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ಸಂಕೇತ ಸಂಖ್ಯೆ : **81-E**

Code No. : **81-E**

ವಿಷಯ : ಗಣಿತ

Subject : MATHEMATICS

(ಇಂಗ್ಲಿಷ್ ಮಾಧ್ಯಮ / English Medium)

(ಪುನರಾವರ್ತಿತ ಶಾಲಾ ಅಭ್ಯರ್ಥಿ / Regular Repeater)

ದಿನಾಂಕ : 04. 07. 2022]   [Date : 04. 07. 2022

ಸಮಯ : ಬೆಳಗ್ಗೆ 10-30 ರಿಂದ ಮಧ್ಯಾಹ–1-45 ರವರೆಗೆ] [Time : 10-30 A.M. to 1-45 P.M.

ಗರಿಷ್ಠ ಅಂಕಗಳು : 80]   [Max. Marks : 80

TEAR HERE TO OPEN THE QUESTION PAPER

General Instructions to the Candidate :

1. This question paper consists of objective and subjective types of 38 questions.

2. This question paper has been sealed by reverse jacket. You have to cut on the right side to open the paper at the time of commencement of the examination. Check whether all the pages of the question paper are intact.

3. Follow the instructions given against both the objective and subjective types of questions.

4. Figures in the right hand margin indicate maximum marks for the questions.

5. The maximum time to answer the paper is given at the top of the question paper. It includes 15 minutes for reading the question paper.

Tear here

I. *Four* alternatives are given for each of the following questions / incomplete statements. Choose the correct alternative and write the complete answer along with its letter of alphabet. **8 × 1 = 8**

1. Lines represented by the pair of linear equations $x - y = 8$ and $3x - 3y = 16$ are

   (A) intersecting lines

   (B) parallel lines

   (C) perpendicular lines

   (D) coincident lines.

2. In an arithmetic progression 5, 3, 1, – 1, ... the common difference is
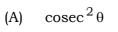
   (A) – 2

   (B) 2

   (C) – 3

   (D) 5.

3. $x (x + 1) = 5$ is a

  (A) linear equation

  (B) quadratic equation

  (C) cubic equation

  (D) quadratic polynomial.

4. $1 + \tan^2 \theta$ is equal to

  (A) $\operatorname{cosec}^2 \theta$

  (B) $\dfrac{1}{\operatorname{cosec}^2 \theta}$

  (C) $\sec^2 \theta$

  (D) $- \sec^2 \theta$

5. Value of $\cot 90°$ is

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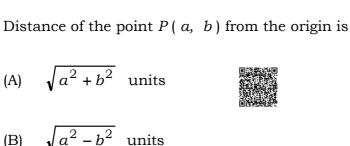
  (C) $\sqrt{3}$ (D) 0.

6.   Distance of the point $P(a, b)$ from the origin is

     (A) $\sqrt{a^2 + b^2}$ units

     (B) $\sqrt{a^2 - b^2}$ units

     (C) $\sqrt{a + b}$ units

     (D) $\sqrt{a - b}$ units.

7.   In the figure, secant is

     (A)   *AB*   (B)   *PQ*

     (C)   *XY*   (D)   *MN*.
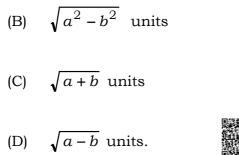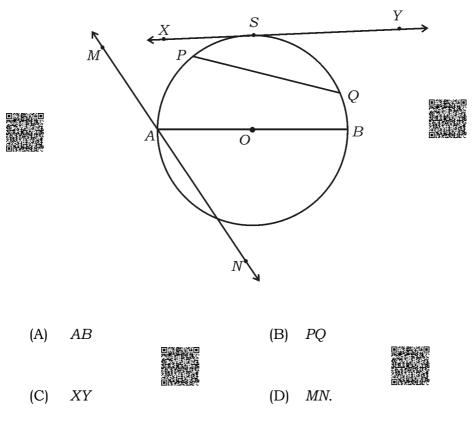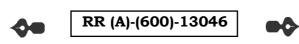
8. Volume of a sphere of radius 'r' unit is

(A) $\frac{2}{3} \pi r^2$ cubic units

(B) $\frac{2}{3} \pi r^3$ cubic units

(C) $\frac{4}{3} \pi r^3$ cubic units

(D) $\frac{4}{3} \pi r^2$ cubic units.

II. Answer the following questions :   **8 × 1 = 8**

9. How many solutions does the pair of linear equations

$a_1 x + b_1 y + c_1 = 0$ and $a_2 x + b_2 y + c_2 = 0$ have if they are

inconsistent ?
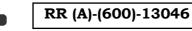
10. What is an Arithmetic progression ?

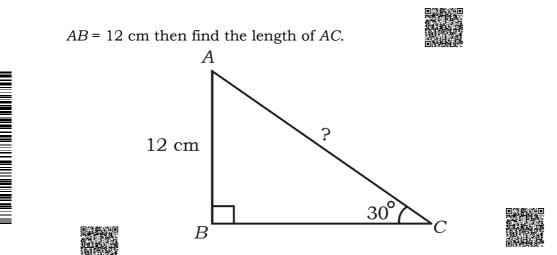11. Write the standard form of a quadratic equation.

12. In the figure, *ABC* is a right angled triangle. If $\angle C = 30°$ and

    AB = 12 cm then find the length of *AC*.

    A

    12 cm

    ?

    30°

    B *C*

13. Write the coordinates of point *P* if it divides the line segment joining

    the points $A (x_1 , y_1)$ and $B (x_2 , y_2)$ internally in the ratio

    $m_1 : m_2$.

14. Find the mode of the following scores :

    4, 5, 5, 6, 7, 7, 6, 7, 5, 5

15. State "Basic proportionality theorem" (Thales theorem).

16. Write the formula to find the volume (*V*) of the frustum of a cone of

    height *h* and radii of two circular ends r_1 and r_2.

III. Answer the following questions :   **8 × 2 = 16**

17. Solve the given equations by elimination method :

    $2x + 3y = 7$

    $2x + y = 5$

18. Find the 12th term of the Arithmetic progression 2, 5, 8, ... using formula.

19. Find the sum of arithmetic progression 7, 11, 15, ... to 16 terms using formula.

    OR

    Find how many terms of the arithmetic progression   3, 6, 9, ... must be added to get the sum 165.
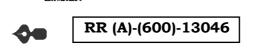
20. Find the value of the discriminant of the equation $4x^2 - 12x + 9 = 0$ and hence write the nature of the roots.

21. Find the roots of the equation $x^2 - 3x + 1 = 0$ using quadratic formula.

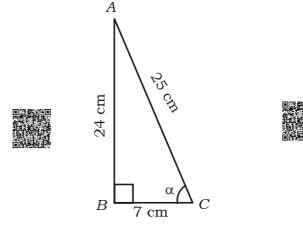22. In the figure *ABC* is a right angled triangle. If *AB* = 24 cm, *BC* = 7 cm and *AC* = 25 cm, then write the value of sin α and cos α.

23. Find the distance between the points *P* (2, 3) and *Q* (4, 1) using distance formula.

OR

Find in what ratio the point *P* (– 4, 6) divides the line segment joining the points *A* (– 6, 10) and *B* (3, – 8).

24. Draw a line segment of length 8·4 cm and divide it in the ratio 1 : 3 by geometric construction.

IV. Answer the following questions :   **9 × 3 = 27**

25. Find the arithmetic progression whose third term is 16 and its 7th term exceeds the 5th term by 12.

26. The sum of the reciprocals of Rehman's age (in years) 3 years ago and his age 5 years from now is $\frac{1}{3}$. Find his present age.
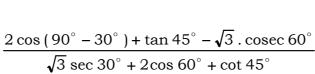
OR

A train travels 360 km at a uniform speed. If the speed had been 5 km/h more, it would have taken 1 hour less for the same journey. Find the speed of the train.
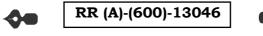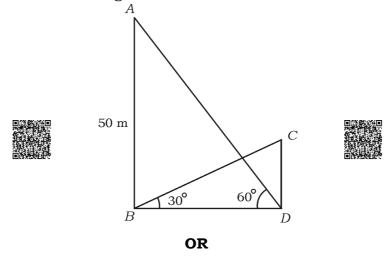
27. Evaluate :

$$\frac{2\cos\left(90^\circ - 30^\circ\right) + \tan 45^\circ - \sqrt{3}\,.\,\operatorname{cosec} 60^\circ}{\sqrt{3}\,\sec 30^\circ + 2\cos 60^\circ + \cot 45^\circ}$$
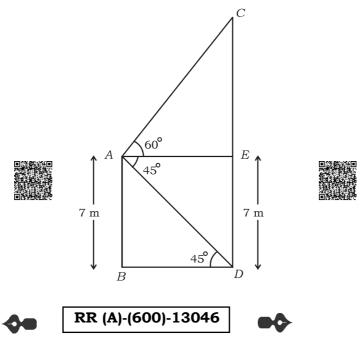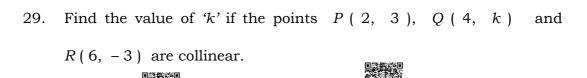
28. A tower and a building are standing vertically on the same level ground. The angle of elevation of the top of a building from the foot of the tower is 30° and the angle of elevation of the top of the tower from the foot of the building is 60°. If the tower is 50 m high, find the height of the building.

OR

A cable tower and a building are standing vertically on the same level ground. From the top of the building which is 7 m high, the angle of elevation of the cable tower is 60° and the angle of depression of its foot is 45°. Find the height of the tower. (Use $\sqrt{3}$ = 1·73)

29. Find the value of 'k' if the points P (2, 3), Q (4, k) and R (6, -3) are collinear.

OR

A circle whose centre is at P (2, 3) passes through the points A (4, 3) and B (x, 5). Then find the value of 'x'.

30. Find the mean of the following scores by direct method :

Class-interval	Frequency
5 — 15	1
15 — 25	3
25 — 35	5
35 — 45	4
45 — 55	2

OR

Find the median of the following scores :

Class-interval	Frequency
0 — 20	6
20 — 40	9
40 — 60	10
60 — 80	8
80 — 100	7

31. The following table gives the information of heights of 60 students of class *X* of a school. Draw a 'less than type' ogive for the given data :

Height of students (in cms)	Number of students (Cumulative frequency)
Less than 130	04
Less than 140	12
Less than 150	30
Less than 160	45
Less than 170	56
Less than 180	60

32. Prove that "the lengths of tangents drawn from an external point to a circle are equal".

33. Draw a pair of tangents to a circle of radius 3 cm which are inclined to each other at an angle of 60°.

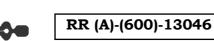**V.**   **Answer the following questions :**   **4 × 4 = 16**

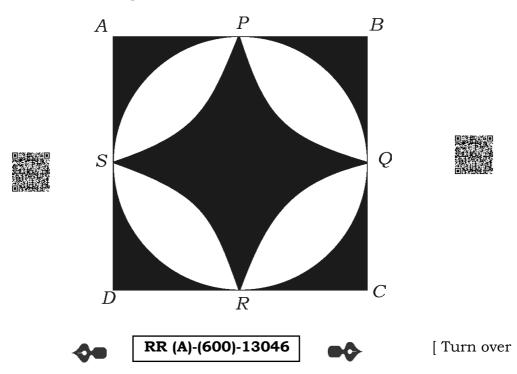34. Find the solution of the pair of linear equations by graphical method :

$$2x - y = 7$$

$$x - y = 2$$

35. Construct a triangle *ABC* with sides *BC* = 6 cm, *AB* = 5 cm and *AC* = 4·5 cm. Then construct a triangle whose sides are $\frac{4}{3}$ of the corresponding sides of the triangle *ABC*.

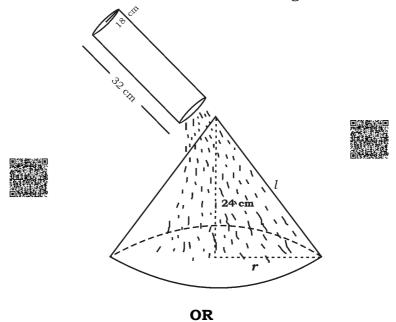36. *ABCD* is a square of side 14 cm. A circle is drawn inside it which just touches the mid-points of sides of the square, as shown in the figure. If *P, Q, R* and *S* are the mid-points of the sides of the square, and *PQ, QR, RS* and *SP* are the arcs of the circle, then find the area of the shaded region.
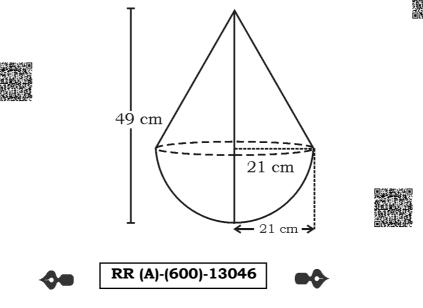
37. Sand is filled in a cylindrical vessel of height 32 cm and radius of its base is 18 cm. This sand is completely poured on the level ground to form a conical shaped heap of sand. If the height of the conical heap is 24 cm. Find the base radius and slant height of the conical heap.

OR

A toy is in the form of a cone of radius 21 cm, mounted on a hemisphere of same radius, as shown in the figure. The total height of the toy is 49 cm. Find the surface area of the toy.

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VI. Answer the following question : **1 × 5 = 5**

38. Prove that "if in two triangles, corresponding angles are equal, then their corresponding sides are in the same ratio (or proportion) and hence the two triangles are similar".