

General Instructions :

- i) The question-cum-answer booklet contains *two* Parts, **Part – A** & **Part – B**.
- ii) **Part – A** consists of 60 questions and **Part – B** consists of 16 questions.
- iii) Space has been provided in the question-cum-answer booklet itself to answer the questions.
- iv) Follow the instructions given in **Part – A** and write the correct choice in full in the space provided below each question.
- v) For **Part – B** enough space for each question is provided. You have to answer the questions in the space provided.
- vi) **Space for Rough Work** has been printed and provided at the bottom of each page.

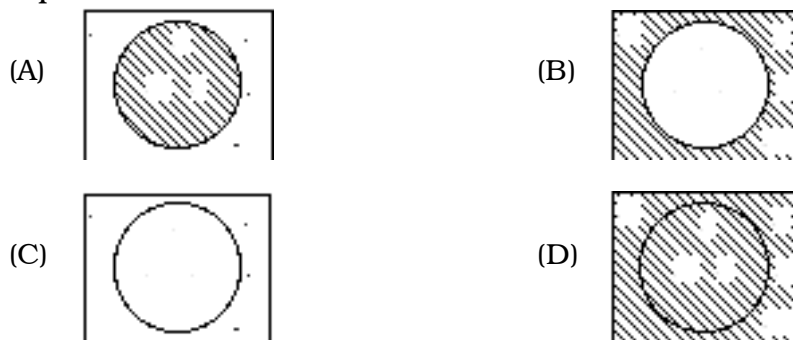
PART – A

Four alternatives are suggested to each of the following questions / incomplete statements. Choose the most appropriate alternative and write the answer in the space provided below each question. $60 \times 1 = 60$

1. In the sets, $(A \cup B) \cup C = A \cup (B \cup C)$. This statement represents
 - (A) commutative property in the union of sets
 - (B) associative property in the union of sets
 - (C) distributivity of union over intersection
 - (D) distributivity of intersection over union.

Ans. : _____

2. Universal set $U = \{ 2, 3, 5, 6, 10 \}$, subset $A = \{ 5, 6 \}$. The diagram which represents A' is



Ans. : _____

(SPACE FOR ROUGH WORK)

3. In a class of 60 students 22 of them play volleyball, 12 of them play both volleyball and kho-kho, 17 of them do not take part in any of the games. The number of students who play only kho-kho is
- (A) 32 (B) 28
(C) 33 (D) 21.

Ans. : _____

4. The general term of Geometric Progression is
- (A) $T_n = a + (n - 1)d$ (B) $T_n = ar^{n-1}$
(C) $T_n = \frac{1}{a + (n - 1)d}$ (D) $T_n = ar^n - 1$.

Ans. : _____

5. A person continuously places 3 marbles in first box, 5 in second box, 7 in third box etc. The number of marbles that he places in sixteenth box is
- (A) 66 (B) 33
(C) 31 (D) 35.

Ans. : _____

6. If 11, 13, 15, 17, 19, is an Arithmetic Progression, then the terms in Harmonic Progression are
- (A) 1, 2, 3, 4, (B) 1, 3, 5, 7,
(C) $\frac{1}{11}, \frac{1}{13}, \frac{1}{15}, \frac{1}{17}, \frac{1}{19}, \dots$ (D) $\frac{1}{10}, \frac{1}{12}, \frac{1}{14}, \dots$

Ans. : _____

7. If 3, x, 7 are in Harmonic Progression then the value of x is
- (A) $\frac{21}{5}$ (B) 5
(C) $\sqrt{21}$ (D) $\frac{5}{21}$.

Ans. : _____

(SPACE FOR ROUGH WORK)

8. A is a matrix. If $A = A'$ then the matrix is a

- (A) scalar matrix (B) skew symmetric matrix
(C) unit matrix (D) symmetric matrix.

Ans. : _____

9. If $B = \begin{bmatrix} 0 & 5 \\ x + 6 & 0 \end{bmatrix}$ is a skew symmetric matrix, then the value of x is

- (A) 0 (B) 5
(C) -1 (D) -11.

Ans. : _____

10. If matrix $A = [1 \ 2 \ 3]$, $B = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ then the order of $A \times B$ is

- (A) 1×3 (B) 3×1
(C) 1×1 (D) 3×3 .

Ans. : _____

11. The formula to find the sum to n terms of Geometric series is

- (A) $\frac{n(n+1)}{2}$ (B) $\frac{n}{2} [n^2 + 1]$
(C) $\frac{a(1-r^n)}{1-r}$ (D) $\frac{r^n - 1}{a(r-1)}$.

Ans. : _____

12. If $\begin{bmatrix} 0 & x \\ 1 & 5 \end{bmatrix} = \begin{bmatrix} 0 & 6 \\ 1 & 5 \end{bmatrix}$ then the value of x is

- (A) -6 (B) 0
(C) 5 (D) 6.

Ans. : _____

13. The relation between ${}^n P_r$ and ${}^n C_r$ is

- (A) ${}^n P_r = {}^n C_r$ (B) ${}^n P_r \cdot \underline{r} = {}^n C_r$
(C) ${}^n C_r \cdot \underline{r} = {}^n P_r$ (D) ${}^n C_r \cdot \underline{n} = {}^n P_r$

Ans. : _____

(SPACE FOR ROUGH WORK)

14. Coefficients of variation of Bhavana and Rashmi are 8.5 and 12.8 respectively. Which of the following is a correct statement ?
- (A) Bhavana is more consistent than Rashmi
 (B) Rashmi is more consistent than Bhavana
 (C) Bhavana and Rashmi both are equally consistent
 (D) Bhavana and Rashmi are not consistent.

Ans. : _____

15. If ${}^5P_r = 60$ then the value of r is

- (A) 2 (B) 3
 (C) 5 (D) 60.

Ans. : _____

16. Formula to find the coefficient of variation is

- (A) $\frac{\sum fx}{n}$ (B) $\frac{\sigma}{M} \times 100$
 (C) $\sqrt{\frac{\sum fd^2}{n}}$ (D) $\frac{M}{\sigma} \times 100.$

Ans. : _____

17. The L.C.M. of $8x^3 - 1$ and $4x^2 + 2x + 1$ is

- (A) $(2x - 1)^3$ (B) $8x^3 - 1$
 (C) $2x - 1$ (D) $4x^2 + 2x + 1.$

Ans. : _____

18. Expanded form of $\sum_{xyz} x^2$ is

- (A) $x^2 + y^2$ (B) x^2
 (C) $x^2 + y^2 + z^2$ (D) $x^2 + z^2.$

Ans. : _____

19. Which of the following is in cyclic with x, y, z variables ?

- (A) $x^2 + xy$ (B) $x^2 + z^2 + xz + yz$
 (C) $x^2 + y^2 + z^2$ (D) $x^2 + y^2 + xy + yz.$

Ans. : _____

(SPACE FOR ROUGH WORK)

20. The factors of $a^3 + b^3$ are

- (A) $(a + b)^3$ (B) $(a + b)(a^2 + ab + b^2)$
 (C) $(a - b)(a^2 - ab + b^2)$ (D) $(a + b)(a^2 - ab + b^2)$.

Ans. : _____

21. Which of the following is a pair of like surds ?

- (A) $\sqrt{2}$, $\sqrt{3}$ (B) $\sqrt[3]{2}$, $\sqrt{2}$
 (C) $\sqrt{2}$, $\sqrt{8}$ (D) $4\sqrt{3}$, $3\sqrt{4}$.

Ans. : _____

22. If $\sqrt{3} - \sqrt{2}$ is subtracted from $\sqrt{2} - \sqrt{3}$, then the result is

- (A) $2(\sqrt{2} - \sqrt{3})$ (B) $2(\sqrt{3} - \sqrt{2})$
 (C) 0 (D) 1.

Ans. : _____

23. The product of $3\sqrt{5}$ and $(\sqrt{3} - 2)$ is

- (A) $3\sqrt{15} - 3\sqrt{10}$ (B) $3\sqrt{15} - 6\sqrt{5}$
 (C) $3\sqrt{15} - 3\sqrt{6}$ (D) $3\sqrt{15} - 5\sqrt{6}$.

Ans. : _____

24. The rationalising factor of $p\sqrt{q} - q\sqrt{p}$ is

- (A) $p\sqrt{q} - q\sqrt{p}$ (B) $\sqrt{q} + \sqrt{p}$
 (C) $p\sqrt{q} + q\sqrt{p}$ (D) $\sqrt{q} - \sqrt{p}$.

Ans. : _____

25. In an equation $ax^2 + bx + c = 0$, if $b = 0$ then the equation is

- (A) pure quadratic equation (B) adfected quadratic equation
 (C) linear equation (D) simultaneous equation.

Ans. : _____

(SPACE FOR ROUGH WORK)

26. The quadratic equation whose roots are 5 and -6 is

- (A) $x^2 - 30x - 1 = 0$ (B) $x^2 - x - 30 = 0$
 (C) $x^2 + x - 30 = 0$ (D) $x^2 - x + 30 = 0$.

Ans. : _____

27. The product of the roots of an equation $3x^2 - 7x + 9 = 0$ is

- (A) $\frac{7}{3}$ (B) 3
 (C) $\frac{1}{3}$ (D) -3 .

Ans. : _____

28. If $s = \frac{1}{2}gt^2$ is solved for t , then

- (A) $t = \pm \sqrt{\frac{2s}{g}}$ (B) $t = \frac{2s}{g}$
 (C) $t = \frac{2g}{s}$ (D) $t = \pm \sqrt{\frac{2g}{s}}$.

Ans. : _____

29. The nature of the roots of the equation $x^2 - 5x + 6 = 0$ is

- (A) real and distinct (B) real and equal
 (C) imaginary (D) equal.

Ans. : _____

30. The graph of $y = 3$ is a straight line

- (A) passing through origin
 (B) perpendicular to x -axis
 (C) parallel to x -axis and passing through 3 on y -axis
 (D) parallel to y -axis and passing through 3 on x -axis.

Ans. : _____

31. If the roots of an equation $x^2 - mx + 16 = 0$ are equal, then the value of m is

- (A) ± 4 (B) ± 16
 (C) ± 2 (D) ± 8 .

Ans. : _____

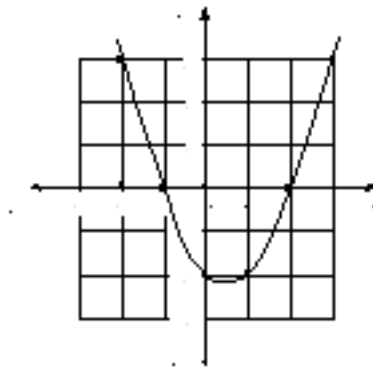
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32. If m and n are the roots of the quadratic equation $x^2 - 6x + 2 = 0$, then the value of $mn (m + n)$ is

- (A) 12 (B) 6
(C) 2 (D) 3.

Ans. : _____

33. The roots of the quadratic equation solved in this graph are



- (A) + 2, - 1 (B) - 2, + 1
(C) - 2, + 2 (D) - 2, - 1.

Ans. : _____

34. The set of residues of modulo 4 is

- (A) { 0, 1, 2, 3 } (B) { 0, 1, 2, 3, 4 }
(C) { 1, 2, 3 } (D) { 1, 2, 3, 4 } .

Ans. : _____

35. If $y \otimes y = 1 \pmod{8}$, then the value of y is

- (A) 6 (B) 3
(C) 8 (D) 4.

Ans. : _____

(SPACE FOR ROUGH WORK)

36. The sum of $(5 \oplus_5 5) \oplus_5 5$ is

- (A) 5 (B) 1
(C) 0 (D) 15.

Ans. : _____

37. The angle formed by the radius at the point of contact with a tangent is

- (A) 30° (B) 180°
(C) 90° (D) 60° .

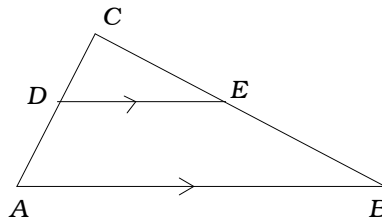
Ans. : _____

38. The radii of two circles are R and r . The distance between their centres is d . If $d = R + r$, then the number of transverse common tangents that can be drawn is

- (A) 4 (B) 1
(C) 2 (D) 3.

Ans. : _____

39. In the following figure $DE \parallel AB$. If $AD = 7$ cm, $CD = 5$ cm, $CE = 10$ cm, then the length of BE is

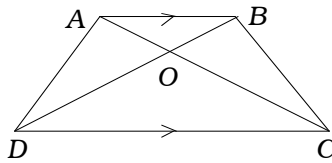


- (A) 17 cm (B) 14 cm
(C) 12 cm (D) 20 cm.

Ans. : _____

(SPACE FOR ROUGH WORK)

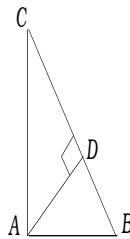
40. In a trapezium $ABCD$, $AB \parallel DC$. Which of the following is a correct statement ?



- (A) $AO \cdot OD = OB \cdot OC$
- (B) $AO \cdot OB = OC \cdot OD$
- (C) $AB \cdot DC = OB \cdot OD$
- (D) $AO \cdot AB = OC \cdot DC$

Ans. : _____

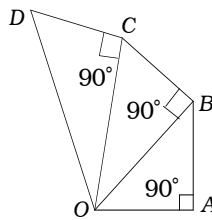
41. In a right-angled triangle ABC , $\angle CAB = 90^\circ$. If $AD \perp BC$ then the angle equal to $\angle ACD$ is



- (A) $\angle ABD$
- (B) $\angle DAB$
- (C) $\angle CAD$
- (D) $\angle ADB$.

Ans. : _____

42. In the figure $OA = AB = BC = CD = 1$ unit. The unit of OD is

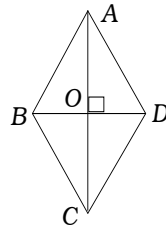


- (A) 1
- (B) 2
- (C) 3
- (D) 4.

Ans. : _____

(SPACE FOR ROUGH WORK)

43. In a Rhombus $ABCD$, diagonals intersect at O . The sum of $AC^2 + BD^2$ is



- (A) $4AB^2$ (B) $4AC^2$
 (C) $4BD^2$ (D) $4AO^2$.

Ans. : _____

44. In a right-angled triangle ABC , if $\angle CAB = 90^\circ$, which of the following is correct ?

- (A) $BC^2 = AC^2 + AB^2$ (B) $AC^2 = AB^2 + BC^2$
 (C) $AB^2 = BC^2 + AC^2$ (D) $BC^2 = AB^2 - AC^2$.

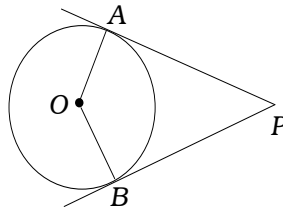
Ans. : _____

45. If the two circles of radii 9 cm and 4 cm are touching internally, then the distance between their centres in cm is

- (A) 13 (B) 36
 (C) 8 (D) 5.

Ans. : _____

46. O is the centre of a circle. PA and PB are tangents at A and B respectively. If $\angle P = 65^\circ$, then the measurement of $\angle AOB$ is



- (A) 130° (B) 65°
 (C) 115° (D) 15° .

Ans. : _____

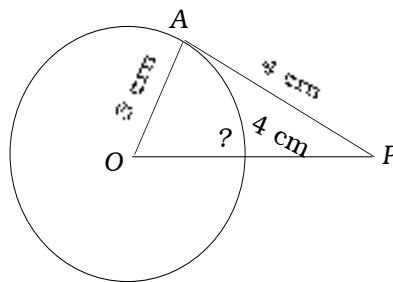
(SPACE FOR ROUGH WORK)

47. In two concentric circles of radii 6 cm and 10 cm with centre O , OP is the radius of the smaller circle. $OP \perp AB$, AB cuts the outer circle at A and B , then length of AB is

- (A) 8 cm
- (B) 16 cm
- (C) 4 cm
- (D) 20 cm.

Ans. : _____

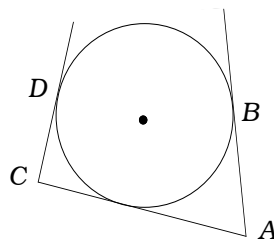
48. In the figure, the length of OP is



- (A) 5 cm
- (B) 4 cm
- (C) 3 cm
- (D) 25 cm.

Ans. : _____

49. In the figure AB , AC , DC are tangents. If $AB = 3$ cm and $CD = 2$ cm, the length of AC is

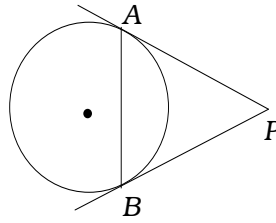


- (A) 6 cm
- (B) 10 cm
- (C) 5 cm
- (D) 1 cm.

Ans. : _____

(SPACE FOR ROUGH WORK)

50. In the figure, if PA and PB are tangents and $AB = AP$ then $\angle APB$ is



- (A) 30° (B) 90°
 (C) 45° (D) 60° .

Ans. : _____

51. Formula to find the curved surface area of a cone is

- (A) $\pi r^2 l$ (B) $\pi r l$
 (C) $\pi r (r + l)$ (D) $2\pi r l$.

Ans. : _____

52. Formula to find the volume of a cylinder is

- (A) $\pi r^2 h$ (B) $\frac{\pi r^2}{3}$
 (C) $\frac{\pi r^2 h}{3}$ (D) $2\pi r (r + h)$.

Ans. : _____

53. The perimeter of the base of a cylinder is 44 cm and height is 10 cm. The curved surface area is

- (A) 4.4 sq. cm (B) 440 sq. cm
 (C) 440 sq. m (D) 34 sq. cm.

Ans. : _____

54. Revolution of a semicircle about a fixed diameter is a solid called

- (A) sphere (B) cone
 (C) cylinder (D) cuboid.

Ans. : _____

(SPACE FOR ROUGH WORK)

55. A hemispherical bowl has radius 21 cm. The volume of hemisphere is

(A) $\frac{4}{3} \pi (21)^2$ sq.cm

(B) $\frac{4}{3} \pi (21)^3$ cu.cm

(C) $\frac{2}{3} \pi (21)^2$ sq.cm

(D) $\frac{2}{3} \pi (21)^3$ cu.cm.

Ans. : _____

56. In the figure the order of Q is



(A) 2

(B) 3

(C) 4

(D) 5.

Ans. : _____

57. The matrix of the network is



(A) $\begin{bmatrix} 0 & 3 \\ 3 & 0 \end{bmatrix}$

(B) $\begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$

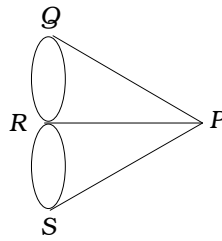
(C) $\begin{bmatrix} 3 & 3 \\ 3 & 3 \end{bmatrix}$

(D) $\begin{bmatrix} 2 & 3 \\ 3 & 2 \end{bmatrix}$.

Ans. : _____

(SPACE FOR ROUGH WORK)

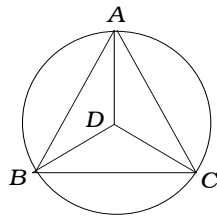
58. This network is not traversible because



- (A) network has 4 nodes
 (B) network contains more than two odd nodes
 (C) no even nodes
 (D) Euler's formula cannot be verified.

Ans. : _____

59. Verification of Euler's formula $N + R = A + 2$ for the network is



- (A) $3 + 8 = 9 + 12$ (B) $4 + 7 = 3 + 8$
 (C) $9 + 2 = 5 + 2$ (D) $4 + 7 = 9 + 2$.

Ans. : _____

60. Which of the following are the sides of the right-angled triangle ?

- (A) 6, 7, 8 (B) 20, 30, 10
 (C) 24, 26, 10 (D) 16, 17, 18.

Ans. : _____

(SPACE FOR ROUGH WORK)

PART – B

61. Find the sum of natural odd numbers from 1 to 100.

2

(SPACE FOR ROUGH WORK)

62. In a Geometric Progression, if $T_6 = 32$ and $r = 2$, find a .

2

(SPACE FOR ROUGH WORK)

63. If set $A = \{ 1, 2 \}$ set $B = \{ 2, 3, 5 \}$, set $C = \{ 2, 3, 6, 8 \}$, then prove that

$$A \cup (B \cap C) = (A \cup B) \cap (A \cup C).$$

2

(SPACE FOR ROUGH WORK)

64. If ${}^n P_4 = 12 \cdot {}^n P_2$, find the value of n .

2

(SPACE FOR ROUGH WORK)

65. If $a + b + c = 0$, show that $b^2 - 4ac$ is a perfect square.

2

(SPACE FOR ROUGH WORK)

66. Find the product of $\sqrt{3}$ and $\sqrt[3]{6}$.

2

(SPACE FOR ROUGH WORK)

67. Solve : $(x + 4)(x - 4) = 6x$.

(SPACE FOR ROUGH WORK)

68. If the sum of two numbers is 18 and the sum of their squares is 290, find the numbers. 2

(SPACE FOR ROUGH WORK)

69. Form the quadratic equation whose roots are the squares of the roots of the equation $x^2 - 2x + 4 = 0$. 2

(SPACE FOR ROUGH WORK)

70. Prove that if two triangles are equiangular then their corresponding sides are proportional.

4

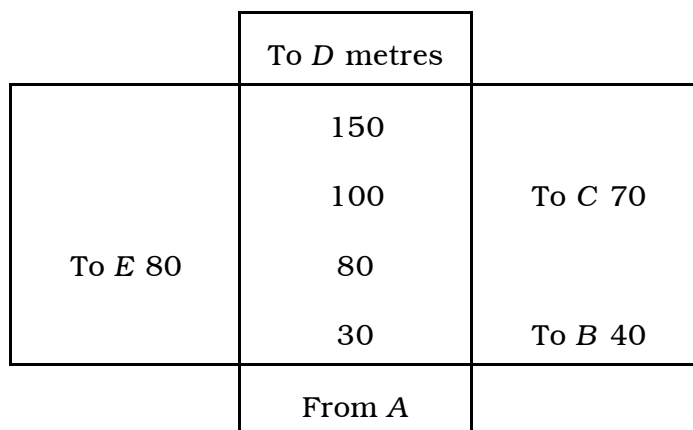
(SPACE FOR ROUGH WORK)

71. Draw the circle of radius 3 cm, construct the two tangents from an external point which is at a distance of 7 cm from the centre. 2

(SPACE FOR ROUGH WORK)

72. Draw a plan out to the data given below according to scale [No need to calculate the area].

2



(SPACE FOR ROUGH WORK)

73. Calculate variance and standard deviation for the following distribution :

4

x	10	15	20	25	30	35
f	3	8	5	9	4	1

(SPACE FOR ROUGH WORK)

74. The H.C.F. and L.C.M. of two expressions are $(a - 3)$ and $(a^3 + a^2 - 17a + 15)$ respectively. Find the two expressions. 4

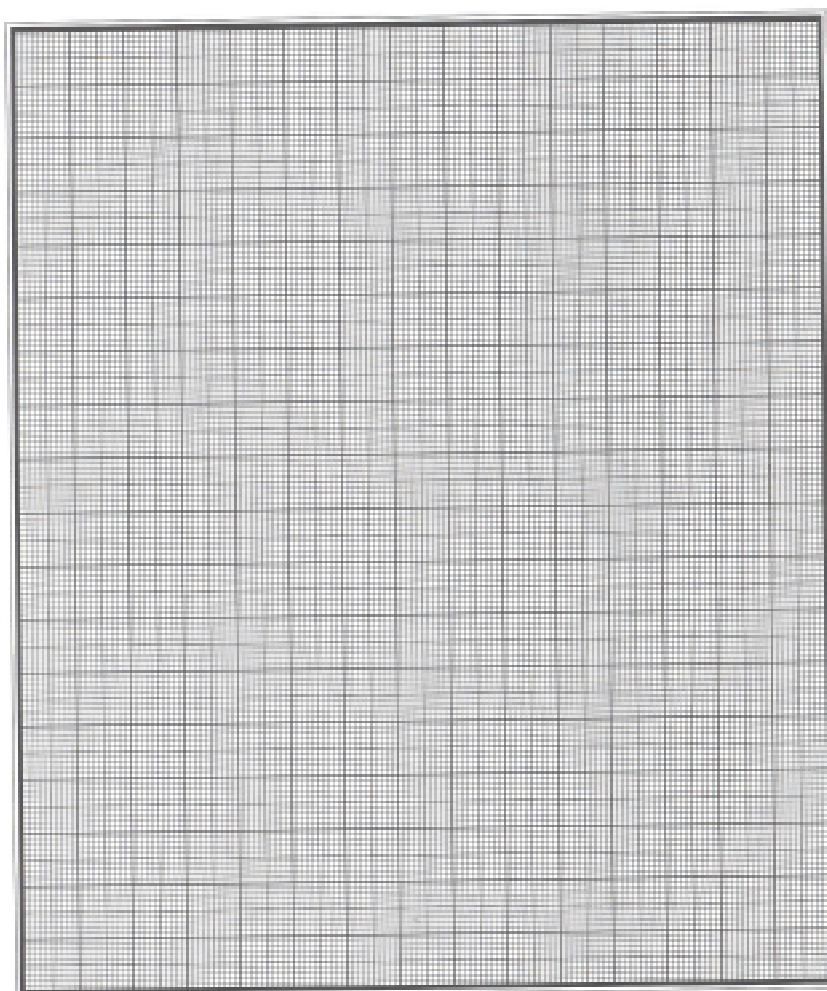
(SPACE FOR ROUGH WORK)

75. Construct a transverse common tangent to two circles of radii 3 cm and 2 cm, whose centres are 8 cm apart. Measure the length of transverse common tangent and verify by calculation. 4

(SPACE FOR ROUGH WORK)

76. Draw the graph of $y = x^2$ and from the graph find the value of $\sqrt{3}$.

2



(SPACE FOR ROUGH WORK)

(SPACE FOR ROUGH WORK)