VIII (EM) ADTM

**CENTRE FOR PEDAGOGICAL STUDIES IN MATHEMATICS (CPSM)
ACHIEVEMENT-CUM-DIAGNOSTIC TEST IN MATHEMATICS - 2024**

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.

[Students of West Bengal Board will answer Group A and Group B, students reading in ICSE and CBSE board will answer Group A and Group C]

Group A

1. In ΔABC , two angles are 96° and 42°, the name of the triangle is

    (a) isosceles triangle   (b) equilateral triangle

    (c) right angled triangle   (d) scalene triangle

2. Each of five angles of a polygon is 172° and each of the remaining angles is 160°. The number of sides of the polygon is

    (a) 20   (b) 21   (c) 25   (d) non of these

3. In ΔABC, $\angle A + \angle B = 135°$ and $\angle C + 2\angle B = 180°$, the nature of the triangle is

    (a) right angled   (b) equilateral

    (c) Scalene   (d) isosceles

4. Two straight lines intersect at a point and four angles are formed. If the sum of the measures of three angles of those four be 290°, the measures of these four angles are

    (a) 100°, 70°, 100°, 90°   (b) 100°, 80°, 100°, 80°

    (c) 140°, 40°, 140°, 40°   (d) 110°, 70°, 110°, 70°

5. If one angle of a triangle is equal to the sum of the other two then the triangle is

    (a) acute angled   (b) obtuse angled

    (c) right angled   (d) isosceles

6. If two straight lines intersect each other at a point and the sum of two vertically opposite angles is 100°, the measures of these four angles are

    (a) 100°, 80°, 100°, 80°   (b) 100°, 20°, 80°, 100°

    (c) 20°, 160°, 20°, 160°   (d) 50°, 130°, 50°, 130°

7. In ΔBAC, $\angle BAC = 115°$, $\angle ACB = 20°$, $AD \perp BC$ if $BD = x$ cm find AD.

    (a) 2x cm   (b) x cm   (c) $\frac{x}{2}$ cm   (d) none of these

8. ABCDE is a regular pentagon, the measure of $\angle BEC$ is

    (a) 54°   (b) 52°   (c) 36°   (d) 45°

9. An exterior angle of a regular rectilinear figure is double the interior angle. How many sides does the figure has?

    (a) 4   (b) 3   (c) 6   (d) 8

10. In a pentagon, the second angle is twice the first, but half of the fourth, the third angle is three times the first and the fifth is 20° less than the fourth. Find the greatest angle

    (a) 160°   (b) 120°   (c) 140°   (d) 80°

11. The two angles of the ΔABC are as follows, ∠ABC = 67°, ∠BCA = 76°. Arrange the sides of the triangle from lowest to greatest.

    (a) AC, AB, BC   (b) BC, AB, AC

    (c) BC, AC, AB   (d) AC, BC, AB

12. When the sides of a regular polygon are produced in the same order the measure of each external angle is 60°. The number of sides of the polygon is

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

13. The side BC of the ΔABC is produced to D such that CD = AC; if ∠BAD = 109°and ∠ACB = 72°, find ∠ABC.

    (a) 35°   (b)45°   (c) 55°   (d) 50°

14. In ΔABC the bisectors of ∠ABC and ∠ACB meet at O, then ∠BOC =

    (a) $90° - \frac{1}{2}∠BAC$ (b) $90° + \frac{1}{2}∠BAC$

    (c) $180° - \frac{1}{2}∠BAC$ (d) $90° + \frac{1}{4}∠BAC$

15. In ΔABC, BA is produced to D, the bisector of ∠CAD is parallel to BC, the ΔABC is

    (a) isosceles triangle   (b) right angled triangle

    (c) obtuse angled triangle   (d) equilateral triangle

16. The measure of each exterior angle of a regular polygon having n sides when the sides are produced in the same order is

    (a) 30n°   (b)15n°   (c) $\frac{180°}{n}$ (d) $\frac{360°}{n}$

17. Both of AB and CD are perpendicular to XY. What is the relation between AB and CD.

    (a) AB = CD   (b) AB ⊥ CD
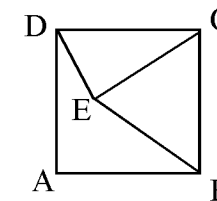
    (c) AB ∥ CD   (d) AB = $\frac{1}{2}$ CD

18. ABCD is a square and ΔABE is an equilateral triangle. AC and EB are produced to meet at F. Calculate the least angle of the ΔAEF.
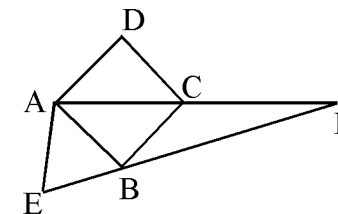
    (a) 25°   (b)30°   (c) 10°   (d) 15°

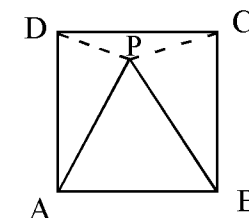19. ABCD is a square and ΔBCE is an equilateral triangle. Find the measure of reflex ∠BED

    (a) 210°   (b) 225°

    (c) 230°   (d) 220°

20. The equilateral triangle ABP lies inside the square ABCD. Find ∠CPD.

    (a) 150°   (b) 145°

    (c) 155°   (d) 160°

21. If $p^2 + \dfrac{1}{p^2} = 7$, find the value of $p^2 - \dfrac{1}{p^2}$

    (a) 45   (b) $\pm 2\sqrt{5}$ (c) $\pm 3 + \sqrt{5}$ (d) $\pm 3\sqrt{5}$

22. Find the value of $a^3 + b^3 + c^3 - 3abc$ if $a + b + c = 8$ and $bc + ca + ab = 19$

    (a) -56 (b) 56   (c) 14   (d) 208

23. When $a - b = 4$ and $ab = -2$, find the value of $a^3 - b^3$

    (a) 64   (b) 72   (c) 40   (d) 88

24. The value of $\dfrac{8\cdot73 \times 8\cdot73 \times 8\cdot73 + 4\cdot27 \times 4\cdot27 \times 4\cdot27}{8\cdot73 \times 8\cdot73 - 8\cdot73 \times 4\cdot27 + 4\cdot27 \times 4\cdot27}$ is

    (a) 13   (b) 12   (c) 11   (d) 10

25. $(-a - b)(b - a)$ is

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

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

26. Factorise : $n^3 - 3n - 2$

    (a) $(n + 1)(n^2 + n - 2)$ (b) $(n + 1)(n + 1)(n - 2)$

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

27. In a two digit number, the digit in the unit's place is 3 more than the digit in the ten's place. The number formed by interchanging the digits and the original number are in the ratio 7:4, the number is

    (a) 39   (b) 37   (c) 63   (d) 36

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

$$\frac{1}{a^2 - bc} + \frac{1}{b^2 - ca} + \frac{1}{c^2 - ab} =$$

    (a) 0   (b) 1   (c) 3   (d) $a + b + c$

29. $(x + y)^2 - z^2 = 4$, $(y + z)^2 - x^2 = 9$ and $(z + x)^2 - y^2 = 36$ then the value of $x + y + z$ is

    (a) 49   (b) 14   (c) ± 7 (d) ± 28

30. If $a + b + c = 0$ then the value of $\dfrac{a^2}{bc} + \dfrac{b^2}{ca} + \dfrac{c^2}{ab}$ is

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

31. The expression $\dfrac{(x^2 - xy - 12y^2)(x^2 + xy - 12y^2)}{(x^2 - 16y^2)(x^2 - 9y^2)}$

    when simplified equals to

    (a) xy (b) 1   (c) $(x + y)$ (d) $(x - y)$

32. If a and b are positive integers such that $a = p^3q^4$ and $b = p^2q^3$ where p and q are prime numbers. If the H.C.F of a and b be $p^m q^n$ and the L.C.M. of a and b be $p^r q^s$ then $(m + n)(r + s) =$

    (a) 15   (b) 30   (c) 35   (d) 72

33. The L.C.M. of $x^2 - 3x + 2$ and $x^3 - 2x^2 - 3x$ is

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

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

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

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

34. If p, m, n are prime numbers, none of which is equal to the other two, what is the greatest common factor of $24\,pm^2n^3$, $9\,pmn^2$ and $36p(mn)^3$

(a) $3pmn$ (b) $3pmn^2$ (c) $3pmn^3$ (d) $3p^2\,m^2n^2$

35. Given $\dfrac{x^2 - 5x + 6}{x^2 - 7x + 12} = \dfrac{x^2 - x - 6}{x^2 + 7x + 10}$, find x.

(a) –2 (b) –2·2 (c) 4 (d) 2·2

36. The average of two numbers is 6 and four times the difference between them is 16. The greater number is

(a) 4 (b) 8 (c) 16 (d) 12

37. If x = 2a – 1, y = 2a – 2 and z = 3 – 4a then the value of $x^3 + y^3 + z^3$ will be

(a) $6(3 - 13a + 18a^2 - 8a^3)$ (b) $6(3 + 13a - 18a^2 + 8a^3)$

(c) $6(3 + 13a + 18a^2 - 8a^3)$ (d) $6(3 - 13a - 18a^2 - 8a^3)$

38. The digit in the unit's place in the cube root of the number 21952 is

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

39. $\sqrt[3]{\sqrt[3]{\sqrt[3]{a^3}}}$ =

(a) $a^{\frac{1}{9}}$ (b) $a^{\frac{1}{27}}$ (c) $a^{\frac{1}{18}}$ (d) none of these

40. The number of trees in each row of a garden is equal to the total number of rows in the garden. After 111 trees have been uprooted in a storm, their remain 10914 trees in the garden. The number of rows of the trees in the garden is

(a) 95 (b) 125 (c) 115 (d) 105

41. If S is 150 percent of T, then T is what per cent of (S + T)?

(a) 20% (b) 40% (c) 80% (d) 60%

42. Out of the total candidates appeared for a competitive examination 20% qualified and 10% of the qualified candidates got finally selected. If 290 candidates were finally selected then how many candidates appeared?

(a) 14000 (b) 15000 (c) 15500 (d) 14500

43. A began a business with Rs. 45,000 and B joined afterwards with Rs. 30,000. At the end of the year the profit was divided in the ratio 2 : 1. When did B join?

(a) after 6 months (b) after 9 months
(c) after 3 months (d) after 4 months

44. If an article is sold for Rs. 178 at a loss of 11%, what should be its selling price in order to earn a profit of 11%

(a) Rs. 211 (b) Rs. 222 (c) Rs. 220 (d) Rs. 267

45. A person invested in all Rs. 2600 at 4%, 6% and 8% per annum simple interest. At the end of the year he get the same interest in all the three cases. The money invested at 4% is

(a) Rs. 900   (b) Rs. 800   (c) Rs. 1200   (d) Rs. 600

46. A alone can do a piece of work in 6 days, B alone in 8 days. A and B undertook to do it for Rs. 3200. With the help of C they completed the work in 3 days. How much is to be paid to C?

(a) Rs. 375   (b) Rs. 400   (c) Rs. 600   (d) Rs. 800

47. A pipe can empty a tank in 40 minutes. A second pipe with diameter twice as much as that of the first is also attached with the tank to empty it. The two pipes together can empty the full tank in

(a) 8 minutes   (b) $13 \frac{1}{3}$ minutes

(c) 30 minutes   (d) 13 minutes

48. If a^2% of b = b^3% of C and c^4% of a = b% of b then the relation between a and b is

(a) $a = b$ (b) $a = b^2$ (c) $a^9 = b^{10}$ (d) $a^3 = b^{10}$

49. x % of x is the same as 10% of P, then P =

(a) $\dfrac{x}{10}$ (b) $\dfrac{x^2}{10}$ (c) $\dfrac{x^3}{10}$ (d) $\dfrac{x}{100}$

50. 5 years ago a father's age was x years and the average age of his two sons was y years. The sum of their present ages is

(a) x + 2y + 15 yrs.   (b) x + y + 15 yrs.

(c) x + y + 10 yrs.   (d) x + 2y + 5 yrs.

51. The digit in the unit's place of the number $(3254)^{1793} \times (415)^{31} \times (41)^{91}$ is

(a) 4   (b) 5   (c) 1   (d) 0

52. A took a loan of Rs. 800 at 12% simple interest and B took a loan of Rs. 910 at 10% simple interest. After how many years will the amount of their loans will be equal?

(a) 20 yrs.   (b) 22 yrs.   (c) 24 yrs.   (d) 18 yrs.

53. 50% of the cost price of an article is equal to 40% of the selling price. Find the percentage of profit when the article is sold.

(a) 5%   (b) 25%   (c) 20%   (d) 15%

54. $12\frac{1}{4}$ % of a stick is in mud, $7\frac{3}{4}$ % is in water and remaining 160 cm is above water. The length of the stick is

(a) 150 cm.   (b) 400 cm.   (c) 250 cm.   (d) 200 cm.

55. Five years ago the ratio of the ages of A and B was 5 : 6. The ratio of their ages will be 7 : 8 after years. What is the ratio of their present ages?

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

56. A train went from Burdwan to Howrah with a speed of 36 Km/hr. and returned with a speed of 45 Km/hr. Find the average speed of the train.

(a) 40 Km/hr.   (b) 44 Km/hr.   (c) 43 Km/hr.   (d) 42 Km/hr.

57. Rs. 900 was distributed among Mimi, Rimi and Bini in such a way that, $\frac{1}{2}$ of Mimi's money = $\frac{1}{3}$ of Rimi's money = $\frac{1}{4}$ of Bini's money. Find the money received by Rimi.

(a) Rs. 300   (b) Rs. 100   (c) Rs. 200   (d) Rs. 400

58. The sum of the present ages of A, B and C is 108 years, three years ago the ratio of their ages was 10 : 11 : 12. Present age of A is

(a) 27 yrs.   (b) 36 yrs.   (c) 33 yrs.   (d) 30 yrs.

59. A train 300 m long crossed a platform 900 m long in one minute 12 seconds. The speed of the train in Km/hr. was

(a) 45.   (b) 50   (c) 54   (d) 60

60. The sum of squares of two numbers is 68 and the square of their difference is 36. The product of the numbers is

(a) 16   (b) 32   (c) 6   (d) 104

61. Factorize $a^6 - 7a^2 - 8$ completely.

(a) $(a^3 - 8)(a^3 + 1)$

(b) $(a + 1)(a - 2)(a^2 - a + 1)(a^2 + 2a + 4)$

(c) $(a + 1)(a - 2)(a - 1)^2(a + 2)^2$

(d) $(a + 1)(a + 2)(a^2 - a + 1)(a^2 + 2a + 4)$

62. If $a + b + c = 0$, then $(a + b - c)^3 + (c + a - b)^3 + (b + c - a)^3 =$

(a) $8(a^3 + b^3 + c^3)$ (b) $a^3 + b^3 + c^3$

(c) $24abc$ (d) $-24abc$

63. There are three containers of equal capacity. The ratio of sulphuric acid to water in the first container is 3 : 2, that in the second container is 7 : 3 and in the third is 11 : 4. If all the liquids are mixed together then the ratio of sulphuric acid to water in the mixture will be

(a) 122 : 29   (b) 2 : 1   (c) 61 : 29   (d) none of these

64. A sold a watch to B at 20% gain and B sold it to C at a loss of 10%. If C bought the watch for Rs. 216 at what price did A purchase it?

(a) Rs. 270   (b) Rs. 200   (c) Rs. 216   (d) Rs. 250

65. What value should come in place of x in the following equation?
$48\sqrt{x} + 32\sqrt{x} = 320$

(a) 36   (b) 4   (c) 25   (d) 16

66. A man, a woman and a boy can together complete a piece of work in 3 days. If the man alone can do it in 6 days, the boy alone can do it in 18 days, how long will a woman take to complete the same piece of work.

(a) 9 days   (b) 21 days   (c) 12 days   (d) 15 days

67. A and B can do a piece of work in 12 days, B and C can do it in 15 days while C and A can do it in 20 days. In how many days they finish it working together.

(a) 5 days   (b) 10 days   (c) 15 days   (d) 20 days

68. In the adjoining figure
$\angle ABC = 90°$, $\angle ACD = 140°$,
Find $\angle BAE$

(a) 125°   (b) 140°   (c) 120°   (d) 130°
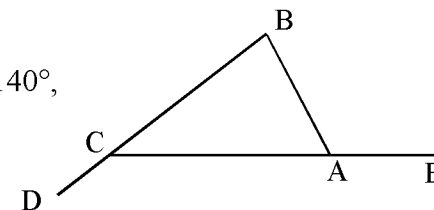
69. The ratio between an exterior angle and an interior angle of a regular polygon is 1 : 5; find the number of sides of the polygon

    (a) 15   (b) 12   (c) 18   (d) 8

70. Factorise : $x^2 + \dfrac{1}{x^2} - 7\left(x - \dfrac{1}{x}\right) + 8$

    (a) $\left(x - \dfrac{1}{x} - 1\right)\left(x - \dfrac{1}{x} - 10\right)$

    (b) $\left(x - \dfrac{1}{x} + 5\right)\left(x - \dfrac{1}{x} + 2\right)$

    (c) $\left(x + \dfrac{1}{x} - 5\right)\left(x - \dfrac{1}{x} - 2\right)$

    (d) $\left(x - \dfrac{1}{x} - 5\right)\left(x - \dfrac{1}{x} - 2\right)$

Group B
[For students under west Bengal Board]

71. The sum of three consecutive even integers is 36, the product of the least and the largest is

    (a) 120   (b) 140   (c) 168   (d) 160

72. Factorize : $x^2 y^2 (a^4 + b^4) + a^2 b^2 (x^4 + y^4)$

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

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

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

    (d) $(a^2 + b^2)(x^2 + y^2)$

73. A polyhedron have 7 faces, 10 vertices and 15 edges. The name of the polyhedron is

    (a) hexagonal prism   (b) hexagonal pyramid

    (c) pentagonal prism   (d) heptagonal pyramid

74. A number when decreased by 20% becomes 136. What is the number?

    (a) 200   (b) 170   (c) 270   (d) 185

75. Sanku's salary increased by 20% and then decreased by 30%, the effective change in his salary was Rs. 8560. Find his original salary.

    (a) Rs. 53,100   (b) Rs. 53,000   (c) Rs. 54,000   (d) Rs. 53,500

76. The difference between the present ages of Ramu and his son is 24 years. After six years their ages will be in the ratio 3 : 1; find the present age of Ramu

    (a) 24 yrs.   (b) 28 yrs.   (c) 30 yrs.   (d) 32 yrs.

77. $x + y = 11$ and $xy = 24$ find $x^3 + y^3$

    (a) 539   (b) 2123   (c) 1331   (d) 792

78. Two years ago Harish was three times as old as his son. Two years later, twice his age will be equal to five times that of his son's age. The present age of Harish is

    (a) 42 yrs.   (b) 38 yrs.   (c) 40 yrs.   (d) 36 yrs.

79. A person covers a certain distance at a certain speed. If he increases his speed by 25% then he takes 12 minutes less to cover the same distance. Find the time taken by him initially to cover the distance travelling at the original speed

    (a) 72 mins   (b) $1\dfrac{1}{2}$ hrs.   (c) 50 mins   (d) 1 hr.

80. What should the added to $\dfrac{a}{a-b} + \dfrac{b}{a+b}$ to get 1?

   (a) $\dfrac{2ab}{a^2-b^2}$ (b) $\dfrac{-2ab}{a^2-b^2}$ (c) $\dfrac{2ab}{b^2+a^2}$ (d) $\dfrac{-2ab}{b^2-a^2}$

## Group C

[For the students reading in ICSE or CBSE Board]

71. The solution set of x + 2 < 9 over a set of positive even integers is

   (a) {8, 10, 12.............}   (b) {2, 4, 6}

   (c) {1, 2, 3, 4, 5, 6 }   (d) {2, 4, 6, 8}

72. If x is an integer greater than −10 but less than 10 and $| x - 2 | < 3$, then the values of x are.

   (a) 0, 1, 2, 3, 4.

   (b) −10, −9, −8, −7, −6, −5, −4, −3, −2, −1, 0, 1, 2, 3, 4

   (c) 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

   (d) −1, 0, 1

73. The roots of $x^2 - 8x + 15 = 0$ are

   (a) 5, 15   (b) 6, 5   (c) 5, 3   (d) 2, 3

74. Two trains leave a railway station at the same time. The first train travels due west and the second train due north. If after two hours they are 50 Km apart, find the speed of the first train if the speed of the second train is 15Km/hr.

   (a) 15 Km/hr.   (b) 20 Km/hr.

   (c) 25Km/hr.   (d) 40Km/hr.

75. The square root of $\left[y^3 - \dfrac{1}{y^3} - 3 \left(y - \dfrac{1}{y} \right) \right] \div \left(y - \dfrac{1}{y} \right)$ is

   (a) $\pm \left(y + \dfrac{1}{y} \right)$ (b) $2 \left(y - \dfrac{1}{y} \right)$

   (c) $3 \left(y + \dfrac{1}{y} \right)$ (d) $\pm \left(y - \dfrac{1}{y} \right)$

76. The factors of $a^4 - 64a$ are

   (a) $(a - 4)(a^2 - 4a + 16)$ (b) $a(a + 4)(a^2 - 4a + 16)$

   (c) $a(a - 4)(a^2 + 4a + 16)$ (d) $(a^2 + 8)(a^2 + 4)$

77. The cube of a natural number whose unit digit is 7, ends with the digit

   (a) 3   (b) 1   (c) 7   (d) 9

78. If $a^2 - 3a - 1 = 0$ evalute $a^2 + \dfrac{1}{a^2}$

   (a) 7   (b) 11   (c) 5   (d) 83

79. The solution set of $3x \le 10,\ x \in \mathbb{N}$ is

   (a) {1, 2}   (b) {0, 1, 2, 3}

   (c) {0, 1, 2}   (d) {1, 2, 3}

80. In the adjoining figure, PA and PB are two tangents to the circle with centre at O. If PA = 12 cm and OA = 5cm find PO
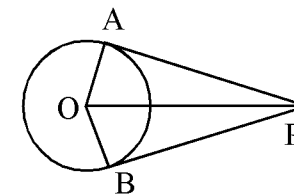
   (a) 12 cm.   (b) 13 cm.   (c) 12·5 cm.   (d) None of these