

2024 X 22

0900

Seat No.

DIV :

Time : 3 Hours

MATHEMATICS

Subject Code

N 2 0 2 1

SET : **B**

Total No. of Questions : 55 (Printed Pages : 16)

Maximum Marks : 80

Instructions :

- (i) This question paper consists of **55** questions. *All* questions are compulsory.
- (ii) This question paper is divided into four sections— A, B, C and D.
- (iii) In Section A, Question Nos. **1** to **40** are multiple choice questions (MCQs) carrying **1** mark each which are to be answered on an OMR sheet. The OMR sheet shall be collected after **90** minutes of commencement of exam.
- (iv) In Section B, Question Nos. **41** to **47** are short answer type I (SA-I) questions carrying **2** marks each.
- (v) In Section C, Question Nos. **48** to **53** are short answer type II (SA-II) questions carrying **3** marks each.
- (vi) In Section D, Question Nos. **54** and **55** are long answer (LA) questions carrying **4** marks each.
- (vii) There is no overall choice. However, an internal choice has been provided in three questions of **2** marks each in Section B and two questions of **3** marks each in Section C.
- (viii) In questions on constructions, the drawing should be clear and exactly as per given measurements. The construction lines and arcs should be maintained.
- (ix) Graph paper will be provided on request.
- (x) Use of calculator is not permitted.

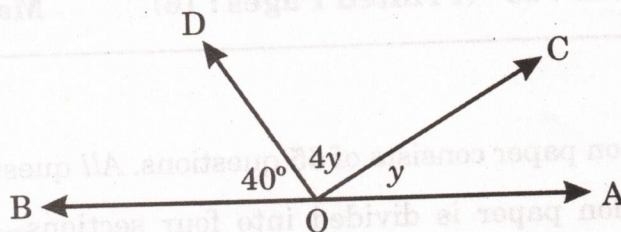
Section A (1 mark each)

* Choose the correct alternative from those given below each statement :

1. If two acute angles of a right triangle are equal, then each acute angle is equal to :

(A) 30° (B) 45°
(C) 60° (D) 90°

2. In the given figure, AOB is a line. Therefore the value of y is :

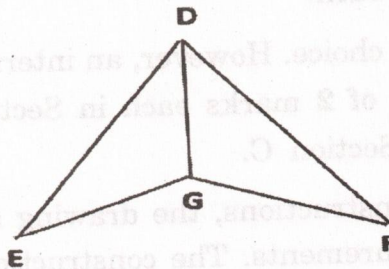


(A) 18° (B) 28°
(C) 72° (D) 90°

3. If the measures of two complementary angles are $3x^\circ$ and $6x^\circ$, then the value of x is :

(A) 10° (B) 20°
(C) 90° (D) 180°

4. In the given figure, if DG bisects $\angle EDF$ and $DE = DF$, then the congruence rule by which $\triangle DGE \cong \triangle DGF$ is :



(A) RHS

(B) AAS

(C) ASA

(D) SAS

5. In $\triangle PQR$, if $PQ = 3.8$ cm, $QR = 6.2$ cm and $PR = 4.7$ cm, then :
- (A) $\angle P > \angle Q > \angle R$ (B) $\angle Q > \angle R > \angle P$
 (C) $\angle R > \angle P > \angle Q$ (D) $\angle P > \angle R > \angle Q$
6. A parallelogram with a right angle is a :
- (A) kite (B) rectangle
 (C) rhombus (D) square
7. The value of the polynomial $p(x) = 5x^2 - 3x + 7$ at $x = 1$ is :
- (A) 0 (B) 7
 (C) 9 (D) 14
8. The graph of the linear equation $x + 2y = 4$, intersects the Y-axis at the point :
- (A) (0, 4) (B) (0, 2)
 (C) (2, 0) (D) (4, 0)
9. The equation of a line parallel to the Y-axis and at a distance of 5 units to the left of Y-axis is :
- (A) $x = -5$ (B) $y = -5$
 (C) $x = 5$ (D) $y = 5$
10. The value of $\frac{\cos 37^\circ}{\sin 53^\circ}$ is :
- (A) 0 (B) 1
 (C) 2 (D) Not defined

11. The real number $\frac{2}{5}$ is a zero of the polynomial :

(A) $2x + 5$

(B) $2x - 5$

(C) $5x + 2$

(D) $5x - 2$

12. The value of $\left[\frac{1}{6^{-2}}\right]^{\frac{3}{2}}$ is :

(A) 6

(B) 36

(C) 216

(D) 1296

13. If $(x + 1)$ is a factor of the polynomial $2x^2 + kx$, then the value of k is :

(A) -3

(B) -2

(C) 2

(D) 4

14. If $x = \sqrt{5} + 2$, then $\frac{1}{x}$ is equal to :

(A) $\sqrt{5}$

(B) $\sqrt{5} - 4$

(C) $\sqrt{5} - 2$

(D) $\sqrt{5} + 2$

15. The product of $\left(x - \frac{1}{x}\right)\left(x + \frac{1}{x}\right)\left(x^2 + \frac{1}{x^2}\right)$ is :

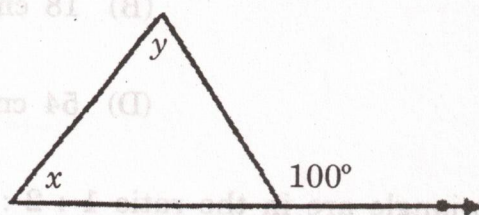
(A) $x^4 + \frac{1}{x^4}$

(B) $x^3 + \frac{1}{x^3} - 2$

(C) $x^4 - \frac{1}{x^4}$

(D) $x^2 + \frac{1}{x^2} + 2$

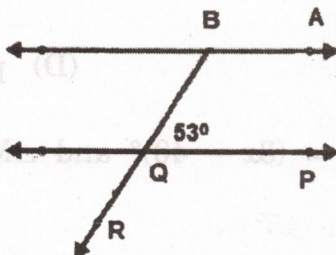
16. The coefficient of x^2 in the product $(x - 1)(1 - 2x)$ is :
- (A) -2 (B) 1
(C) 2 (D) 3
17. The remainder when $m^2 + 2m + 1$ is divided by $m + 3$ is :
- (A) -4 (B) 1
(C) 3 (D) 4
18. The positive solutions of the equation $ax + by + c = 0$ always lie in the :
- (A) First Quadrant (B) Second Quadrant
(C) Third Quadrant (D) Fourth Quadrant
19. If 'x' represents the present age of a father and 'y' represents the present age of his son, then the algebraic equation representing the statement 'The present age of the father is 5 years more than 6 times the present age of his son' is :
- (A) $x = 6y - 5$ (B) $x = 5y + 6$
(C) $x = 6y + 5$ (D) $x = y + 30$
20. In the given figure, the value of $\angle x + \angle y$ is :



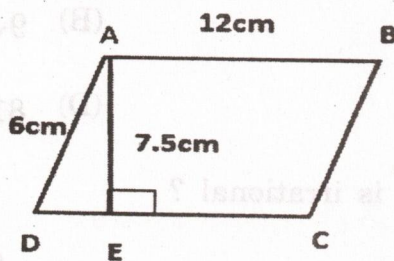
- (A) 60° (B) 80°
(C) 100° (D) 120°

21. ΔABC and ΔPQR are two triangles such that $\Delta ABC \cong \Delta PQR$. If $AB = 5$ cm, $\angle B = 40^\circ$ and $\angle A = 80^\circ$, then which of the following is true ? :
- (A) $QP = 5$ cm, $\angle P = 60^\circ$ (B) $QR = 5$ cm, $\angle R = 60^\circ$
 (C) $QP = 5$ cm, $\angle R = 60^\circ$ (D) $QR = 5$ cm, $\angle Q = 40^\circ$
22. The value of $\sin^2 45^\circ - \cos^2 45^\circ + \tan^2 45^\circ$ is :
- (A) 0 (B) 1
 (C) $\sqrt{2}$ (D) $2\sqrt{2}$
23. If $\sin 4x = \cos 5x$, then the value of x is :
- (A) 10° (B) 30°
 (C) 45° (D) 90°
24. ΔPQR is a right triangle, right angled at Q. If $PQ = 9$ cm and $\angle R = 60^\circ$, then the length of side PR is :
- (A) $6\sqrt{3}$ cm (B) 18 cm
 (C) $18\sqrt{3}$ cm (D) 54 cm
25. If three angles of a triangle are in the ratio $1 : 2 : 3$, then the triangle is :
- (A) an acute triangle (B) an obtuse triangle
 (C) an equilateral triangle (D) a right-angled triangle

26. In the given figure, $AB \parallel PQ$ and $\angle PQB = 53^\circ$. Therefore measure of $\angle ABQ$ is :



- (A) 27° (B) 53°
 (C) 127° (D) 180°
27. In $\triangle ABC$, if $\angle A + \angle B = 95^\circ$ and $\angle A - \angle B = 25^\circ$, then the measure of $\angle A$ is :
- (A) 35° (B) 60°
 (C) 85° (D) 120°
28. In the figure, $\square ABCD$ is a parallelogram. If $AB = 12$ cm, $AE = 7.5$ cm and $AD = 6$ cm, then the perimeter of $\square ABCD$ is :



- (A) 18 cm (B) 36 cm
 (C) 43.5 cm (D) 72 cm

29. If diagonals of a quadrilateral are equal and bisect each other at right angles, then the quadrilateral is a :

- (A) square (B) rectangle
(C) rhombus (D) parallelogram

30. JUMP is a rhombus, $\angle J = (3x - 40)^\circ$ and $\angle M = 2x^\circ$, then the value of x is :

- (A) 8° (B) 40°
(C) 44° (D) 80°

31. The product of a rational number and an irrational number is :

- (A) always a rational number
(B) always an irrational number
(C) always an integer
(D) sometimes rational and sometimes irrational

32. The product of $\sqrt{6}$ and $\sqrt{27}$ is :

- (A) $6\sqrt{2}$ (B) $9\sqrt{2}$
(C) $9\sqrt{3}$ (D) $81\sqrt{2}$

33. Which of the following is irrational ?

- (A) $\sqrt{\frac{4}{9}}$ (B) $\frac{\sqrt{12}}{\sqrt{3}}$
(C) $\sqrt{7}$ (D) $\sqrt{81}$

34. A quadratic polynomial has degree :

(A) 1

(B) 2

(C) 3

(D) 4

35. The zero of the polynomial $p(x) = -8x + 8$ is :

(A) -9

(B) -1

(C) 0

(D) 1

36. Any point on the X-axis is of the form :

(A) (x, y)

(B) $(0, y)$

(C) $(x, 0)$

(D) $(0, 0)$

37. The maximum number of points that lie on the graph of a linear equation in two variables is :

(A) two

(B) three

(C) finite

(D) infinite

38. If $(2, 0)$ is a solution of the linear equation $2x + 3y = k$, then the value of k is :

(A) 2

(B) 4

(C) 5

(D) 6

39. If θ is an acute angle of a right-angled triangle, then the value of

$\sin^2 \theta + \cos^2 \theta$ is :

(A) -1

(B) 0

(C) 1

(D) Not defined

40. The value of $\sin^2 30^\circ$ is :

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

(B) $\frac{\sqrt{3}}{2}$

(C) $\frac{1}{4}$

(D) Not defined

Section B (2 marks each)

41. Represent $\sqrt{6.5}$ on a number line.

42. Factorise the following quadratic polynomial by splitting the middle term :

$$4x^2 + 13x + 9$$

Or

$$8x^2 - 14x + 5$$

43. Factorise using a suitable identity :

$$27y^3 + 125z^3$$

44. Expand using a suitable identity :

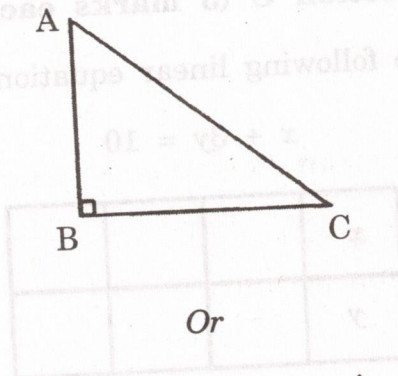
$$(x + 2y + 4z)^2$$

Or

44. Evaluate using a suitable identity :

$$(101)^3$$

45. In $\triangle ABC$, $\angle B = 90^\circ$, $AB = 8$ cm and $BC = 15$ cm. Find the length of AC and the value of $\sin A$.



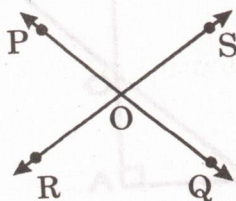
Or

45. Evaluate the following trigonometric expression using known trigonometric values of specific angles :

$$5\tan^2 60^\circ + 4\cos^2 30^\circ$$

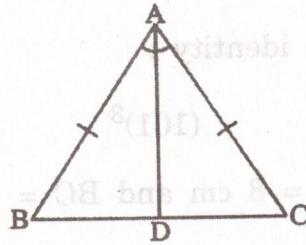
46. Given : In the following figure, lines PQ and RS intersect at 'O'. Prove that :

$$\angle POR = \angle SOQ$$



47. Given : $\triangle ABC$ is an Isosceles triangle such that $AB = AC$ and AD is the bisector of $\angle BAC$. Prove that :

$$\triangle ADB \cong \triangle ADC$$



Section C (3 marks each)

48. Draw the graph of the following linear equation in two variables :

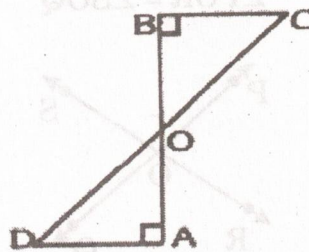
$$x + 3y = 10$$

x			
y			

(Plot at least three points)

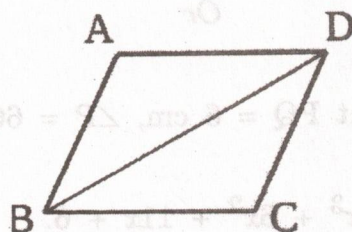
49. In the given figure, AD and BC are equal perpendiculars to a line segment AB . Prove that :

$$\triangle DAO \cong \triangle CBO \text{ and } OB = \frac{1}{2} AB$$



50. Given : $\square ABCD$ is a parallelogram. BD is the diagonal. Prove that :

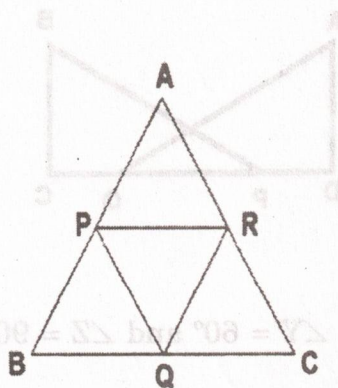
$$AD = CB \text{ and } AB = CD$$



Or

50. The angles of a quadrilateral are in the ratio $2 : 4 : 5 : 7$. Find all the angles of the quadrilateral.

51. In the given figure, $\triangle ABC$ is an Isosceles triangle where $AB = AC$. Points P , Q and R are the midpoints of sides AB , BC and AC respectively. If $BC = 10$ cm and the perimeter of $\triangle ABC = 26$ cm, find length AB , PQ and perimeter of $\triangle PQR$.



52. Construct $\triangle ABC$ such that :

$$BC = 5.6 \text{ cm}, \angle B = 30^\circ \text{ and } AB - AC = 2.8 \text{ cm.}$$

Or

52. Construct $\triangle PQR$ such that $PQ = 6 \text{ cm}$, $\angle P = 60^\circ$ and $PR + QR = 8.5 \text{ cm}$.

53. Factorise the polynomial $x^3 + 6x^2 + 11x + 6$.

Section D (4 marks each)

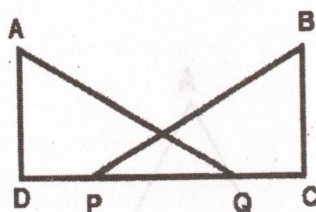
54. In the following figure, $AD \perp CD$ and $BC \perp CD$. $AD = BC$ and $DP = CQ$.

Prove that :

$$\triangle ADQ \cong \triangle BCP$$

$$\angle DAQ = \angle CBP$$

$$AQ = BP$$



55. Construct $\triangle XYZ$ in which $\angle Y = 60^\circ$ and $\angle Z = 90^\circ$ and $XY + YZ + ZX = 10 \text{ cm}$.

Measure and state the length of XY , YZ and ZX .

Rough Work