

Time allowed: **3 hours**; Maximum marks: **90**

General Instructions:

- All Questions are compulsory
- The Question Paper consists of 31 Questions divided in to four sections A, B, C and D
- Section- A comprises of 4 questions of one mark each
- Section- B comprises of 6 questions of one mark each
- Section- C comprises of 9 questions of four mark each
- Section- D comprises of 11 questions of Four mark each
- The use of calculator is not permitted.

Section-A

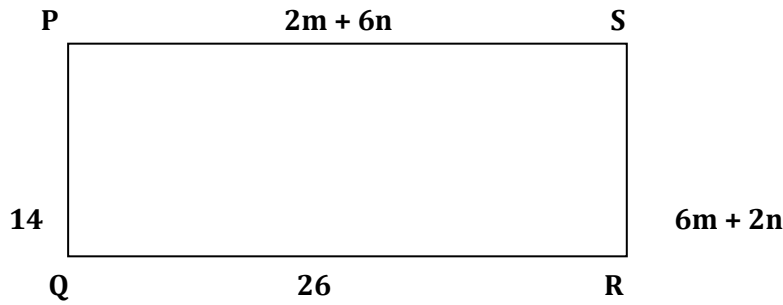
- Express 109 in the form of $5q + 4$ for some positive integer?
- In an isosceles right triangle, if the equal sides are of length $5\sqrt{2}$, find the length of its hypotenuse?
- Cards marked with number 7, 8, 9, ... , 25 are placed in a box. If a card is drawn randomly from the box, find the probability that the selected card bears a prime number?
- If $\tan 3B = \cot(B - 54)$, find B?

Section - B

- Can the number 6^n , n being a natural number end with the digit 5? Give reasons?
- Given below is a frequency distribution table showing pocket money of 40 students of a class for a month. Change the table to a 'less than type' cumulative frequency table.

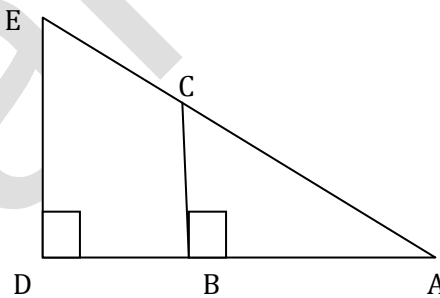
Pocket money of students (in Rs)	0-50	50-100	100-150	150-200	200-250	250-300
Number of students	11	10	7	6	4	2

- In ΔPQR , if PS is the median, then show that $PQ^2 + PR^2 = 2(PS^2 + QS^2)$?
- If $x - 2$ is a factor of $x^3 + px^2 + qx + 16$ and $p - q = 18$, find the value of p and q?
- If $\sin \alpha = \frac{a}{b}$, find the value of $\frac{4 \cot \alpha + 5}{5 \tan \alpha + 4}$?
- Find the value of m and n in the given figure, if PQRS is a rectangle.



Section -C

11. A vertical pole of length 9 cm casts a shadow 8 m long on the ground and at the same time a tower casts a shadow 72 m long. Find the height of the tower?
12. If one zero of the polynomial $2y^2 - 5y - (2p + 1)$ is twice the other, find both the zeros of the polynomial and also find the value of p ?
13. Prove that $\frac{\sin B - 2\sin^3 B}{2\cos^3 B - \cos B} = \tan B$?
14. A woman has only 25 paise coins and 50 paise coins in her purse, if she has 75 coins in all totaling Rs. 27.5, how many coins of each kind does she have?
15. If $4\cot A = 3$, then find the value of $\sqrt{\frac{\sec A - \operatorname{cosec} A}{\sec A + \operatorname{cosec} A}}$?
16. In the given figure, $\triangle ABC$ and $\triangle ADE$ are two right angled triangles, right angled at B and D respectively.



Prove that

(A) $\frac{BC}{DE} = \frac{AB}{AD}$ (B) $AC \times DE = AE \times BC$

17. Evaluate: $4(\sin^4 60^\circ + \cos^4 30^\circ) - 3(\sin^2 45^\circ - \cos^2 90^\circ)$?

18. Find the value of “x” if the median of the following frequency distribution is 50?

Class	20-30	30-40	40-50	50-60	60-70	70-80	80-90
Frequency	25	15	x	6	24	12	8

19. Draw a cumulative frequency curve for the following cumulative frequency distribution.

Class	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	100	96	88	70	40	15

Section-D

20. Determine graphically the coordinates of the vertices of the triangle formed by the lines represented by the equations $y = x$, $3y = x$, $x + y = 8$?

21. If the polynomial $p(y) = 3y^4 - 9y^3 + y^2 + 15y + m$ is completely divisible by $3y^2 - 5$, find the value of m and hence find the other two zeros of the polynomial?

22. Mrinal has two tanks of capacity 828 litre and 396 litre. He filled both the tanks with water to their brim before distributing the water among some people. The water from these tanks is poured into small containers of equal capacity to their brim. Find the minimum number of small containers that can be filled. Which values are depicted by Mrinal in the question?

23. Prove that the ratio of the areas of two similar triangles is equal to the ratio of square of their corresponding sides?

24. Solve:

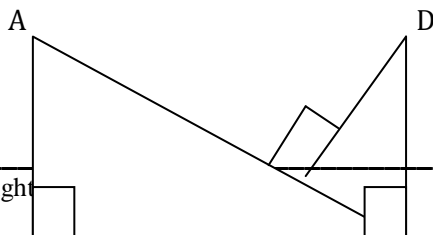
(A) If P, Q, R are interior angles of triangle PQR, show that $\operatorname{cosec}^2\left(\frac{Q+R}{2}\right) - \tan^2\left(\frac{P}{2}\right) = 1$?

(B) If α is an acute angle and $\sin\alpha = \cos\alpha$, find the value of $5\cot^2\alpha + 3\tan^2\alpha - 2$?

25. State the fundamental theorem of Arithmetic. Using prime factorization method, find the HCF and LCM of 36, 63 and 84. Also show that $\text{HCF} \times \text{LCM} \neq \text{Product of the three numbers}$?

26. If $\sec\theta + \tan\theta = m$, then prove that $\sin\theta = \frac{m^2 - 1}{m^2 + 1}$?

27. In the figure given below, $DB \perp BC$, $DE \perp AB$ and $AC \perp BC$. Prove that $\frac{BE}{DE} = \frac{AC}{BC}$?



E

C

B

28. If $(\cos\theta - \sin\theta) = \sqrt{2} \sin\theta$, then show that $\cos\theta + \sin\theta = \sqrt{2} \cos\theta$?

29. The following table shows the ages of the persons who bought health policies from a company. Find the mode and mean of the data given below.

Age (in years)	0-10	10-20	20-30	30-40	40-50	50-60
No. of persons	8	12	20	25	15	10

30. Draw a less than type and more than type ogive for the following distribution on the same graph. Also find the median from the graph.

Daily Income (in Rs)	100-200	200-300	300-400	400-500	500-600	600-700	700-800
No. of Workers	20	15	9	8	12	14	16