DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE TOLD TO DO SO

T.B.C. : DZOL-T-LKM

Test Booklet Series

A

TEST BOOKLET

ELEMENTARY MATHEMATICS

Time Allowed : Two Hours   *Maximum Marks : 100*

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES *NOT* HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS, ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.

2. Please note that it is the candidate's responsibility to encode and fill in the Roll Number and Test Booklet Series A, B, C or D carefully and without any omission or discrepancy at the appropriate places in the OMR Answer Sheet. Any omission/discrepancy will render the Answer Sheet liable for rejection.

3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. *DO NOT* write **anything else** on the Test Booklet.

4. This Test Booklet contains **100** items (questions). Each item is printed both in **Hindi** and **English**. Each item comprises four responses (answers). You will select the response which you want to mark on the Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each item.

5. You have to mark all your responses **ONLY** on the separate Answer Sheet provided. See directions in the Answer Sheet.

6. **All** items carry equal marks.

7. Before you proceed to mark in the Answer Sheet the response to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per instructions sent to you with your Admission Certificate.

8. After you have completed filling in all your responses on the Answer Sheet and the examination has concluded, you should hand over to the Invigilator *only the Answer Sheet*. You are permitted to take away with you the Test Booklet.

9. Sheets for rough work are appended in the Test Booklet at the end.

10. **Penalty for wrong answers :**
    THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY A CANDIDATE IN THE OBJECTIVE TYPE QUESTION PAPERS.

    (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-third** of the marks assigned to that question will be deducted as penalty.

    (ii) If a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above to that question.

    (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be **no penalty** for that question.

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1. $x^3 + x^2 + 16$ is exactly divisible by x, where x is a positive integer. The number of all such possible values of x is

   (a) 3

   (b) 4

   (c) 5

   (d) 6

2. The number of (a, b, c), where a, b, c are positive integers such that $abc = 30$, is

   (a) 30

   (b) 27

   (c) 9

   (d) 8

3. If the roots of the quadratic equation $x^2 - 4x - \log_{10} N = 0$ are real, then what is the minimum value of N ?

   (a) 1

   (b) $\dfrac{1}{10}$

   (c) $\dfrac{1}{100}$

   (d) $\dfrac{1}{10000}$

4. The number of different solutions of the equation $x + y + z = 12$, where each of x, y and z is a positive integer, is

   (a) 53

   (b) 54

   (c) 55

   (d) 56

5. If $I = a^2 + b^2 + c^2$, where a and b are consecutive integers and $c = ab$, then I is

   (a) an even number and it is not a square of an integer

   (b) an odd number and it is not a square of an integer

   (c) square of an even integer

   (d) square of an odd integer

6. If the number 23P62971335 is divisible by the smallest odd composite number, then what is the value of P ?

   (a) 4

   (b) 5

   (c) 6

   (d) 7

7. What is the remainder when the sum $1^5 + 2^5 + 3^5 + 4^5 + 5^5$ is divided by 4 ?

   (a) 0

   (b) 1

   (c) 2

   (d) 3

8. What is the digit in the unit place of 3^{99} ?

(a) 1

(b) 3

(c) 7

(d) 9

9. LCM of two numbers is 28 times their HCF. The sum of the HCF and the LCM is 1740. If one of these numbers is 240, then what is the other number ?

(a) 420

(b) 640

(c) 820

(d) 1040

10. $(x^n - a^n)$ is divisible by $(x - a)$, where $x \neq a$, for every

(a) natural number n

(b) even natural number n only

(c) odd natural number n only

(d) prime number n only

11. If 17^{2020} is divided by 18, then what is the remainder ?

(a) 1

(b) 2

(c) 16

(d) 17

12. What is the value of

$$\frac{1}{1+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{4}} + \dots + \frac{1}{\sqrt{99}+\sqrt{100}} \ ?$$

(a) 1

(b) 5

(c) 9

(d) 10

13. If $x^m = \sqrt[14]{x \sqrt{x \sqrt{x}}}$, then what is the value of m ?

(a) $\dfrac{1}{8}$

(b) $\dfrac{1}{4}$

(c) $\dfrac{3}{4}$

(d) $\dfrac{7}{4}$

14. The sum of all possible products taken two at a time out of the numbers ± 1, ± 2, ± 3, ± 4, ± 5 is

(a)   0

(b)   − 30

(c)   − 55

(d)   55

15. A train of length 110 m is moving at a uniform speed of 132 km/hr. The time required to cross a bridge of length 165 m is

(a)   6·5 seconds

(b)   7 seconds

(c)   7·5 seconds

(d)   8·5 seconds

16. The simple interest on a certain sum is one-fourth of the sum. If the number of years and the rate of annual interest are numerically equal, then the number of years is

(a)   2·5

(b)   3

(c)   3·5

(d)   5

17. A 60-page book has n lines per page. If the number of lines were reduced by 3 in each page, the number of pages would have to be increased by 10 to give the same writing space. What is the value of n ?

(a)   18

(b)   21

(c)   24

(d)   30

18. If x men working x hours per day can do x units of work in x days, then y men working y hours per day in y days would be able to do k units of work. What is the value of k ?

(a) $x^2 y^{-3}$

(b) $x^3 y^{-2}$

(c) $y^2 x^{-3}$

(d) $y^3 x^{-2}$

19. Let d(n) denote the number of positive divisors of a positive integer n. Which of the following are correct ?

    1. d(5) = d(11)

    2. d(5).d(11) = d(55)

    3. d(5) + d(11) = d(16)

    Select the correct answer using the code given below :

    (a) 1 and 3 only

    (b) 1 and 2 only

    (c) 2 and 3 only

    (d) 1, 2 and 3

20. If $A_n = P_n + 1$, where P_n is the product of the first n prime numbers, then consider the following statements :

    1. A_n is always a composite number.

    2. $A_n + 2$ is always an odd number.

    3. $A_n + 1$ is always an even number.

    Which of the above statements is/are correct ?

    (a) 1 only

    (b) 2 only

    (c) 3 only

    (d) 2 and 3 only

21. A shopkeeper sells his articles at their cost price but uses a faulty balance which reads 1000 gm for 800 gm. What is the actual profit percentage ?

    (a) 20%

    (b) 25%

    (c) 30%

    (d) 40%

22. A river 3 m deep and 40 m wide is flowing at the rate of 2 km/hr and falls into the sea. What is the amount of water in litres that will fall into the sea from this river in a minute ?

    (a) 40,00,000 litres

    (b) 4,00,000 litres

    (c) 40,000 litres

    (d) 4,000 litres

23. If a television set is sold at ₹ x, a loss of 28% would be incurred. If it is sold at ₹ y, a profit of 12% would be incurred. What is the ratio of y to x ?

    (a) 41 : 9

    (b) 31 : 9

    (c) 23 : 9

    (d) 14 : 9

24. By increasing the speed of his car by 15 km/hr, a person covers a distance of 300 km by taking an hour less than before. What was the original speed of the car ?

(a) 45 km/hr

(b) 50 km/hr

(c) 60 km/hr

(d) 75 km/hr

25. Three persons start a business with capitals in the ratio $\frac{1}{3} : \frac{1}{4} : \frac{1}{5}$. The first person withdraws half his capital after 4 months. What is his share of profit if the business fetches an annual profit of ₹ 96,800 ?

(a) ₹ 32,000

(b) ₹ 34,500

(c) ₹ 36,000

(d) ₹ 36,800

26. If x varies as y, then which of the following is/are correct ?

1. $x^2 + y^2$ varies as $x^2 - y^2$

2. $\frac{x}{y^2}$ varies inversely as y

3. $\sqrt[n]{x^2 y}$ varies as $\sqrt[2n]{x^4 y^2}$

Select the correct answer using the code given below :

(a) 1 and 2 only

(b) 2 and 3 only

(c) 3 only

(d) 1, 2 and 3

27. Ena was born 4 years after her parents marriage. Her mother is 3 years younger than her father and 24 years older than Ena, who is 13 years old. At what age did Ena's father get married ?

(a) 25 years

(b) 24 years

(c) 23 years

(d) 22 years

28. Mahesh is 60 years old. Ram is 5 years younger to Mahesh and 4 years elder to Raju. Babu is a younger brother of Raju and he is 6 years younger. What is the age difference between Mahesh and Babu ?

(a)   18 years

(b)   15 years

(c)   13 years

(d)   11 years

29. The number of items in a booklet is N. In the first year there is an increase of x% in this number and in the subsequent year there is a decrease of x%. At the end of the two years, what will be the number of items in the booklet ?

(a)   Less than N

(b)   Equal to N

(c)   More than N

(d)   It depends on the value of N

30. If $ab + xy - xb = 0$ and $bc + yz - cy = 0$, then what is $\dfrac{x}{a} + \dfrac{c}{z}$ equal to ?

(a) $\dfrac{y}{b}$

(b) $\dfrac{b}{y}$

(c)   1

(d)   0

31. What is the HCF of the polynomials $x^6 - 3x^4 + 3x^2 - 1$ and $x^3 + 3x^2 + 3x + 1$?

(a) $(x + 1)$

(b) $(x + 1)^2$

(c) $x^2 + 1$

(d) $(x + 1)^3$

32. The HCF and the LCM of two polynomials are $3x + 1$ and $30x^3 + 7x^2 - 10x - 3$ respectively. If one polynomial is $6x^2 + 5x + 1$, then what is the other polynomial ?

(a) $15x^2 + 4x + 3$

(b) $15x^2 + 4x - 3$

(c) $15x^2 - 4x + 3$

(d) $15x^2 - 4x - 3$

33. If $(p + 2)(2q - 1) = 2pq - 10$ and $(p - 2)(2q - 1) = 2pq - 10$, then what is pq equal to ?

(a) -10

(b) -5

(c) 5

(d) 10

34. What is the value of

$$\frac{a^2 + ac}{a^2c - c^3} - \frac{a^2 - c^2}{a^2c + 2ac^2 + c^3} - \frac{2c}{a^2 - c^2} + \frac{3}{a + c} \ ?$$

(a) 0

(b) 1

(c) $\dfrac{ac}{a^2 + c^2}$

(d) $\dfrac{6}{a + c}$

35. What is the square root of $4x^4 + 8x^3 - 4x + 1$?

(a) $2x^2 - 2x - 1$

(b) $2x^2 - x - 1$

(c) $2x^2 + 2x + 1$

(d) $2x^2 + 2x - 1$

36. The sum of the digits of a two digit number is 13 and the difference between the number and that formed by reversing the digits is 27. What is the product of the digits of the number ?

(a)   35

(b)   40

(c)   45

(d)   54

37. If $\dfrac{x}{b+c} = \dfrac{y}{c+a} = \dfrac{z}{b-a}$, then which one of the following is correct ?

(a) $x + y + z = 0$

(b) $x - y - z = 0$

(c) $x + y - z = 0$

(d) $x + 2y + 3z = 0$

38. X, Y and Z travel from the same place with uniform speeds 4 km/hr, 5 km/hr and 6 km/hr respectively. Y starts 2 hours after X. How long after Y must Z start in order that they overtake X at the same instant ?

(a) $\dfrac{3}{2}$ hours

(b) $\dfrac{4}{3}$ hours

(c) $\dfrac{9}{8}$ hours

(d) $\dfrac{11}{8}$ hours

39. $1 - x - x^n + x^{n+1}$, where n is a natural number, is divisible by

(a) $(1 + x)^2$

(b) $(1 - x)^2$

(c) $1 - 2x - x^2$

(d) $1 + 2x - x^2$

40. A person sold an article for ₹ 75 which cost him ₹ x. He finds that he realised x% profit on his outlay. What is x equal to ?

(a)   20%

(b)   25%

(c)   50%

(d)   100%

41. A car did a journey in t hours. Had the average speed been x kmph greater, the journey would have taken y hours less. How long was the journey ?

   (a) $x(t-y)ty$

   (b) $x(t-y)ty^{-1}$

   (c) $x(t-y)ty^{-2}$

   (d) $x(t+y)ty$

42. When a ball is allowed to fall, the time it takes to fall any distance varies as the square root of the distance and it takes 4 seconds to fall 78·40 m. How long would it take to fall 122·50 m ?

   (a) 5 seconds

   (b) 5·5 seconds

   (c) 6 seconds

   (d) 6·5 seconds

43. If $6^{3-4x}\,4^{x+5} = 8$ (Given $\log_{10} 2 = 0.301$ and $\log_{10} 3 = 0.477$), then which one of the following is correct ?

   (a) $0 < x < 1$

   (b) $1 < x < 2$

   (c) $2 < x < 3$

   (d) $3 < x < 4$

44. The Euclidean algorithm is used to calculate the

   (a) square root of an integer

   (b) cube root of an integer

   (c) square of an integer

   (d) HCF of two integers

45. If radius of a sphere is rational, then which of the following is/are correct ?

   1. Its surface area is rational.

   2. Its volume is rational.

   Select the correct answer using the code given below :

   (a) 1 only

   (b) 2 only

   (c) Both 1 and 2

   (d) Neither 1 nor 2

46. If $\operatorname{cosec}\theta - \sin\theta = m$ and $\sec\theta - \cos\theta = n$, then what is $m^{\frac{4}{3}}n^{\frac{2}{3}} + m^{\frac{2}{3}}n^{\frac{4}{3}}$ equal to ?

   (a) 0

   (b) 1

   (c) mn

   (d) $m^2 n^2$

47. If $\cos\theta + \sec\theta = k$, then what is the value of $\sin^2\theta - \tan^2\theta$?

   (a) $4-k$

   (b) $4-k^2$

   (c) k^2-4

   (d) k^2+2

48. ABC is a triangle inscribed in a semicircle of diameter AB. What is $\cos(A+B) + \sin(A+B)$ equal to?

(a) 0

(b) $\dfrac{1}{4}$

(c) $\dfrac{1}{2}$

(d) 1

49. Consider the following statements:

1. $\sin\theta = x + \dfrac{1}{x}$ is possible for some real value of x.

2. $\cos\theta = x + \dfrac{1}{x}$ is possible for some real value of x.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

50. What is the magnitude (in radian) of the interior angle of a regular pentagon?

(a) $\dfrac{\pi}{5}$

(b) $\dfrac{2\pi}{5}$

(c) $\dfrac{3\pi}{5}$

(d) $\dfrac{4\pi}{5}$

51. The difference between two angles is 15° and the sum of the angles in radian is $\dfrac{5\pi}{12}$. The bigger angle is k times the smaller angle. What is k equal to?

(a) $\dfrac{4}{3}$

(b) $\dfrac{3}{2}$

(c) $\dfrac{6}{5}$

(d) $\dfrac{7}{6}$

52. Consider the following statements:

1. The equation $2\sin^2\theta - \cos\theta + 4 = 0$ is possible for all θ.

2. $\tan\theta + \cot\theta$ cannot be less than 2, where $0 < \theta < \dfrac{\pi}{2}$.

Which of the above statements is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

53. A road curve is to be laid out on a circle. What radius should be used if the track is to change direction by 42° in distance of 44 m?

(Assume $\pi = \dfrac{22}{7}$)

(a) 60 m

(b) 66 m

(c) 75 m

(d) 80 m

54. What is the maximum value of $3\sin\theta - 4$?

   (a) -4

   (b) -1

   (c) 0

   (d) 1

55. If $\sin\theta + \cos\theta = \sqrt{2}$, then what is $\sin^6\theta + \cos^6\theta + 6\sin^2\theta\cos^2\theta$ equal to ?

   (a) $\dfrac{1}{4}$

   (b) $\dfrac{3}{4}$

   (c) 1

   (d) $\dfrac{7}{4}$

56. What is the least value of $9\sin^2\theta + 16\cos^2\theta$?

   (a) 0

   (b) 9

   (c) 16

   (d) 25

57. If $\cos 47° + \sin 47° = k$, then what is the value of $\cos^2 47° - \sin^2 47°$?

   (a) $k\sqrt{2 - k^2}$

   (b) $-k\sqrt{2 - k^2}$

   (c) $k\sqrt{1 - k^2}$

   (d) $-k\sqrt{1 - k^2}$

58. If $\csc\theta - \sin\theta = p^3$ and $\sec\theta - \cos\theta = q^3$, then what is the value of $\tan\theta$?

   (a) $\dfrac{p}{q}$

   (b) $\dfrac{q}{p}$

   (c) pq

   (d) $p^2 q^2$

59. If $0 \le \alpha, \beta \le 90°$ such that $\cos(\alpha - \beta) = 1$, then what is $\sin\alpha - \sin\beta + \cos\alpha - \cos\beta$ equal to ?

   (a) -1

   (b) 0

   (c) 1

   (d) 2

60. Consider the following statements :

1. The value of $\cos 61° + \sin 29°$ cannot exceed 1.

2. The value of $\tan 23° - \cot 67°$ is less than 0.

Which of the above statements is/are correct ?

   (a)   1 only

   (b)   2 only

   (c)   Both 1 and 2

   (d)   Neither 1 nor 2

61. In a quadrilateral ABCD, $\angle B = 90°$ and $AB^2 + BC^2 + CD^2 - AD^2 = 0$, then what is $\angle ACD$ equal to ?

(a) 30°

(b) 60°

(c) 90°

(d) 120°

62. In a $\triangle ABC$, $AC = 12$ cm, $AB = 16$ cm and AD is the bisector of $\angle A$. If $BD = 4$ cm, then what is DC equal to ?

(a) 2 cm

(b) 3 cm

(c) 4 cm

(d) 5 cm

63. ABCD is a cyclic quadrilateral. The bisectors of the angles A, B, C and D cut the circle at P, Q, R and S respectively. What is $\angle PQR + \angle RSP$ equal to ?

(a) 90°

(b) 135°

(c) 180°

(d) 270°

64. ABC is an equilateral triangle. The side BC is trisected at D such that BC = 3 BD. What is the ratio of AD^2 to AB^2 ?

(a) 7 : 9

(b) 1 : 3

(c) 5 : 7

(d) 1 : 2

65. Consider the following statements :

1. The diagonals of a trapezium divide each other proportionally.

2. Any line drawn parallel to the parallel sides of a trapezium divides the non-parallel sides proportionally.

Which of the above statements is/are correct ?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

66. If H, C and V are respectively the height, curved surface area and volume of a cone, then what is $3\pi VH^3 + 9V^2$ equal to ?

(a) C^2H^2

(b) $2\,C^2H^2$

(c) $5\,C^2H^2$

(d) $7\,C^2H^2$

67. How many solid lead balls each of diameter 2 mm can be made from a solid lead ball of radius 8 cm ?

   (a)   512

   (b)   1024

   (c)   256000

   (d)   512000

68. The two sides of a triangle are 40 cm and 41 cm. If the perimeter of the triangle is 90 cm, what is its area ?

   (a)   90 cm^2

   (b)   135 cm^2

   (c)   150 cm^2

   (d)   180 cm^2

69. The diagonals of a rhombus differ by 2 units and its perimeter exceeds the sum of the diagonals by 6 units. What is the area of the rhombus ?

   (a)   48 square units

   (b)   36 square units

   (c)   24 square units

   (d)   12 square units

70. What is the area of a right-angled triangle, if the radius of the circumcircle is 5 cm and altitude drawn to the hypotenuse is 4 cm ?

   (a)   20 cm^2

   (b)   18 cm^2

   (c)   16 cm^2

   (d)   10 cm^2

71. In a triangle, values of all the angles are integers (in degree measure). Which one of the following *cannot* be the proportion of their measures ?

   (a)   1 : 2 : 3

   (b)   3 : 4 : 5

   (c)   5 : 6 : 7

   (d)   6 : 7 : 8

72. The length of a rectangle is increased by 10% and breadth is decreased by 10%. Then the area of the new rectangle is

   (a)   neither increased nor decreased

   (b)   increased by 1%

   (c)   decreased by 1%

   (d)   decreased by 10%

73. The surface areas of two spheres are in the ratio 1 : 4. What is the ratio of their volumes ?

   (a)   1 : 16

   (b)   1 : 12

   (c)   1 : 10

   (d)   1 : 8

74. The length, breadth and height of a brick are 20 cm, 15 cm and 10 cm respectively. The number of bricks required to construct a wall with dimensions 45 m length, 0·15 m breadth and 3 m height is

   (a)   12450

   (b)   11250

   (c)   6750

   (d)   None of the above

75. If the sum of all interior angles of a regular polygon is twice the sum of all its exterior angles, then the polygon is

(a) Hexagon

(b) Octagon

(c) Nonagon

(d) Decagon

76. A bicycle wheel makes 5000 revolutions in moving 11 km. What is the radius of the wheel ? (Assume $\pi = \frac{22}{7}$)

(a) 17·5 cm

(b) 35 cm

(c) 70 cm

(d) 140 cm

77. The volumes of two cones are in the ratio 1 : 4 and their diameters are in the ratio 4 : 5. What is the ratio of their heights ?

(a) 25 : 64

(b) 16 : 25

(c) 9 : 16

(d) 5 : 9

78. In a triangle ABC, if $2 \angle A = 3 \angle B = 6 \angle C$, then what is $\angle A + \angle C$ equal to ?

(a) 90°

(b) 120°

(c) 135°

(d) 150°

79. If the perimeter of a circle and a square are equal, then what is the ratio of the area of the circle to that of the square ?

(a) $1 : \pi$

(b) $2 : \pi$

(c) $3 : \pi$

(d) $4 : \pi$

80. The lengths of the sides of a right-angled triangle are consecutive even integers (in cm). What is the product of these integers ?

(a) 60

(b) 120

(c) 360

(d) 480

81. A circle is inscribed in a triangle ABC. It touches the sides AB and AC at M and N respectively. If O is the centre of the circle and $\angle A = 70°$, then what is $\angle MON$ equal to ?

   (a)   90°

   (b)   100°

   (c)   110°

   (d)   120°

82. The sum of the squares of sides of a right-angled triangle is 8,450 square units. What is the length of its hypotenuse ?

   (a)   50 units

   (b)   55 units

   (c)   60 units

   (d)   65 units

83. A triangle and a parallelogram have equal areas and equal bases. If the altitude of the triangle is k times the altitude of the parallelogram, then what is the value of k ?

   (a)   4

   (b)   2

   (c)   1

   (d) $\frac{1}{2}$

84. Areas of two squares are in the ratio $m^2 : n^4$. What is the ratio of their perimeters ?

   (a) $m : n$

   (b) $n : m$

   (c) $m : n^2$

   (d) $m^2 : n$

85. AD is the median of the triangle ABC. If P is any point on AD, then which one of the following is correct ?

   (a)   Area of triangle PAB is greater than the area of triangle PAC

   (b)   Area of triangle PAB is equal to area of triangle PAC

   (c)   Area of triangle PAB is one-fourth of the area of triangle PAC

   (d)   Area of triangle PAB is half of the area of triangle PAC

86. What is the area of a segment of a circle of radius r subtending an angle θ at the centre ?

   (a) $\frac{1}{2}r^2 \theta$

   (b) $\frac{1}{2}r^2 \left(\theta - 2\sin\frac{\theta}{2} \cos\frac{\theta}{2} \right)$

   (c) $\frac{1}{2}r^2 \left(\theta - \sin\frac{\theta}{2} \cos\frac{\theta}{2} \right)$

   (d) $\frac{1}{2}r^2 \sin\frac{\theta}{2} \cos\frac{\theta}{2}$

87. ABC is a triangle right-angled at C. Let P be any point on AC and Q be any point on BC. Which of the following statements is/are correct ?

1. $AQ^2 + BP^2 = AB^2 + PQ^2$

2. $AB = 2PQ$

Select the correct answer using the code given below :

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

88. Four circular coins of equal radius are placed with their centres coinciding with four vertices of a square. Each coin touches two other coins. If the uncovered area of the square is 42 cm^2, then what is the radius of each coin ? (Assume $\pi = \frac{22}{7}$)

(a) 5 cm

(b) 7 cm

(c) 10 cm

(d) 14 cm

89. The radii of the flat circular faces of a bucket are x and 2x. If the height of the bucket is 3x, what is the capacity of the bucket ? (Assume $\pi = \frac{22}{7}$)

(a) $11x^3$

(b) $22x^3$

(c) $44x^3$

(d) $55x^3$

90. If p, q, r, s and t represent length, breadth, height, surface area and volume of a cuboid respectively, then what is $\frac{1}{p} + \frac{1}{q} + \frac{1}{r}$ equal to ?

(a) $\frac{s}{t}$

(b) $\frac{2t}{s}$

(c) $\frac{s}{2t}$

(d) $\frac{2s}{t}$

91. Fifteen candidates appeared in an examination. The marks of the candidates who passed in the examination are 9, 6, 7, 8, 8, 9, 6, 5, 4 and 7. What is the median of marks of all the fifteen candidates ?

(a) 6

(b) 6·5

(c) 7

(d) 7·5

92. If the yield (in gm) of barley from 7 plots of size one square yard each, were found to be 180, 191, 175, 111, 154, 141 and 176, then what is the median yield ?

(a) 111 gm

(b) 154 gm

(c) 175 gm

(d) 176 gm

93. Which one of the following measures of central tendency will be used to determine the average size of the shoe sold in the shop ?

(a) Arithmetic mean

(b) Geometric mean

(c) Median

(d) Mode

94. When the class intervals have equal width, the height of a rectangle in a histogram represents

(a) Width of the class

(b) Lower class limit

(c) Upper class limit

(d) Frequency of the class

95. The ages of 7 family members are 2, 5, 12, 18, 38, 40 and 60 years respectively. After 5 years a new member aged x years is added. If the mean age of the family now goes up by 1·5 years, then what is the value of x ?

(a) 1

(b) 2

(c) 3

(d) 4

96. The mean weight of 100 students in a class is 46 kg. The mean weight of boys is 50 kg and that of girls is 40 kg. The number of boys exceeds the number of girls by

(a) 10

(b) 15

(c) 20

(d) 25

97. What is the algebraic sum of the deviations from the mean of a set of values 25, 65, 73, 75, 83, 76, 17, 15, 7, 14 ?

(a) -1

(b) 0

(c) 1

(d) 2

98. The mean of five observations x, $x + 2$, $x + 4$, $x + 6$, $x + 8$ is m. What is the mean of the first three observations ?

(a) m

(b) $m - 1$

(c) $m - 2$

(d) $m - 3$

99. What is the median of 2, 4, 6, ..., 100 ?

(a) 48

(b) 49

(c) 50

(d) 51

100. The harmonic mean and the geometric mean of two numbers are 10 and 12 respectively. What is their arithmetic mean ?

(a) $\dfrac{25}{3}$

(b) $\sqrt{120}$

(c) 11

(d) 14·4