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 difficult to you, better try the next question.

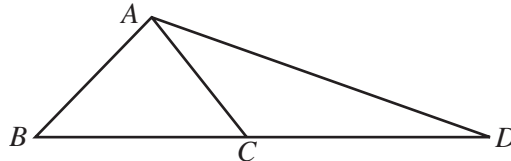1. In the adjoining figure $\angle AOB : \angle BOC : \angle COA = 2 : 3 : 4$, find the least angle.

    (a) 40°   (b) 80°

    (c) 100°   (d) 70°
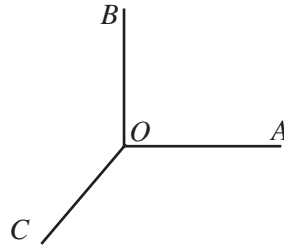
2. Which one of the following statements is wrong for a rectangle?

    (a) Its diagonals are equal

    (b) The diagonals are perpendicular to each other.

    (c) The diognals bisect each other

    (d) Each diagonal divides it into two congruent triangles

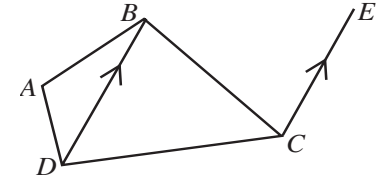3. In the adjoining figure $AB = AC$, $\angle BAC = x$ and $\angle CAD = y$, find $\angle ADB$.

    (a) $90° - \dfrac{x}{2} - y$ (b) $90° - x - y$

    (c) $90° - \dfrac{x}{2} + y$ (d) $90° - \dfrac{x}{2} - \dfrac{y}{2}$

4. The bisector of an angle is produced backwards. It bisects which angle at the same vertex?
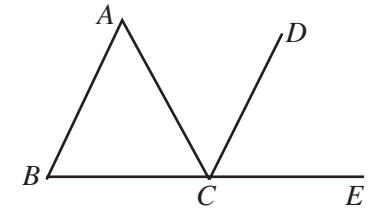
    (a) acute   (b) obtuse   (c) reflex   (d) complete

5. In the adjoining figure $CE \parallel DB$, $\angle ABD = 30°$, $\angle BAD = 110°$. $\angle ADC = 75°$ and $\angle BCD = 60°$, find $\angle BCE$

    (a) 45°   (b) 75°
    (c) 60°   (d) 85°

6. In the adjoining figure $AB \parallel CD$ and $\angle BAC : \angle ABC : \angle ACB = 2 : 3 : 4$; find $\angle DCE$.

    (a) 40°   (b) 60°
    (c) 72°   (d) 80°

7. The angles of a triangle are $3x°$, $(2x - 7)°$ and $(4x - 11)°$; find x.

    (a) 22   (b) 18   (c) 44   (d) 36

8. The angles of a triangle are x, y and z such that $y - x = z - y = 15°$, then $y =$

    (a) 70°   (b) 75°   (c) 50°   (d) 60°

9. $ABCD$ is a trapezium in which $AB \parallel CD$. If $\angle A = 55°$ and $\angle B = 70°$, then $\angle C =$

    (a) 90°   (b) 100°
    (c) 110°   (d) 55°
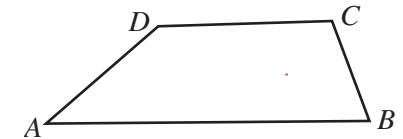
10. The number of edges of a prism whose base is a polygon having 18 sides is

    (a) 36   (b) 54

    (c) 37   (d) 19

11. How many sides does a regular polygon have if each of its interior angles is 120°

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

12. The lower part of a pillar is a prism having 8 sides and the upper part is a pyramid whose base is equal to the base of the prism. Number of faces (excluding the base) of the pillar is

    (a) 16   (b) 24   (c) 17   (d) 25

13. The bases of two regular tetrahedrons with equal bases are joined to form only one solid. The number of edges of the solid thus formed is

    (a) 6   (b) 9   (c) 12   (d) 15

14. In the adjoining figure $AB = AC$, $\angle PAQ = 70°$, $\angle ABC = x$ and $\angle ACR = y$, find $x + y$

    (a) 250°   (b) 120°

    (c) 125°   (d) 180°

15. The length of two sides of a triangle are 5 cm and 7.5 cm. If the length of the third side be x cm then

    (a) $x < 12.5$ cm (b) 2.5 cm $< x < 12.5$ cm

    (c) 2 cm $< x < 12$ cm   (d) $x = 6.25$ cm

16. The triangle whose two angles are 40° and 41° must be

    (a) acute angled   (b) right angled

    (c) obtuse angled   (d) isosceles

17. The two acute angles of a right-angled triangle are in the ratio 7 : 8. Find the least angle.

    (a) 42°   (b) 48°   (c) 30°   (d) 36°

18. An exterior angle of a triangle is 127°. One of the two interior opposite angles be 59°, then the other interior opposite angle is

    (a) 67°   (b) 79°   (c) 58°   (d) 68°
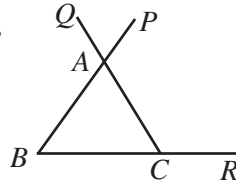
19. In the adjoining figure $PQ \parallel BC \parallel RS$ and $AB \parallel QR \parallel CD$ and $\angle QRS = 110°$. Find the sum of the angles $\angle ABC$, $\angle BCD$, $\angle PQR$ and $\angle BOQ$.
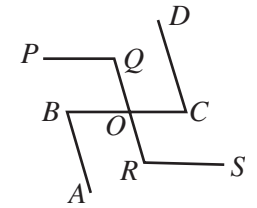
    (a) 300°   (b) 210°

    (c) 320°   (d) 360°

20. In a right angled triangle ABC, $\angle BAC = 90°$, the bisector of the base angles meet at O, $\angle BOC =$

    (a) 135°   (b) 145°   (c) 105°   (d) 125°

21. If $x^2 + \dfrac{1}{x^2} = 18$ then $x - \dfrac{1}{x} =$

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

22. $\dfrac{5^{n+2} - 5^{n+1}}{5^{n+2}} =$

    (a) $\dfrac{4}{5}$ (b) $\dfrac{2}{5}$

    (c) $\dfrac{5}{2}$ (d) none of these

23. If $\dfrac{a+b}{b+c} = \dfrac{c+d}{d+a}$ then

    (a) $a = c$

    (b) Either $a = c$ or, $a + b + c + d = 0$

    (c) $a = c$ and $b = d$

    (d) $a + b + c + d = 0$

24. If $x = 5$, $y = 3$ and $z = 2$, then $x^2 + y^2 + z^2 - 2xy + 2yz - 2zx =$

    (a) 125   (b) 25   (c) 10   (d) 0

25. How much is $3p - 4q + r$ less than $4p + 3q - 5r$?

    (a) $p - q - r$ (b) $p + 7q - 6r$

    (c) $p + 7q + 6r$ (d) $5p - q - 4r$

26. Subtract the sum of $3x + 2xy - 2y$ and $5y - 7xy$
   from $5x + 2y - 3xy$.

   (a) $8x + 2xy + 5y$ (b) $2x + y - 2xy$

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

27. If $x = 3$ and $b = -1$ then the value of $\left(\dfrac{a}{b}+\dfrac{b}{a}\right)^a$

   (a) $-\dfrac{10}{3}$ (b) $\dfrac{1000}{27}$ (c) $-\dfrac{27}{1000}$ (d) $-\dfrac{1000}{27}$

28. If $p + \dfrac{1}{P} = 4$, then $p^2 - \dfrac{1}{p^2} =$

   (a) 0 (b) $\pm 4\sqrt{3}$ (c) ± 8 (d) $\pm 8\sqrt{3}$

29. Factorize: $x^4 - 4x^2$

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

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

30. There are 90 multiple choice questions in a test. You get 2 marks for every correct answer and for every question you leave unattempted or answer wrongly, one mark is deducted from your total score of correct answer. If you get 60 marks in the test, then how many questions did you answer correctly?

   (a) 45   (b) 55   (c) 48   (d) 50

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

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

32. If $\dfrac{2}{3}(n + 6) - \dfrac{1}{5}(n - 4) = \dfrac{3}{7}(n + 12)$ then $n =$

   (a) -9 (b) 8 (c) 9 (d) 27

33. For which question(s) is $x = 3$ is a solution.

   I. $2x - 5 = 10 - 3x$ II. $\dfrac{-x+7}{2} = 2$

   III. $4x - 11 = 17$ IV. $9 = -(x - 1) + 11$

   (a) Only I and III   (b) Ony I and II

   (c) I, II and III   (d) I, II and IV

34. If $(x - 2)(x + 3) = x^2 - 4$ then the value of x is

   (a) 2   (b) -2 (c) -4 (d) 10

35. One factor of $x^2 + 2xy + y^2 + yz + zx$ is

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

   (c) $x + y - 1$ (d) $x + y + z + 1$

36. The value of $(5x - 3y)^2 - (5x + 3y)^2$ when $x = -1$ and $y^2 = \dfrac{1}{25}$ is

   (a) 10   (b) 30   (c) $\dfrac{1}{15}$ (d) ± 12

37. If $a^2 + b^2 + c^2 = 31$ and $bc + ca + ab = 25$, then $a + b + c =$

   (a) 9   (b) 81   (c) ± 6 (d) ± 9

38. $x^2 \div 4x + \dfrac{1}{4}$ of $4x + 8x \div 8 - \dfrac{x}{4} =$

   (a) x (b) $2x$ (c) 2   (d) 0

39. The average age of x boys in a class is m years. If a boy of age y years joins the class then the average age of the boys of that class is

   (a) $\dfrac{mx + y}{x}$ yrs   (b) $\dfrac{m(x + y)}{x+1}$ yrs

   (c) $\dfrac{mxy}{x+1}$ yrs   (d) $\dfrac{mx + y}{x+1}$ yrs

40. $\left\{\dfrac{x^{a^2}}{x^{b^2}}\right\}^{\frac{1}{a+b}}\left\{\dfrac{x^{b^2}}{x^{c^2}}\right\}^{\frac{1}{b+c}}\left\{\dfrac{x^{c^2}}{x^{a^2}}\right\}^{\frac{1}{c+a}} =$

   (a) 0   (b) 1

   (c) x (d) none of these

41. $-\dfrac{1}{243} =$

   (a) -3^{-5} (b) -3^5 (c) $\left(\dfrac{1}{3}\right)^{-5}$ (d) $\left(\dfrac{1}{3}\right)^{5}$

42. Express the ratio $\dfrac{1}{5} : \dfrac{1}{10} : \dfrac{1}{15}$ in its simplest form

   (a) $1 : \dfrac{1}{2} : \dfrac{1}{3}$ (b) 6 : 2 : 3

   (c) 2 : 3 : 6   (d) 6 : 3 : 2

43. Find x when $\dfrac{1}{10} : x :: \dfrac{1}{2} : \dfrac{1}{5}$

   (a) 25   (b) $\dfrac{1}{20}$ (c) $\dfrac{1}{50}$ (d) $\dfrac{1}{25}$

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

   (a) 14   (b) 18

   (c) 16   (d) None of these

45. The third proportional to 36 and 18 is

   (a) 9   (b) 15   (c) 27   (d) 54

46. If $\sqrt{6} = 2.45$ then $\dfrac{\sqrt{2}}{3\sqrt{3}} =$

   (a) 0.27   (b) $0.27\dot{2}$

   (c) $2.7\dot{2}$ (d) 0.273

47. Two numbers are in the ratio 5 : 6; when 2 is added to the first and 6 is subtracted from the second then the new ratio becomes 9 : 8. The first number is

   (a) 25   (b) 15   (c) 50   (d) 5

48. Archana covers a distance by walking for 6 hrs, while returning her speed decreases by 1 km per hour and she takes 9 hours to cover the same distance. What was her speed in the return journey.

   (a) 3 km/hr   (b) 2 km/hr

   (c) 1 km/hr   (d) can not be determined

49. Soma walks at a uniform speed of 4 km /hr and 4 hours after her start Rumu cycles after her at the uniform speed of 10 km/hr. How far from the starting point will Rumu catch Soma?

   (a) 26.7 km   (b) 21.5 km   (c) 16.7 km   (d) 18.5 km

50. The diagonal of a square field is 20 m. The area of the field is

   (a) 250 m²   (b) 100 m²   (c) 400 m²   (d) 200 m²

51. The rational number $-\dfrac{1100}{1320}$ when reduced to standard form is

   (a) $-\dfrac{10}{12}$ (b) $-\dfrac{5}{6}$ (c) $\dfrac{5}{6}$ (d) $\dfrac{5}{3}$

52. The reciprocal of the rational number $-2\dfrac{3}{7}$ is

   (a) $\dfrac{7}{17}$ (b) $-4\dfrac{1}{3}$ (c) $-\dfrac{7}{3}$ (d) $-\dfrac{7}{17}$

53. From a tape 15 m long, $4\dfrac{1}{3}$ m is given to Dali and $\dfrac{3}{5}$ of the remaining is given to Buni and the remaining part is given to Anu, find Anu's share.

   (a) $\dfrac{43}{5}$ m   (b) $4\dfrac{1}{3}$ m   (c) $4\dfrac{4}{15}$ m   (d) $4\dfrac{1}{5}$ m

54. The perimeter of a rectangle is 2 m less than $\frac{2}{5}$ th of the perimeter of a square. If the length of each side of the square be 10 m, and the ratio of the length and breadth of the rectangle be 3 : 1, find the bredth of the rectangle.

(a) $\frac{21}{4}$ m   (b) $\frac{3}{4}$ m   (c) $\frac{7}{2}$ m   (d) $1\frac{3}{4}$ m

55. Which one of the following statements is wrong?

  (a) If a is any rational number then $a° = 1$

  (b) If a is any rational number and m, n are natural numbers then $(a^m)^n = a^{m \times n}$.

  (c) If a and b are rational numbers and m is a natural number then $a^m \times b^m = (ab)^m$

  (d) If a be a non-zero rational number and n is a natural number then $a^{-n} = \frac{1}{a^n}$

56. The cost of carpeting a rectangular room 15 m long with a carpet 75 cm wide at the rate of Rs. 0.90 per metre is Rs. 108. The breadth of the room is

  (a) 12 m   (b) 9 m   (c) 8 m   (d) 6 m

57. A car travels from P to Q at 30 km/hr and returns from Q to P at 40 km/hr by the same route. The average speed of the car is

  (a) $34\frac{2}{7}$ km/hr (b) 34 km/hr   (c) 35 km/hr   (d) 36 km/hr

58. A mother was 30 years old when her son was born. Now the sum of the ages of the mother and the son is 40 years. What would be the age of the son after 10 years?

  (a) 20 years   (b) 12 years   (c) 15 years   (d) 12 years
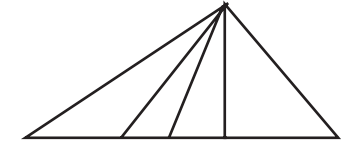
59. If the rate of simple interest is 12% per annum, the amount that would fetch interest of Rs. 6000 per annum is

  (a) Rs. 720000 (b) Rs. 5000

  (c) Rs. 45000   (d) Rs. 50000

60. If m men can do a piece of work in d days, then the number of days in which $(m + r)$ men can do the same work is

  (a) $d + r$ (b) $\frac{d}{m}(m + r)$ (c) $\frac{d}{m+r}$ (d) $\frac{md}{m+r}$

61. The total number of triangles in the adjoining figure is

  (a) 5   (b) 12

  (c) 9   (d) 10

62. The sixth term of the series 2, 5, 9, 19, 37, … … … is

  (a) 75   (b) 74   (c) 76   (d) 80

63. If $(2x – y) : (x + 2y) = 1 : 2$, then $(3x – y) : (3x + y) =$

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

64. If $a * b = a + b + ab$ then $3 * 4 – 2 * 3 =$

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

65. $$1 + \cfrac{1}{3 + \cfrac{1}{3 + \cfrac{1}{2}}} \div \left(\frac{1}{3} + \frac{1}{11} \text{ of } 10\frac{2}{3}\right) =$$

  (a) $1\frac{10}{13}$ (b) 1

  (c) $1\frac{1}{4}$ (d) None of these

66. Tatu can run at a speed of p km/hr to cover a distance of 1 km. But due to slippery ground his speed is reduced by q km/hr, ($p > q$). If he takes r hrs to cover the distance then

  (a) $\frac{1}{r} = p + q$ (b) $r = p – q$

  (c) $r = p + q$ (d) $\frac{1}{r} = p – q$

67. Soma's age after 6 years will be three-seventh of her uncle's age. Ten years ago the ratio of their ages was 1 : 5. What is Soma's present age

    (a) 8 yrs   (b) 28 yrs   (c) 18 yrs   (d) 17 yrs

68. If 5 * 6 = 35, 8 * 4 = 28 then 6 * 8 =

    (a) 38   (b) 46   (c) 34   (d) 23

69. A worker suffers a 20% cut in wages. He regains the original pay by obtaining a rise of

    (a) 20%   (b) 22½%   (c) 25%   (d) 27½%

70. If the number $653xy$ be completely divisible by 80

    then $x + y =$

    (a) 2   (b) 3   (c) 4   (d) 6

71. What least value must be given to * so that the number 97215 *6 is dividible by 11?

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

72. If the numbers 1, 3, 5, 7, 9, …, … 25 are multiplied together, the number of zeros at the right of the product is

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

73. The average of four numbers is 60; if the first is one-fourth of the sum of last three, the first number is

    (a) 24   (b) 96   (c) 48   (d) 64

74. For what value n are $2^n - 1$ and $2^n + 1$ are both prime?

    (a) 7   (b) 5   (c) 2   (d) 1

75. The difference of the number consisting of two digits and the number formed by interchanging its digit is always divisible by

    (a) 5   (b) 11   (c) 6   (d) 9

76. In $\triangle PQR$, the sides PQ and PR are produced to S and T respectively. The bisectors of $\angle SQR$ and $\angle QRT$ meet at the point O. If $\angle QPR = 66°$, then the value of $\angle QOR$ is

    (a) 47°   (b) 57°

    (c) 67°   (d) None of these

77. How many degrees are there in an angle which equals one-fifth of its suplement?

    (a) 15°   (b) 150°   (c) 60°   (d) 30°

78. The value of $\dfrac{10^{-1} \times 5^{x-3} \times 4^{x-1}}{10 \times 5^{x-5} \times 4^{x-2}}$ is

    (a) 1   (b) $\dfrac{1}{5}$ (c) $\dfrac{1}{2}$ (d) 0

79. $3^3 + 3^2 + 3^1 + 3^0 + 3^{-1} + 3^{-2} + 3^{-3} =$

    (a) $40\dfrac{1}{27}$ (b) 40

    (c) $40\dfrac{13}{27}$ (d) None of these

80. The H.C.F. and L.C.M. of two numbers are 7 and 140 respectively. If the numbers lie between 20 and 45, then the sum of those numbers is

    (a) 126   (b) 35   (c) 84   (d) 63

———————

Copyright : C.P.S.M.