CENTRE FOR PEDAGOGICAL STUDIES IN MATHEMATICS (CPSM)
ACHIEVEMENT-CUM-DIAGNOSTIC TEST IN MATHEMATICS-2022

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 blaken the specific rectangle ■ with H.B. pencil 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 difficulat to you, better try the next question.

1. In a quadrilateral $ABCD$, $AB \parallel CD$. If $\angle A : \angle D = 2 : 3$ and $\angle B : \angle C = 7 : 8$. Find the measure of $\angle ABC$.

   (a) 84° (b) 96° (c) 72° (d) 108°

2. Each interior angle of regular polygon is 168°. How many sides does it have?

   (a) 12 (b) 30 (c) 24 d) 15

3. The angles of a hexagon are $x + 10°$, $2x + 20°$, $2x - 20°$, $3x - 50°$, $x + 40°$ and $x + 20°$. Find x.

   (a) 30° (b) 35° (c) 60° (d) 70°

4. $ABCD$ is a parallelogram. AE and CF bisects $\angle A$ and $\angle C$ respectively meeting CD and AB at E and F respectively, then which one of the following statements is wrong?

   (a) $AE = CF$ (b) $AF = CE$

   (c) $AC = EF$ (d) $AE \parallel CF$

5. $ABCDE$ is a regular pentagon. The bisector of $\angle BAE$ meets the side CD at M. Find $\angle AMC$.

   (a) 60° (b) 100° (c) 90° (d) 80°

6. In the quadrilateral $ABCD$, the bisectors of $\angle A$ and $\angle B$ meet at O, then $\angle AOB =$

   (a) $90° + \frac{1}{2}(\angle C + \angle D)$ (b) $180° - \frac{1}{2}(\angle A + \angle B)$

   (c) $90° - \frac{1}{2}(\angle A + \angle B)$ (d) $\frac{1}{2}(\angle C + \angle D)$

7. In a regular pentagon $ABCDE$, the bisector of $\angle BAE$ meets CD at M and the bisector of $\angle BCD$ meets AM at P. Find $\angle CPM$.

   (a) 54° (b) 30° (c) 36° (d) 60°

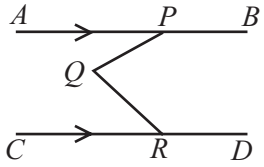
8. Determine the number of sides of a regular polygon whose exterior and interior angle are in the ratio 1 : 5.

   (a) 12 (b) 16 (c) 24 (d) 18

9. $ABCD$ is a rhombus in which the altitude from D to the side AB bisects AB. Find $\angle ADC$.

   (a) 60° (b) 120° (c) 100° (d) 150°

10. In the adjoining figure $AB \parallel CD$, $\angle APQ = 28°$ and $\angle CRQ = 38°$, find reflex angle PQR.



   (a) 246° (b) 294°

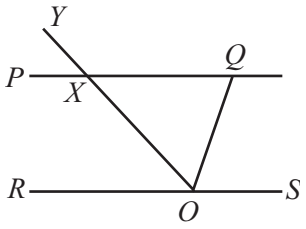
   (c) 336° (d) 204°

11. Two angles are in the ratio 4 : 5, find the angles if they are supplementary to each other.

   (a) 40°, 50° (b) 80°, 180°

   (c) 60°, 120° (d) 80°, 100°

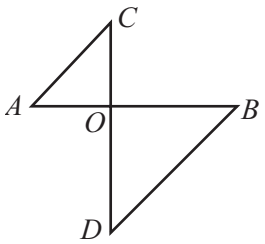
12. In the adjoining figure $PQ \parallel RS$ and $\angle ROX : \angle XOQ : \angle QOS = 2 : 5 : 3$; find $\angle QXY$



(a) 120° (b) 144°

(c) 150° (d) 160°

13. In the adjoining figure, $\angle CAO = 53°$, $\angle OBD = 60°$ and $\angle BDC = 38°$. The measure of $\angle ACD$ is



(a) 45° (b) 55°

(c) 30° (d) 35°

14. In ΔABC, $BD \perp AC$, $CE \perp AB$ and $BD = CE$. The ΔABC is

(a) equilateral (b) isosceles

(c) right angled (d) isoscles right angled

15. In a right angled triangle one acute angle is double the other. The ratio of the smallest side to the hypotenuse is

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

16. $ABCD$ is a rhombus in which $\angle DAB = 2x + 15°$ and $\angle DCB = 3x - 30°$; $\angle BDC$ is equal to

(a) 35° (b) 45° (c) $42\frac{1}{2}°$ (d) $37\frac{1}{2}°$

17. $PQRS$ is a parallelogam and T is a point on PQ. If $\angle PQR = 68°$ and $\angle STQ = 139°$, then $\angle PST =$

(a) 27° (b) 28° (c) 41° (d) 37°

18. $ABCD$ is a rectangle with $\angle BAC = 48°$, then $\angle DBC =$

(a) 21° (b) 38° (c) 42° (d) 48°

19. The number of sides of two regular polygons are in the ratio 1 : 2 and their interior angles are in the ratio 3 : 4. Find the number of sides

(a) 7, 14 (b) 5, 10 (c) 8, 16 (d) 6, 12

20. A regular polygon is inscribed in a circle. If one side subtends an angle of 30° at the centre then the number of sides is

(a) 15 (b) 8 (c) 12 (d) 24

21. If $a + b + c = 9$ and $a^2 + b^2 + c^2 = 29$ then $a^3 + b^3 + c^3 - 3abc =$

(a) 9 (b) 81 (c) 27 (d) none of these

22. If $x = \dfrac{y}{y+1}$ and and $y = \dfrac{a-2}{2}$ then $x(y+2) + \dfrac{y}{x} + \dfrac{x}{y} =$

(a) 1 (b) 0 (c) – 1 (d) a

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

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

(c) $(abcd)^{\frac{1}{8}}$ (d) $\sqrt{abcd}$

24. $\dfrac{(2.3)^3 - 0.027}{(2.3)^2 + 0.69 + 0.09} =$

(a) 2.33 (b) 2.8 (c) 2.6 (d) 2

25. If $\dfrac{p}{q} = 0.25$ then $\dfrac{2q-p}{2q+p} + \dfrac{2}{9} =$

(a) $\dfrac{7}{9}$ (b) $\dfrac{5}{9}$ (c) 1 (d) 2

26. A rectangle is 8 cm long and 5 cm wide. Its perimeter is doubled when each of its sides is increased by x cm. The new length of the rectangle is

(a) 15 cm (b) 14.5 cm (c) 13 cm (d) 14 cm

27. The L.C.M. of $2x^2 - x - 6$, $3x^2 - 7x + 2$ and $6x^2 + 7x - 3$ is

(a) $6(x - 2)(3x - 1)(2x + 3)$

(b) $(x + 2)(3x + 1)(2x + 3)$

(c) $(x - 2)(2x + 3)(3x - 1)$

(d) $(x - 2)(3x - 1)(2x - 3)$

28. The H.C.F. of $x^2 - xy + yz - zx$ and $y^2 - xy - yz + zx$ is

(a) $x + y$ (b) $y - z$ (c) $x - z$ (d) $x - y$

29. Reduce $\frac{a^2 - b^2}{a^2 + 2ab + b^2} \times \frac{ab + b^2}{a^2 - ab}$ to its lowest term.

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

30. Two numbers add upto 70, One-third of the larger number is 10 more than one-seventh of the smaller. The smaller number is

(a) 28 (b) 42 (c) 14 (d) none of these

31. If $x + \frac{1}{x} = 5$, then $x^5 + \frac{1}{x^5} =$

(a) 130 (b) 120 (c) 125 (d) 123

32. If $a + b = 4$ find the value of $a^3 + b^3 + 12ab$

(a) 128 (b) 64 (c) 32 (d) none of these

33. One factor of $(x - 1)(x - 2)(x + 3)(x + 4) - 36$ is

(a) $(x - 4)$ (b) $(x - 3)$ (c) $x + 3$ (d) $x + 1$

34. The values of x and y which satisfy the equations $ax + by = 1$ and $bx + ay = \frac{2ab}{a^2 + b^2}$ are

(a) $x = b, y = a$ (b) $x = \frac{b}{a^2 + b^2}, y = \frac{a}{a^2 + b^2}$

(c) $x = \frac{a}{a^2 + b^2}, y = \frac{b}{a^2 + b^2}$ (d) $x = \frac{a}{a + b}, y = \frac{b}{a + b}$

35. If $m^2 + \frac{1}{m^2} = 23$, find $m - \frac{1}{m}$.

(a) $\pm\sqrt{5}$ (b) 21 (c) $\sqrt{21}$ (d) $\pm\sqrt{21}$

36. If $a^2 = by + cz$, $b^2 = cz + ax$, $c^2 = ax + by$,

then $\frac{x}{x + a} + \frac{y}{y + b} + \frac{z}{z + c} =$

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

37. Simplify:

$$\frac{(b - c)^2}{(a - b)(a - c)} + \frac{(c - a)^2}{(b - a)(b - c)} + \frac{(a - b)^2}{(c - a)(c - b)} + 3$$

(a) 6 (b) 0 (c) 1 (d) $a + b + c$

38. Mintu and Bubun start together to walk 33 km. Mintu walks 12 km in the same time that Bubun takes to walk 11 km and they arrives at the end of the journey an hour before hand. Find their rates of walking in km/hr.

(a) 3 km/hr, $2\frac{3}{4}$ km/hr (b) 3 km/hr, $2\frac{1}{2}$ km/hr

(c) 4 km/hr, 3 km/hr (d) $4\frac{1}{2}$ km/hr, $3\frac{1}{2}$ km/hr

39. Reverse the digits of a number and it will become $\frac{5}{6}$th of what it was before. Also the difference between the digits is 1. The number is

(a) 65 (b) 45 (c) 54 (d) 43

40. One factor of $a(b^2 + c^2) + b(c^2 + a^2) + c(a^2 + b^2) + 3abc$ is

(a) $b + c$ (b) $b^2 + c^2$

(c) $a^2 + b^2 + c^2$ (d) $a + b + c$

41. The sum of the rational number $-\frac{1}{3}$ and its reciprocal is

(a) 1 (b) $\frac{2}{3}$ (c) $-\frac{3}{10}$ (d) $-\frac{10}{3}$

42. The ratio of two numbers is 4 : 5, if the difference of their cubes be 61, then the sum of those two numbers is

(a) 9 (b) 54 (c) 61 (d) 81

43. Evaluate: $\left\{\left(\frac{25}{4}\right)^{-\frac{1}{2}}\right\}^3$

(a) $\frac{125}{8}$ (b) $\frac{8}{125}$ (c) $\frac{4}{25}$ (d) $\frac{4}{5}$

44. Uday goes from A to B with a velocity 60 km/hr and returns with a velocity 80 km/hr. The average velocity if Uday is

(a) 70 km/hr (b) $68\frac{4}{7}$ km/hr

(c) $70\frac{4}{7}$ km/hr (d) 68 km/hr

45. A man's monthly salary is Rs. 24000 and his monthly expenses on travel is Rs. 2500. The central angle of the sector representing travel expenses in the pie-chart would be

(a) 30° (b) $57\frac{1}{2}°$ (c) 45° (d) 60°

46. In the pie-diagram representing the percentage of students having interest in reading various kind of books. The central angle of the sector representing students reading novels is 81°. What is the percentage of students interested in reading novels.

(a) 15% (b) 18% (c) $22\frac{1}{2}\%$ (d) $27\frac{1}{2}\%$

47. $\frac{2}{1+\frac{1}{1-\frac{1}{1-\frac{1}{2}}}} \times \frac{3}{\frac{5}{6}\text{ of }\frac{3}{2} \div 1\frac{1}{4}} =$

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

48. At an annual function of a class each student gives a gift to every other student. If the number of gifts is 1980, find the number of students of the class.

(a) 45 (b) 44 (c) 40 (d) 60

49. If the cost price of 20 articles be equal to the selling price of 12 artilces, the profit percent is

(a) $33\frac{1}{3}\%$ (b) $66\frac{2}{3}\%$ (c) 50% (d) $16\frac{2}{3}\%$

50. The length and breadth of a rectangular plot are increased by 50% and 20% respectively. Then the new area is how much times the original area?

(a) 2 (b) 10 (c) $\frac{9}{5}$ (d) $\frac{5}{2}$

51. A number that can be expressed in the form $\frac{a}{b}$ where a and b are integers and b is not equal to zero ($b \neq 0$) is called

(a) a fraction (b) an integer

(c) a rational number (d) a real number

52. $\frac{1}{20}+\frac{1}{30}+\frac{1}{42}+\frac{1}{56}+\frac{1}{72}+\frac{1}{90}+\frac{1}{110}+\frac{1}{132}=$

(a) $\frac{1}{8}$ (b) $\frac{1}{6}$ (c) $\frac{1}{7}$ (d) $\frac{1}{10}$

53. The sum of the squares of two numbers is 146 and the square root of one of them is $\sqrt{5}$. The cube of the other number is—

(a) 1111 (b) 1221 (c) 1331 (d) 1441

54. What is 20% of 50% of 75% of 80?

(a) $5\frac{1}{2}$ (b) 6 (c) 8 (d) $6\frac{1}{2}$

55. *A* can cultivate $\frac{2}{5}$ of a land in 6 days and *B* can cultivate $\frac{1}{3}$ of the same land in 10 days. Working together *A* and *B* can cultivate $\frac{4}{5}$ of the same land in

(a) 4 days (b) 5 days (c) 8 days (d) 10 days

56. *A* tank can be filled by a pipe in 20 minutes and by another pipe in 60 minutes. Both the pipes are kept open for 10 minutes and then the first pipe is shut-off. After this, the tank will be completely filled in

(a) 10 mins (b) 12 mins (c) 15 mins (d) 20 mins

57. A vessel is filled with liquid, 3 parts of which are water and 5 parts syrup. How much of the mixture must be drawn off and replaced with water so that the mixture may be half water and half syrup?

(a) $\frac{1}{3}$ part (b) $\frac{1}{4}$ part (c) $\frac{1}{5}$ part (d) $\frac{1}{7}$ part

58. The sides of a triangle are in the ratio $\frac{1}{3}:\frac{1}{4}:\frac{1}{5}$ and its perimeter is 94 cm. The length of the smallest side is

(a) 24 cm (b) 18 cm (c) 31.3 cm (d) 15 cm

59. Gold is 19 times as heavy as water and copper is 9 times as heavy as water. The ratio in which these two metals be mixed so that the mixture is 15 times as heavy as water, is

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

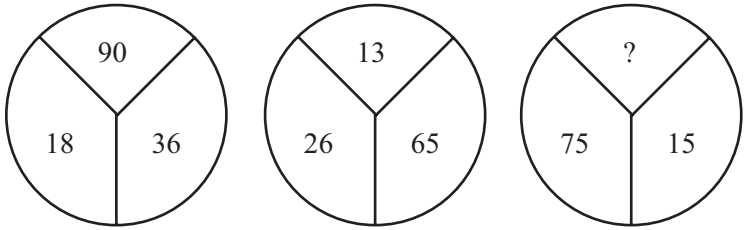
60. A man sold two chairs for Rs. 500 each. On one he gains 20% and on the other he loses 12%. How much does he gain or lose on the whole transaction?

(a) $\frac{3}{2}$% gain (b) $\frac{3}{2}$% loss (c) 2% gain (d) 3% gain

61. If $2^{x+y}=2^{x-y}=16$ then $y=$

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

62. Find the missing number in the third figure.



(a) 105 (b) 60 (c) 30 (d) 45

63. If + stands for multiplication, < stands for division, ÷ stands for subtraction, – stands for addition and × stands for greater than then which one of the following is correct?

(a) $20-4\div4+8<2\times26$

(b) $20\times8+15<5\div9-8$

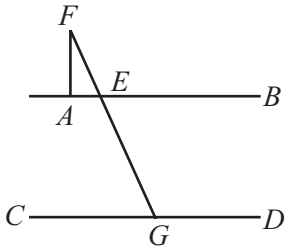
(c) $20<2+10\div4-6\times100$

(d) $20<5+25\div10-2\times96$

64. If $\sqrt{1-\frac{x^3}{100}}=\frac{3}{5}$ then $x=$

(a) 16 (b) 4 (c) 2 (d) 8

65. In the adjoining figure $AB \parallel GD$, $FA \perp AB$ and $\angle AFE = 30°$, find $\angle FGD$.



(a) 100°

(b) 120°

(c) 130°

(d) 150°

66. If n is divided by 4 the remainder is 3; then if $2n$ is divided by 4 then the remainder is

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

67. The denominator of a rational number exceeds its numerator by 10. If the numerator is increased by 4 and the denominator is reduced by 3 the number obtained is $\frac{5}{6}$. The original rational number is

(a) $\frac{9}{19}$ (b) $\frac{13}{23}$ (c) $\frac{7}{17}$ (d) $\frac{11}{21}$

68. If $\frac{a}{1-a}+\frac{b}{1-b}+\frac{c}{1-c}=1$ then $\frac{1}{1-a}+\frac{1}{1-b}+\frac{1}{1-c}=$

(a) 0 (b) 3 (c) 4 (d) 2

69. Divide $3x^4 - 5x^3y + 6x^2y^2 - 3xy^3 + y^4$ by $(x^2 - xy + y^2)$. What should be subtracted from the quotient to make it a perfect square.

(a) $2x^2$ (b) x^2 (c) $-2xy$ (d) none of these

70. If $(x - 4)^2 - (x + 4)^2 = 48$ then the value of $(x + 1)^2$ is

(a) 2 (b) 4 (c) –3 (d) 9

71. The unit digit of $12^{222} + 23^{333} + 34^{444}$ is

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

72. A three digit number $300 + 10a + 5$ is added to another three digit number 933 to give a four digit number $1000 + 200 + 10b + 8$, which is divisible by 11. Find $a + b$.

(a) 11 (b) 0 (c) 15 (d) 5

73. The difference of two numbers is 45. If the larger number is divided by the smaller the quotient is 4. The sum of the numbers is

(a) 100 (b) 90 (c) 60 (d) 75

74. If $x + y - 1 = 0$ then $x^3 + y^3 - 1 =$

(a) $x^2 + y^2 - 1$ (b) $x^2 - xy + y^2$

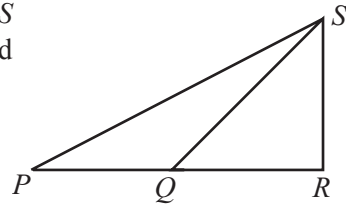
(c) $x^2 + xy + y^2$ (d) $-3xy$

75. The factor of $2(3a - b)^2 - 5(3a - b)(2a - b) + 3(2a - b)^2$ are

(a) $(a + b)(a - b)$ (b) $(2a + b)(a - b)$

(c) ab (d) $(3a - b)(2a - b)$

76. In the adjoining figure, $PQ = QS$ and $QR = RS$. If $\angle PRS = 100°$, find $\angle QPS$.



(a) 20° (b) 15°

(c) 40° (d) 30°

77. The product of two positive numbers is 24 times the difference of these two numbers. If the sum of these two numbers be 14, then the larger number is

(a) 42 (b) 8 (c) 6 (d) none of these

78. The sum of two numbers is 25 and the sum of their squares is 425; then the product of those two numbers is

(a) 425 (b) 125 (c) 200 (d) 100

79. If $3^{a-2b} = 27$ and $9^{a+b} = 3$, then $\frac{a}{b} =$

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

80. If $\frac{p}{q}=\frac{x+3}{x-3}$ then $\frac{p^2-q^2}{p^2+q^2}=$

(a) $\frac{2x}{x^2+3}$ (b) $\frac{6x^2}{x^2+9}$ (c) $\frac{6x}{x^2-9}$ (d) $\frac{6x}{x^2+9}$