{x}{a}\right)^{2/n} - \left(\frac{y}{b}\right)^{2/n} = 1$

17. If ABCD is a cyclic quadrilateral, then the value of $\left(\tan\frac{A}{2}\tan\frac{C}{2} + \tan\frac{B}{2}\tan\frac{D}{2}\right)$ is
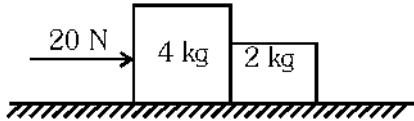
(a) 1 (b) $\frac{1}{2}$ (c) 3 (d) 2

18. 4 unbiased coins are tossed simultaneously. The probability that two tails occur will be

(a) $\frac{3}{8}$ (b) $\frac{3}{16}$ (c) $\frac{4}{16}$ (d) $\frac{5}{16}$

19. The roots of the equation $x^2 - 5x - 2 = 0$ are

(a) Real and Rational (b) Imaginary (c) Real and Equal (d) Real and Irrational

20. If $\sum f_i x_i = 216,$ $\sum f_i = 16$ and weighted mean $= 13.5 + P$, then the value of P will be

(a) 1   (b) 0.1   (c) 0.01   (d) 0

21. The distance-time graph of a particle makes an angle $45°$ with the time axis. After 1 second it makes an angle $60°$ with the time axis. What is the average acceleration of the particle during this time interval?

(a) $(\sqrt{3} - 1)$ unit   (b) $(\sqrt{3} + 1)$ unit   (c) $\sqrt{3}$ unit   (d) 1 unit

22. Two blocks of mass 4 kg and 2 kg are placed side by side on a smooth horizontal table and a horizontal force of 20 N is applied on the 4 kg block as shown in the figure. The normal reaction between the two blocks will be

(a) 10/3 N   (b) 20/3 N   (c) 25/3 N   (d) 40/3 N

23. All other conditions remaining same, if the velocity of sound in oxygen and hydrogen gases are given by V_O and V_H respectively, then which one of the following is correct?

(a) $V_H = 2V_O$ (b) $V_H = 4V_O$ (c) $V_H = V_O$ (d) $V_O = 4V_H$

24. All other conditions remaining same, if the temperature of a gas medium drops by 1%, the velocity of sound in that medium will

(a) increase by 0.5% remain unchanged   (b) remain unchanged

(c) decrease by 0.5%   (d) decrease by 2%

25. A beam of light is incident at $60°$ to a plane separating two medium. The reflected and refracted rays are found to be perpendiclar to each other. What is the refractive index of the second medium with respect to the first medium?

(a) $1/\sqrt{3}$ (b) 1/3   (c) $\sqrt{3}$ (d) 3

26. The peak value of AC voltage on a 220 V mains is

(a) $240\sqrt{2}$V   (b) $230\sqrt{2}$V   (c) $220\sqrt{2}$V   (d) $110\sqrt{2}$V

27. Two rain drops reach the earth with terminal velocities in the ratio 4 : 9. What is the ratio of their radii? (Take all other conditions remains same)

(a) 4 : 9   (b) 2 : 3   (c) 16 : 81   (d) 9 : 4

28. The absolute refractive indices of water and glass are 4/3 and 3/2 respectively. Which is the refractive index of glass with respect to water?

(a) 1.125   (b) 1.5   (c) 1.25   (d) 1.52

29. A block of ice is floating in water keeping $1/11^{th}$ part of its volume above water level. Taking density of water as 1 g/cm^3, what is the nearest value of density of ice block?

(a) 0.81 g/cm^3 (b) 0.91 g/cm^3 (c) 0.11 g/cm^3 (d) 1.11 g/cm^3

30. A and B are two radioactive substances having half life periods T_A and T_B respectively. If $T_A = 3T_B$ and λ_A and λ_B are the respective disintegration constant, what relation between them is correct?

(a) $\lambda_B : \lambda_A = 3 : 1$ (b) $\lambda_B : \lambda_A = 1 : 3$ (c) $\lambda_B : \lambda_A = 2 : 3$ (d) $\lambda_B : \lambda_A = 3 : 2$

31. In the equation of motion $S = at^2 + bt$; S and t are distance and time respectively and a and b are constants. The unit of a and b are respectively given by

(a) $m/s^2, m/s$ (b) $m/s^2, m/s^2$ (c) $m/s^2, m/s^3$ (d) $m/s, m/s^2$

32. When electromagnetic wave propagates, the angle between the electric field and the magnetic field is given by

(a) $0°$ (b) $90°$ (c) $45°$ (d) $135°$

33. The three sides of triangle are of equal resistance of value R each. What is the equivalent resistance between any two vertexes of triangle?

(a) 3R   (b) 2R   (c) R/3   (d) 2R/3

34. Number of neutrons in a parent nucleus 'A' which gives $_7N^{14}$ after two successive beta emission would be

(a) 6   (b) 7   (c) 8   (d) 9

35. The anhydride of pyrosulphuric acid is

(a) SO_2 (b) SO_3 (c) S_2O_3 (d) S_2O_7

36. Which ammonium compound does not produce ammonia gas on heating

(a) $(NH_4)_2SO_4$ (b) $(NH_4)_2CO_3$ (c) NH_4NO_2 (d) NH_4Cl

37. The compound which contains ionic as well as covalent bond is

(a) H_2O_2 (b) KCN   (c) KCl   (d) CH_3Cl

38. In the following compounds which two are not isomers to each other

(a) $(CH_3)_2CHCH_3$, $(CH_3)_2CHCH_2CH_3$

(b) CH_3CH_2OH, $CH_3\text{-}O\text{-}CH_3$

(c) $C_2H_5\text{-}O\text{-}C_2H_5$, $CH_3\text{-}O\text{-}C_3H_7$

(d) CH_3CH_2CHO, CH_3COCH_3

39. The reaction of $AgNO_3$ with acetylene shows which type of property of acetylene

(a) Acidic   (b) Oxidizing   (c) Basic   (d) Reducing

40. In the titration of a weak acid and weak base no indicator is suitable for locating the end point. This is due to

(a) indicator not changing its colour   (b) pH change being much less at the equivalence point

(c) neutralization reaction is very slow   (d) neutralization reaction is very fast

41. What is the number of molecules of CO_2 which contains 8 gms of O_2?

(a) 1.5×10^{23} molecules   (b) 2×10^{23} molecules   (c) 1.5×10^{22} molecules   (d) 2×10^{22} molecules

42. Which reagent will be helpful in differentiating ethanoic acid from ethanol?

(a) Br_2/CCl_4 (b) Dilute NaOH   (c) Dilute HCl solution   (d) $NaHCO_3$

43. Which statement about the cathode and anode of an electrolytic cell is correctly applicable?

(a) Oxidation occurs at cathode and cathode is a negative electrode.

(b) Reduction occurs at cathode and anode is a negative electrode.

(c) Oxidation occurs at anode and anode is a Positive electrode.

(d) Reduction occurs at anode and cathode is a positive electrode.

44. A sample of aqueous $CuSO_4$ was divided in to two equal parts. Through one of these H_2S gas was passed and through the other a small amount of dilute NH_3 solution was added. The colour of the precipitates formed in these two cases will be respectively

(a) Black and brown   (b) Bluish- white and black   (c) Brown and black   (d) Black and bluish-white

45. Among the four elements Li, Na, K, Be, which one has the highest first ionisation energy?

(a) Li   (b) Be   (c) K   (d) Na

46. Under the identical conditions of temperature, The density of gas A is three times that of gas B while molecular mass of B is twice that of gas A. The ratio of pressures of A and B will be

(a) 6:1   (b) 1:6   (c) 2:3   (d) 3:2

47. ACTH stimulates production of

(a) Glucocorticoids   (b) Adrenaline   (c) Thyroxine   (d) Gonadotropins

48. The enzyme,secreted in your mouth helps to digest the rice that you are having in your lunch is

(a) Salivary amylase   (b) Pepsin   (c) Trypsin   (d) Intestinal lipase

49. Mendel chose the following plant for his experiment related to heredity:

(a) *Pisum sativum*(matar)   (b) *Hibiscus rosasinensis*(Jaba) (c) *Mirabilis jalapa*(Sandhyamalati)(d) None of the above

50. The membrane enclosing the heart is known as

(a) Epicardium   (b) Pericardium   (c) Supracardium   (d) Endocardium

51. Analogous organs are those which have

(a) Common origin and common functions   (b) Common origin but different functions.

(c) Similar functions but different origins   (d) Different functions and different origins.

52. Plants that have pneumatophores and show vivipary are known as

(a) Mesophytes   (b) Halophytes   (c) Psammophytes   (d) Hydrophytes

53. Passive immunity is obtained through injecting

(a) Antibiotics   (b) Vaccines   (c) Antigens   (d) Antibodies

54. A transition area between two biomes is known as

(a) Ecozone (b) Biotope (c) Ecotone (d) Buffer Zone

55. Identify the wrong one

(a) Mollusca – Pseudopodia (b) Cnidaria - Nematocyst

(c) Annelida – True coelome (d) Echinodermata – Water vascular system

56. Air sacs in birds help in

(a) Double respiration (b) Increase of body weight (c) Storage of more food (d) loss in lung functions

57. Vasopressin is synthesized in

(a) Adenohypophysis (b) Thyroid (c) Hypothalamus (d) Neurohypophysis

58. The Acharya Jagadish Candra Bose Indian Botanic Garden is situated in

(a) Shibpur, Howrah (near Kolkata) (b) Dehradun

(c) Lucknow (d) Chennai

59. Chromosomes are made up of

(a) DNA (b) RNA (c) Protein (d) All of the above

60. The symbol of WWF (world wildlife found) is

(a) Giant Panda (b) Tiger (c) Rhododendron (d) White Bear

61. "I am the Revolution and I destroyed the Revolution" - Whose speech it was?

(a) Louis XIV (b) Alexander II (c) Napoleon Bonaparte (d) Bismarck

62. Which of the following countries, mentioned was not the member of the Axis power in the Fist World War?

(a) Germany (b) Austria (c) Italy (d) Turkey

63. The Russian Revolution took place in

(a) 1789 AD (b) 1857 AD (c) 1911 AD (d) 1917 AD

64. The First Secretary General of the UNO was

(a) Trygve Lie (b) Ban kin Moon (c) Hammer Shield (d) Butros Butros Ghali

65. Sui Munda was the leader of

(a) The Munda Rebellion (b) The Kol Rebellion

(c) The Chuarh Rebellion (d) The Santhal Rebellion

66. The editor of the 'Bengal Gazette' was

(a) Marshman (b) Surendranath Bandyopadhyay

(c) James Augustus Hickey (d) William Carrey

67. The First woman graduate of Calcutta University was

(a) Kadambini Ganguly
(b) Sarala Devi Chaudhurani
(c) Swarna Kumari Devi
(d) Kalpana Dutta

68. Mr. Allan Octavian Hume, who was the founder of the Indian National Congress was a

(a) Journalist
(b) Civil Servant
(c) Politicians
(d) Police

69. The first president of "All India Trade Union Congress" was

(a) Byomkesh Chakraborty
(b) Surendranath Halder
(c) Lala Lajpat Rai
(d) Qutubuddin Ahmed

70. 'Vaikom Satyagraha' was started in

(a) Kerala
(b) Andhra Pradesh
(c) Maharashtra
(d) Gujarat

71. The Poona Pact (1932) was signed between

(a) Gandhiji and Lord Irwin
(b) Gandhiji and B.R. Ambedker
(c) Gandhiji and Chamberlin
(d) Gandhiji and Ramsay Macdonald

72. The writer of the book named 'Udbastu' was

(a) Hiranmoy Bandyopadhayay
(b) Prafulla Kumar Chakraborty
(c) Prabhash Chandra Lahiri
(d) Dakshinaranjan Basu

73. We separate our planet as two hemispheres - East and West. If you want to put your two legs in two hemisphere, then you must visit following counhtry

(a) Italy
(b) Germany
(c) Netherlands
(d) France

74. Limestone is an example of

(a) Igneous rock
(b) Sedimentary rock
(c) Metamorphic rock
(d) None of these

75. If the location of Kolkata is 22°30' North and 88°30' East, what will be the latitude and longitude of the Antipode of Kolkata?

(a) 22°30' South and 88°30' West
(b) 22°30' South and 91°30' West
(c) 58°30' South and 88°30' West
(d) 31°30' South and 108°30' West

76. The processes of waste management involve

(a) Reuse of waste
(b) Recycling of waste
(c) Reduction of waste
(d) All of these

77. One depositional feature of the Glacier is

(a) Roche Mountonnes
(b) Cravasse
(c) Fonts
(d) Drumlins

78. Which of the following is not suitable for the character of an 'Isobar'?

(a) The unit of isobar is millibar

(b) When the isobars are very near to each other, the wind blows faster

(c) When the isobars are not very close to each other, the movement of wind is slower

(d) Someimes the isobars are perpendicular to each other

79. Canary current flows along the coast of

(a) Portugal   (b) Peru   (c) Japan   (d) India

80. Which of the following is not a right bank tributary of the Ganga river?

(a) Yamuna   (b) Son   (c) Damodar   (d) Gomti

81. Crops grown during April, May and June are known as

(a) Zayad crops   (b) Kharif crops   (c) Rabi crops   (d) Spring crops

82. Lamba in Gujarat is famous for

(a) Hydel power   (b) Wind power   (c) Atomic power   (d) Thermal power

83. India's first petro-chemical industry is

(a) UCIL   (b) HPL   (c) IPL   (d) NOCIL

84. Diamond Quadrilateral is related to

(a) Metro Rail   (b) High Speed Railways   (c) Road ways   (d) Water ways

85. 'The Prince' was written by

(a) Plato   (b) Aristotole   (c) Laski   (d) Machiavelli

86. 'Fundamental Duties' of the citizen of India are described in the constitution of India under chapter

(a) III   (b) IV   (c) V   (d) VI

87. How many members of the Rajya Sabha can be nominated by the president of India?

(a) 2   (b) 4   (c) 6   (d) 12

88. The President of India can Proclaim 'National Emergency' according to Article _____.

(a) 350   (b) 352   (c) 356   (d) 360

89. The 'Joint Session' of the Parliament in India is presided over by the _____.

(a) Vice President   (b) Speaker of the Lok Sabha   (c) Governor   (d) President

90. In Parliamentary System of the Cabinet remains responsible to the ____.

(a) President   (b) Prime Minister   (c) Legislature   (d) Supreme Court

91. The term of the non permanent members of the Security Council of the U.N.O. is ____.

(a) 2 years   (b) 3 years   (c) 4 years   (d) 5 years

92. The Upper House of the State Legislature is _____.

(a) Legislative Assembly   (b) Legislative Council   (c) Lok Sabha   (d) Rajya Sabha

93. National Income of a country is the total of

(a) All the incomes of the persons of a country   (b) the income generated by the public sector

(c) the factor incomes   (d) (b) and the total of all income from abroad.

94. Which of the following taxes is not useful to lower the inequality in income?

(a) Goods and Service Tax   (b) Income Tax

(c) Wealth Tax   (d) Profession Tax

95. In which form of market there is no control on price by an individual seller?

(a) A market where there is a large number of buyers and large number of sellers

(b) A market where there is a large number of buyers and a single seller

(c) A market where there is a single seller and a single buyer

(d) A market where there is few sellers and a large number of buyers

96. Suppose, x denotes the rate of interest on the securities sold by Central Bank to Commercial Banks and y denotes the rate of interest on the loans take by Commercial Bank from Central Bank. Now to lower the capacity of Commercial Banks to provide loans which one is necessary in the time of inflation?

(a) y must be less than x   (b) y must be greater than x

(c) x and y must be equal   (d) It is not dependent on x and y

97. The earning of a factor of production from an alternative use is known as the ____ of that factor of production

(a) Money Cost   (b) Real Cost   (c) Average Cost   (d) Opportunity Cost

98. If the price elasticity of demand for a goods is inelastic and there is no substitute goods in the market, an increase in its price will cause that total expenditure of consumers of the goods to

(a) Increase   (b) decrease   (c) remain same   (d) become zero

99. Which one of the following is not a characteristic of a Capitalist Economy?

(a) Private Ownership of resources   (b) Freedom of enterprise

(c) Consumer sovereignty   (d) Existence of Central Planning Authority

100. Human Development Index measures ____ of an economy.

(a) Birth rate   (b) Death rate   (c) Quality of education   (d) Quality of life

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1

$$23x - 29y = 98 \Rightarrow 667x - 841y = 2842$$
$$29x - 23y = 110 \Rightarrow 667x - 529y = 2530$$

$$-312y = 312$$
$$-y = (-1)$$

$$x = \frac{98 - 29}{23} = \frac{69}{23} = 3$$
$$\therefore \sqrt{x^2 + y^2} = \sqrt{9+1} = \sqrt{10}$$

Ans. A

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2 $x = \dfrac{y}{y+1}$ and $y = \dfrac{a-2}{2}$

$$\therefore x = \frac{\dfrac{a-2}{2}}{\dfrac{a-2}{2}+1} = \frac{\dfrac{a-2}{2}}{\dfrac{a-2+2}{2}} = \frac{a-2}{a}$$

$$\therefore x(y+z) + \frac{x}{y} + \frac{y}{x}$$

$$\left(\frac{a-2}{a}\right)\left(\frac{a-2}{2}+2\right) + \frac{\dfrac{a-2}{a}}{\dfrac{a-2}{a}} + \frac{\dfrac{a-2}{2}}{\dfrac{a-2}{a}}$$

$$\frac{(a-2)(a+2)}{2a} + \frac{2}{a} + \frac{a}{2}$$

$$= \frac{a^2 - 4 + 4 + a^2}{2a} = \frac{2a^2}{2a} = a$$

Ans. D

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3 $\sin\theta + \sin^3\theta = \cos^2\theta$ \qquad $\cos^2\theta - 4\cos^4\theta + 8\cos^2\theta$

$$\Rightarrow \sin^2\theta + \sin^6\theta + 2\sin^4\theta = \cos^4\theta$$

$$\Rightarrow 1 - \cos^2\theta + \left(\sin^2\theta\right)^3 + 2\left(\sin^2\theta\right)^2 = \cos^4\theta$$

$$\Rightarrow 1 - \cos^2\theta + \left(1 - \cos^2\theta\right)^3 + 2\left(1 - \cos^2\theta\right) = \cos^4\theta$$

$$\Rightarrow 1 + \cos^2\theta - \cos^6\theta - 3\cos^2\theta + 3\cos^4\theta + 2\left\{1 + \cos^4\theta - 2\cos^{2\theta}\right\} = \cos^4\theta$$

$$\Rightarrow 2 - 4\cos^2\theta - \cos^6\theta + 4\cos^4\theta = 0$$

$$\Rightarrow 8\cos^2\theta - 4\cos^4\theta + \cos^6 = 4$$

Ans. B

4	$x^2 - 2\sqrt{2}x + 2 + y^2 - 4\sqrt{2}y + 8 = 0$
	$\Rightarrow \left(x - \sqrt{2}\right)^2 + \left(y - 2\sqrt{2}\right)^2 = 0$
	$\therefore x - \sqrt{2} = 0 \Rightarrow x = \sqrt{2}$
	$y - 2\sqrt{2} = 0 \Rightarrow y = 2\sqrt{2}$
	$\therefore \dfrac{x}{y} = \dfrac{\sqrt{2}}{2\sqrt{2}} = \dfrac{1}{2}$
	Ans. A
5	$AM \geq GM$
	$\Rightarrow \dfrac{x+y}{2} \geq \sqrt{xy}$
	$\Rightarrow \dfrac{12}{2} \geq \sqrt{xy}$
	$\Rightarrow \sqrt{xy} \leq 6$
	$\Rightarrow xy \leq 36$
	36 is maximum value.
	Ans. C
6	$\alpha = \dfrac{4+\sqrt{5}}{2}, \ \beta = \dfrac{4-\sqrt{5}}{2}$
	$\alpha + \beta = \dfrac{4+\sqrt{5}+4-\sqrt{5}}{2} = 4$
	$\alpha\beta = \dfrac{16-5}{4} = \dfrac{11}{4}\left[k\left(x^2 - \left(\alpha+\beta\right)x + \alpha\beta\right) = 0\right]$
	$\therefore 4x^2 - 16x + 11 = 0$
	Ans. D
7	If $\sin^4 x + \sin^2 x = 1$, value of $\cot^4 x + \cot^2 x$
	$\sin^4 x = 1 - \sin^2 x$
	$\Rightarrow \sin^4 x = \cos^2 x$
	$\Rightarrow \sin^2 x \times \sin^2 x = \cos^2 x \Rightarrow \sin^2 x = \cot^2 x$
	$\cot^2 x + \cot^4 x \Rightarrow \sin^2 x + \sin^4 x = 1$
	Ans. B
8	**Ans. A**

9	$$\frac{d}{\frac{d}{60}+\frac{d}{80}}$$
	$$=\frac{80d+60d}{4800}=\frac{140d}{4800}$$
	$$=\frac{7d}{240}$$
	$$V_{avg}=\frac{2d}{\frac{7d}{240}}=\frac{480}{7}\text{ kmph}=68.57\text{ kmph}$$
	Ans. B

10	$(7, 9),\ (3,\ -7),\ (-3, 3)$
	$$\sqrt{(7-3)^2+(9+7)^2}=\sqrt{16-256}=\sqrt{272}$$
	$$\sqrt{(3+3)^2+(-7-3)^2}=\sqrt{36+100}=\sqrt{126}$$
	$$\sqrt{(7+3)^2(9-3)^2}=\sqrt{100+36}=\sqrt{136}$$
	Ans. D

11	$$\sqrt{l^2+b^2+h^2}=\rho$$
	$$l^2+b^2+h^2=\rho^2$$
	$$2(lb+bh+hl)=\theta$$
	$$4\times(l+b+h)=\gamma$$
	Ans. A

12	Let the side of first cube $=a$
	$\therefore\ 6a^2=S$
	$$\Rightarrow a=\sqrt{\frac{5}{6}}$$
	$a^3=V$
	$$\Rightarrow a=\sqrt[3]{V}$$
	$$\therefore\ \sqrt{\frac{5}{6}}=\sqrt[3]{V}$$
	$$\Rightarrow\sqrt{\frac{2S}{6}}=\sqrt{2}\sqrt{\frac{S}{6}}=\sqrt[3]{V}\text{ side of new cube}$$
	$\therefore$ Volume of new cube $=2\sqrt{2}\times V$
	Ans. B

13	$1, 2, 3, 4, \ldots\ldots\ldots\ldots,$ till 100th
	$a=1,\ d=1,\ n=100$
	$$S_n=\frac{n}{2}(2a+(n-1)d)=50(2+99)$$
	$$=50\times101$$
	$$=5050$$
	$$\therefore\text{ Average}=\frac{5050}{100}=50.5$$
	Ans. B

14
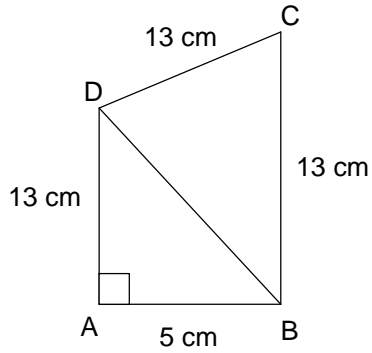
Area of ABCD

$\therefore \ \text{Area} = \dfrac{1}{2} \times 5 \times 12 + \dfrac{\sqrt{3}}{4} = 13 \times 13$

$= 30 + \dfrac{\sqrt{3}}{4} \times 16$

$= 30 + 73.09$

$= 103.09$

$= \dfrac{1}{4}\left(120 + 169\sqrt{3}\right)$ sq. cm.

Ans. A

15

$S = \dfrac{9 + 12 + 15}{2} = 18$

$= \dfrac{4}{3}\sqrt{S(S-9)(S-12)(S-15)}$

$= \dfrac{4}{3}\sqrt{18(9)(6)(3)}$

$= \dfrac{4}{3}(9 \times 2 \times 3)$

$= 72$

Ans. A

16

$\sec^n \theta = \dfrac{x}{a} \ \Rightarrow \sec \theta = \left(\dfrac{x}{a}\right)^{\frac{1}{n}}$

$\tan \theta = \left(\dfrac{y}{b}\right)^{\frac{1}{n}}$

$\sec^2 \theta - \tan^2 \theta = 1$

$\left(\dfrac{x}{a}\right)^{\frac{2}{n}} - \left(\dfrac{y}{b}\right)^{\frac{2}{n}} = 1$

Ans. D

17	$\left(\tan\dfrac{A}{2}\tan\dfrac{C}{2}+\tan\dfrac{B}{2}\tan\dfrac{D}{2}\right)$

$$=\left(\tan\left(\frac{180^\circ-C}{2}\right)\tan\frac{C}{2}+\tan\frac{180^\circ-D}{2}\tan\frac{D}{2}\right)$$

$$=\left(\tan\left(90^\circ-\frac{C}{2}\right)\tan\frac{C}{2}\right)+\left(\tan\left(90^\circ-\frac{D}{2}\right)\tan\frac{D}{2}\right)$$

$$=\cot\frac{C}{2}\tan\frac{C}{2}+\cot\frac{D}{2}\tan\frac{D}{2}$$

$$=1+1=2$$

Ans. D

18	$P\left(\text{two tails}\right)=\dfrac{6}{16}=\dfrac{3}{8}$

Ans. A

19	$x^2-5x-2=0$

$D=b^2-4ac=25+8=33$

$D>0$, Roots are real & unequal

D is not a perfect square

$\therefore$ Roots will be irrational

Ans. D

20	If $\sum\int 1x1=216$ $\sum\int 1=16$

Weighted mean $=13.5+P$

$M=\dfrac{216}{16}=13.5+0$

Ans. D

21	A
22	B
23	B
24	C
25	C
26	C
27	B
28	A
29	B
30	A
31	A
32	B
33	D
34	D
35	D
36	C
37	B
38	A
39	A
40	B

41	A
42	D
43	C
44	D
45	B
46	A
47	A
48	A
49	A
50	B
51	C
52	B
53	D
54	C
55	A
56	A
57	D
58	A
59	D
60	A
61	D
62	C
63	D
64	A
65	D
66	C
67	A
68	B
69	C
70	A
71	B
72	A
73	D
74	B
75	A
76	D
77	D
78	D
79	A
80	A
81	A
82	B
83	D
84	A
85	B
86	C
87	D
88	B
89	B
90	C

91	A
92	B
93	D
94	A
95	A
96	A
97	D
98	A
99	D
100	D