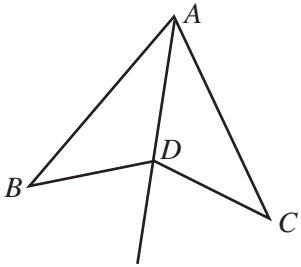
**CENTRE FOR PEDAGOGICAL STUDIES IN MATHEMATICS (CPSM)**
**ACHIEVEMENT-CUM-DIAGNOSTIC TEST IN MATHEMATICS-2023**

**INSTRUCTION:** Write your Name, Class Roll No. etc. in the answersheet. Select the correct answer out of (a), (b), (c) and (d) of particular item and fill the specific rectangle ■ with blue/black ball pen denoting the correct answer. For example, if (c) is the correct answer to Q. No. X: blacken like this: Q. No. X: □ □ ■ □. Rough work is to be done on separate paper. Marks will be deducted for wrong answer. Don't waste time for answering a question which appears difficult to you, better try the next question.

1. In the adjoining figure $\angle ABD = 20°$, $\angle ACD = 30°$ and $\angle BDC = 110°$, find $\angle BAC$.




(a) 45°

(b) 60°

(c) 75°

(d) 100°

2. In $\Delta ABC$ if $\angle A > \angle B > \angle C$ and the measure of $\angle A$, $\angle B$, $\angle C$ are in degrees are intergers then the possible value of $\angle A$ is—

(a) 65° (b) 70° (c) 60° (d) 61°

3. How many line segments can be drawn through five points, three of which are collinear.

(a) 6 (b) 7 (c) 5 (d) 8

4. The difference between the measure of an angle and its complement is 28°. The measure of the angle is—

(a) 59° (b) 31° (c) 28° (d) 49°

5. The measure of the angle between the external and internal bisectors of an angle is

(a) 180° (b) 100° (c) 90° (d) 60°

6. Find the measure of an angle whose measure is equal to one-third of its complement.

(a) 22½° (b) 67½° (c) 30° (d) 45°

7. The supplementary angle of 1° is

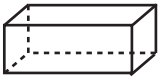
(a) 89° (b) 179° (c) 199° (d) 99°

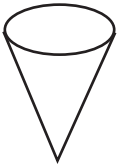
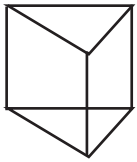
8. Euler's formula for any polyhedron where F stands for number of faces, V stands for number of vertices and E stands for the number of edges is

(a) $F + V + E = 12$ (b) $F - V + E = 2$

(c) $F + V - E = 2$ (d) $F - V - E = 2$

9. Which of the following is not a polyhedron?

(a)  (b) 

(c)  (d) 

10. The number of faces of a square prism is—

(a) 4 (b) 8 (c) 5 (d) 6

11. Which one is not true?

(a) The diagonals of a rhombus are unequal.

(b) The diagonals of a square are equal

(c) Te diagonals of a parallelogram are equal

(d) The diagonals of a kite are unequal

12. The number of lines of symmetry of a regular hexaogn is

(a) 3 (b) 2 (c) 9 (d) 6

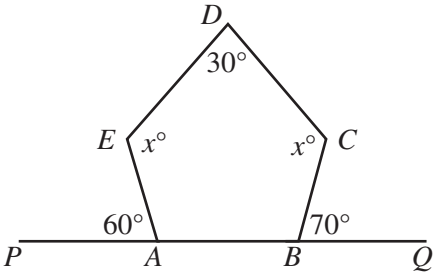
13. If one angle of a parallelogram is a right angle then the parallelogram is a

(a) square (b) rectangle (c) rombus (d) kite

14. The supplement of the complement of the angle whose measure is 10° is—

(a) 100° (b) 120° (c) 170° (d) 80°

15. In the adjoining figure $ABCDE$ is a pentagon. $AB$ is produced to $Q$ and $BA$ is produced to $P$. If $\angle AED = \angle BCD = x°$, $\angle CDE = 30°$, $\angle EAP = 60°$ and $\angle CBQ = 70°$, then find $x$




(a) 70 (b) 90 (c) 100 (d) 140

16. The ratio of the angles of $\Delta ABC$ is 1 : 1 : 2; If the equal sides measure 10 cm each then the length of the longest side is—

(a) 20 cm (b) $\sqrt{20}$ cm (c) $10\sqrt{2}$ cm (d) $\sqrt{15}$ cm

17. In $\Delta ABC$, $AB$ = 10 cm, $BC$ = 8 cm; find the range of the values that $AC$ can take.

(a) 2 cm < $AC$ < 18 cm (b) 1 cm < $AC$ < 9 cm

(c) $AC$ < 18 cm (d) $AC$ > 2 cm

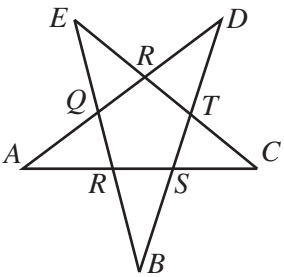
18. The quadrilateral formed by joining the mid-points of the consecutive sides of a rectangle is a

(a) square (b) rhombus (c) rectangle (d) kite

19. $PQRS$ is a rhombus with $\angle PQR = 54°$, find $\angle PRS$.

(a) 63° (b) 54° (c) 68° (d) 117°

20. The alternate sides of a regular pentagon are produced to form a star-shaded figure as shown in the adjoining figure, then $\angle A + \angle B + \angle C + \angle D + \angle E =$




(a) 108° (b) 180°

(c) 270° (d) 360°

21. If $x^2 + \frac{1}{x^2} = 79$, then $x + \frac{1}{x} =$

(a) 81 (b) ± 9 (c) 9 (d) ±3

22. $(5x^2 + 12x + 7) \div (5x + 7) =$

(a) $x + 5$ (b) $x + 3$ (c) $x + 7$ (d) $x + 1$

23. Solve for $x$ : $\frac{x+2}{5} - \frac{x-7}{2} = 3$

(a) 6 (b) – 9 (c) – 3 (d) 3

24. What should be taken away from $3x^3 - 5x^2 - x + 2$ to get $4x^3 + 3x - 5$?

(a) $-x^3 - 5x^2 - 4x - 7$ (b) $x^3 + 5x^2 + 4x - 7$

(c) $-x^3 - 5x^2 - 4x + 7$ (d) $x^3 - 5x^2 - 4x + 7$

25. $|-25| + 9 - |-4| =$

(a) 12 (b) 30 (c) – 20 (d) 38

26. If $3a = 2b = 3c$ then $a : b : c =$

(a) 2 : 3 : 2 (b) 3 : 2 : 5 (c) 2 : 3 : 6 (d) 10 : 15 : 6

27. If $36 : 4 = x : 5$ then $x =$

(a) 45 (b) $\frac{20}{9}$ (c) 20 (d) $\frac{5}{9}$

28. The area of a rectangle is 540 $m^2$ and its length is $x$ m. The perimeter of the rectangle is—

(a) $\frac{2x^2 + 540}{x}$ m (b) $\frac{2(x^2 + 540)}{x}$ m

(c) $\frac{x^2 + 540}{x}$ m (d) $\frac{x^2 + 540}{2x}$ m

29. If $\frac{x}{5}$ and $\frac{12}{30}$ are equivalent then $x =$

(a) $\frac{1}{2}$ (b) 0 (c) 1 (d) 2

30. If $x + \frac{1}{x} = 4$ then $x^4 + \frac{1}{x^4} =$

(a) 14 (b) 194 (c) 94 (d) 100

31. If $81p^4 - 1$ is divided by $3p - 1$ then the quotient is

(a) $9p^2 + 1$ (b) $27p^3 + 9p^2 - 3p - 1$

(c) $27p^3 - 9p^2 + 9p - 1$ (d) $27p^3 + 9p^2 + 3p + 1$

32. If $a + b = \sqrt{7}$ and $a - b = \sqrt{5}$ then $4ab(a^2 + b^2) =$

(a) 6 (b) 48 (c) 12 (d) 24

33. If $x = p + 1$, find $p$ from the equation

$\frac{1}{2}(x - 30) - \frac{1}{3}(1 - p) = \frac{1}{4}$

(a) 18.1 (b) 18

(c) 181 (d) None of these

34. The area of a rectangular garden is $(4a^2 - 9b^2)$ sq m. and its breadth is $(2a - 3b)$ m. The perimeter of the garden is

(a) $4a$ m (b) $6a$ m (c) $8a$ m (d) $(4a + 2b)$ m

35. The factor of $x^2 + y^2 + yz + zx + 2xy$ are

(a) $(y + z)$ and $(x + y + z)$ (b) $(z + x)$ and $(x + y + z)$

(c) $(x + y)$ and $(x + y + z)$ (d) None of these

36. If $x + y = \sqrt{11}$ and $x - y = \sqrt{7}$ then $x^2 + y^2 =$

(a) 12 (b) 18 (c) 85 (d) 9

37. The value of $\left\{\left(\frac{a}{b}\right)^{\sqrt{99}-\sqrt{97}}\right\}^{\sqrt{99}+\sqrt{97}}$ is

(a) $\sqrt{\frac{b}{a}}$ (b) $\frac{a^2}{b^2}$ (c) $\frac{b^2}{a^2}$ (d) $\frac{a}{b}$

38. What percent of $y$ is $x$?

(a) $\frac{x}{y}$ % (b) $\frac{100x}{y}$ % (c) $\frac{100y}{x}$ % (d) $\frac{y}{x}$ %

39. The value of $\frac{(619+613)^2-(619-613)^2}{619\times613}$ is

(a) 2 (b) 8 (c) 4 (d) 1232

40. If $a$ and $b$ are two odd integers and $a > b$, then which one of the following is even?

(a) $a - b$ (b) $a + b + 1$ (c) $ab$ (d) $ab + 2$

41. The value of $(1° + 2° + 3°) \times 6^{-1} =$

(a) $\frac{1}{2}$ (b) 2 (c) 1 (d) –1

42. Which of the following is not a prime number?

(a) 107 (b) 109 (c) 111 (d) 113

43. The difference between the squares of two consecutive odd integers is always divisible by

(a) 6 (b) 8 (c) 10 (d) 12

44. $\sqrt{248+\sqrt{52+\sqrt{144}}}$ =

(a) 16 (b) 4 (c) 8 (d) 24

45. The unit digit of $8^{25}$ is

(a) 2 (b) 4 (c) 6 (d) 8

46. The largest among $(0.1)^2$, $\sqrt{0.0121}$, 0.1222 and $\sqrt{0.0004}$ is

(a) $(0.1)^2$ (b) $\sqrt{0.0121}$ (c) 0.1222 (d) $\sqrt{0.0004}$

47. The speed of a train is 72 km/hr. The distance covered by the train in 5 seconds is

(a) 50 m (b) 75 m (c) 150 m (d) 100 m

48. $\dfrac{2\frac{1}{3}-1\frac{2}{11}}{3+\dfrac{1}{3+\dfrac{1}{3+\frac{1}{3}}}}=$

(a) 1 (b) $\frac{38}{109}$ (c) $\frac{33}{109}$ (d) $\frac{109}{38}$

49. A garrison of 1000 soldiers have provisions for 50 days. After 15 days how many soldiers must leave the garrison so that the remaining food may last for 40 days.

(a) 225 (b) 775 (c) 125 (d) 250

50. Which one of the following is equal to 5.234 quintal?

(a) $0.5234 \times 10^3$ kg (b) $52.34 \times 10^4$ gm

(c) $5234 \times 10^{-3}$ quintal (d) $0.5234 \times 10^2$ kg

51. Find the value of $x$ for which $\left\{\left(-\frac{2}{7}\right)^2\right\}^x \times \left(-\frac{7}{2}\right)^{-1} = -\frac{8}{343}$

(a) $x = 3$ (b) $x = -3$ (c) $x = \frac{3}{2}$ (d) $x = -\frac{3}{2}$

52. A farmar can reap a field in 10 days while his wife can do it in 8 days. If they work together in how much time can they reap the field?

(a) 4 days (b) 5 days (c) $4\frac{1}{2}$ days (d) $4\frac{4}{9}$ days

53. The ratio of milk and water in 64 litres of mixture is 5 : 3. What amount of water should be added to make the ratio 3:5?

(a) 42 litre (b) 43 litre (c) $42\frac{2}{3}$ litre (d) 40 litre

54. A path one metre wide is built along the border and inside a square garden of side 30 metres. The area of the path is

(a) 59 $m^2$ (b) 116 $m^2$ (c) 232 $m^2$ (d) None of these

55. Mr. David's monthly income is Rs. 16000. He spends $\frac{1}{4}$ th of his salary on food, out of the remaining he spends $\frac{3}{20}$ on house rent and $\frac{5}{24}$ on the education of the children. Find how much money is left with him?

(a) Rs. 4300 (b) Rs. 3850 (c) Rs. 3300 (d) Rs. 7700

56. 50 is divided into two parts such that the sum of their reciprocals is $\frac{1}{12}$. The parts are

(a) 36, 14 (b) 28, 22 (c) 26, 24 (d) 30, 20

57. The average age of the students of a class is 15.8 years. The average age of the boys in the class is 16.4 years and that of the girls is 15.4 years. The ratio of the number of boys to the number of girls is—

(a) 1 : 2 (b) 2 : 3 (c) 3 : 4 (d) 4 : 5

58. An ore contains 12% copper. How many kg of the ore are required to get 69 kg of copper?

(a) 424 kg (b) 600 kg (c) 828 kg (d) 575 kg

59. If the speed of a railway train is increased by 5 km/hr from the normal speed then it would have taken 2 hours less for a journey of 300 km. The normal speed of the train is

(a) 30 km/hr (b) 50 km/hr

(c) 45 km/hr (d) 25 km/hr

60. A number when divided by 6 leaves a remainder 3, when the square of that number is divided by 6 the remainder is—

(a) 3 (b) 1 (c) 2 (d) 0

61. The number of diagonals of a regular pentagon.

(a) 10 (b) 5 (c) 6 (d) 8

62. The length and breadth of a rectangle are $(7x^2 - y^2)$ cm and $(x - y)$ cm respectively. The area of the rectangle is

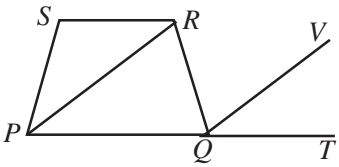
(a) $7x^3 - 7x^2y - xy^2 + y^3$ cm$^2$

(b) $7x^3 + 7x^2y - xy^2 + y^3$ cm$^2$

(c) $7x^3 + 7x^2y - xy^2 - y^3$ cm$^2$

(d) $7x^3 - x^2y - 7xy^2 + y^3$ cm$^2$

63. In the given figure (drawn not to scale), $QV \| PR$, $\angle PSR = 100°$, $\angle PRS = 40°$, $\angle QPS = 85°$, $\angle PQR = 40°$, find $\angle RQV$




(a) 95° (b) 45° (c) 85° (d) 65°

64. If $\frac{7}{3}x^2 - 10 = \frac{7}{5}x^2 + 200$, then $x =$

(a) 20 (b) ± 15 (c) ±10 (d) ± 5

65. The average of 100 numbers is 44. The average of these 100 numbers and four other new numbers is 50. The average of the four new numbers will be

(a) 240 (b) 176 (c) 210 (d) 200

66. A diagonal of a rectangle is inclined to one side of the rectangle at 34°. The acute angle between the diagonals is

(a) 42° (b) 56° (c) 78° (d) 68°

67. Find $x$ from the equation $x^2 = x$.

(a) 0 (b) 1 (c) 0, 1 (d)None of these

68. The largest prime number with only one digit is

(a) 7 (b) 9 (c) 5 (d) 3

69. If $bc + ca + ab = 0$, then the value of

$\frac{1}{a^2 - bc} + \frac{1}{b^2 - ca} + \frac{1}{c^2 - ab} =$ [given $a + b + c \neq 0$]

(a) 1 (b) 0 (c) $a + b + c$ (d) $\frac{1}{3}$

70. A vendor bought toffees at 6 for a rupee. how many for a rupee must he sell to gain 20%?

(a) 3 (b) 4 (c) 5 (d) None of these

71. The ratio of the angles of a triangle is 1 : 1 : 2. If each of the equal sides measure 10 cm, then the length of the longest side is

(a) 20 cm (b) 12 cm (c) 15 cm (d) $10\sqrt{2}$ cm

72. In $\Delta ABC$, $AC = BC$ and $\angle BAC = 70°$, find $\angle BCA =$

(a) 70° (b) 40° (c) 80° (d) 45°

73. For what value/values of $t$ the expression $x^2 - tx + 0.25$ will be a perfect square

(a) –1 (b) 1 (c) 1 or – 1 (d) 2 or, –2

74. The product of $(a + b + c)$ and $(a^2 + b^2 + c^2 - bc - ca - ab)$ is

(a) $a^3 + b^3 + c^3$

(b) $a^3 + b^3 + c^3 + 3abc$

(c) $a^3 + b^3 + c^3 - abc$

(d) $a^3 + b^3 + c^3 - 3abc$

75. If the amount of Rs. 180 after one year be Rs. 198, then the rate of simple interest is

(a) 5% (b) 18%

(c) 10% (d) 20%

76. If $a + b = 9$ and $a - b = 5$, find the value of $\frac{a^2 + b^2}{2ab}$

(a) $\frac{81}{25}$ (b) $\frac{106}{45}$ (c) $\frac{53}{28}$ (d) $\frac{53}{2}$

77. The difference of the digits of a two digit number is 3, if the number formed by interchanging the digits is added to the original number the sum becomes 143. The original number is

(a) 74 (b) 85 (c) 63 (d) 96

78. Solve for $x$ : $\frac{x+1}{2} + \frac{x+3}{2} = 4$

(a) 2 (b) 1 (c) 3 (d) 4

79. One factor of $x^4 - 4$ is

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

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

80. The height of a slippery pole is 10 m and an insect is trying to climb the pole. The insect climbs 5 m in one minute and then slips down by 4 m in the next minute. In how much time will the insect reach the top.

(a) 11 mins (b) 2 mins

(c) 6 mins (d) 10 mins