SECTION-A

Question number 1 to 8 carry one mark each.

1. If $n \in N$, then 4^n will never end with the digit

   (*a*) 4 (*b*) 6 (*c*) 0 (*d*) none of these

2. Zeroes of $p(x) = 5x^2 + 11x + 6$ are

   (*a*) -1 and 2 (*b*) 1 and $\frac{-6}{5}$ (*c*) 1 and $\frac{6}{5}$ (*d*) -1 and $\frac{-6}{5}$

3. If $2\cos^2\theta = \frac{1}{2}$, $0° < \theta < 90°$, then $\theta =$

   (*a*) 30° (*b*) 60° (*c*) 45° (*d*) 50°

4. Which of the following is true ?

   (*a*) 3 median = mode + 2 mean (*b*) 3 mode = median + 2 mean

   (*c*) 3 mean = median + 2 mode (*d*) mode = 2 median – 2 mean

5. If D and E are points on sides AB and AC of a ΔABC such that DE || BC. If AD = 6 cm, BD = 9 cm and AE = 8 cm, then EC

   (*a*) 10 cm (*b*) 12 cm (*c*) 14 cm (*d*) 18 cm

6. $\sin(50° + \theta) - \cos(40° - \theta) =$

   (*a*) 1 (*b*) 0 (*c*) 2 (*d*) none of these

7. $2\cos^2 30° - 1$

   (*a*) sin 60° (*b*) cos 60° (*c*) tan 60° (*d*) sec 60°

8. $\tan A =$

   (*a*) $\frac{\cos A}{\sqrt{1-\cos^2 A}}$ (*b*) $\frac{\sec A}{\sqrt{1-\sec^2 A}}$ (*c*) $\frac{\sin A}{\sqrt{1-\sin^2 A}}$ (*d*) $\frac{1}{\sqrt{1-\sin^2 A}}$

SECTION-B

Question number 9 to 14 carry 2 marks each.

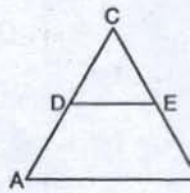
9. Show that square of any positive integer is either of the form $3m$ or $3m + 1$.

10. Find A and B, if $\sin(A + B) = 1$ and $\cos(A - B) = 1$.

Or

If $\sin 30° = \frac{1}{2}$ and $\cos(A + B) = \frac{1}{2}$, then A and B are acute angles.

11. In the given figure, $\angle A = \angle B$ and AD = BE, $\therefore$ DE || AB. State True or False. Justify your answer.



12. Find the median wage of a worker engaged at a construction site whose data are given below :

Wages (in ₹)	Number of workers
3500	12
3800	13
4100	25
4500	17
5500	15
6500	12
7000	6

13. The HCF and LCM of two numbers are 9 and 360 respectively. If one number is 45, write the other number.

14. If $\sec A = \frac{15}{7}$ and $A + B = 90°$, find the value of cosec B.

SECTION-C

Question number 15 to 24 carry 3 marks each.

15. Find LCM and HCF of 312 and 27 and verify LCM × HCF = Product of the numbers.

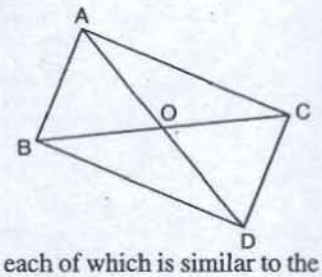
16. If $\sec A = x + \frac{1}{4x}$, then prove that $\sec A + \tan A = 2x$ or $\frac{1}{2x}$.

Or

Prove that : $\cos\theta \sin\theta - \frac{\sin\theta \cos(90° - \theta)\cos\theta}{\sec(90° - \theta)} - \frac{\cos\theta \sin(90° - \theta)\sin\theta}{\operatorname{cosec}(90° - \theta)} + \operatorname{cosec}(90° - \theta) = \frac{1}{\cos\theta}$.

17. In a ΔABC, AB = AC and D is a point on side AC, such that $BC^2 = AC \times CD$.
Prove that BD = BC.

18. In fig., ABC and DBC are two triangles on the same base BC. If AD intersects BC at O.



Prove that $\frac{\text{ar.}\Delta ABC}{\text{ar.}\Delta DBC} = \frac{AO}{DO}$.

Or

Prove that the line segments joining the mid-points of the sides of a triangle, form four triangles each of which is similar to the original triangle.

19. Solve the system of equations : $\frac{11}{v} - \frac{7}{u} = 1; \frac{9}{v} - \frac{4}{u} = 6$.

Or

A and B are two points 150 km apart on a highway two cars start from A and B at the same time. If they move in the same direction, they meet in 15 hours. But if they move in the opposite directions, they meet in one hours. Find their speeds.

20. Two zeroes of the polynomial $P(x) = 2x^4 - 3x^3 - 3x^2 + 6x - 2$ are $\sqrt{2}$ and $-\sqrt{2}$. Find the remaining zeroes of $P(x)$, if any.

21. Show that : $\tan^4\theta + \tan^2\theta = \sec^4\theta - \sec^2\theta$.

22. The following data gives the distribution of total monthly household expenditure of 200 families of a village. Find the modal monthly expenditure of the families.

Expenditure (in ₹)	Number of families
1000 — 1500	24
1500 — 2000	40
2000 — 2500	33
2500 — 3000	28
3000 — 3500	30
3500 — 4000	22
4000 — 4500	16
4500 — 5000	7

23. Construct the cumulative frequency distribution of

Class	12.5 – 17.5	17.5 – 22.5	22.5 – 27.5	27.5 – 32.5
Frequency	2	22	19	14

24. Use Euclid's Division Algorithm to show that the cube of any positive integer is of the form 9m, 9m + 1 or 9m + 8.

SECTION-D

Question number 25 to 34 carry 4 marks each.

25. The ratio of the areas of similar triangles is equal to the ratio of the squares on the corresponding sides, prove.

26. If $\frac{x}{a}\cos\theta + \frac{y}{b}\sin\theta = 1$ and $\frac{x}{a}\sin\theta - \frac{y}{b}\cos\theta = 1$, prove that $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 2$.

27. Find the mean marks of students from the following cumulative frequency table :

Marks	Number of Students
0 and above	80
10 and above	77
20 and above	72
30 and above	65
40 and above	55
50 and above	43
60 and above	28
70 and above	16
80 and above	10
901and above	8
100 and above	0

28. On dividing the polynomial $4x^4 - 5x^3 - 39x^2 - 46x - 2$ by the polynomial $g(x)$, the quotient is $x^2 - 3x - 5$ and the remainder is $-5x + 8$. Find the polynomial $g(x)$.

Or

Check whether the $g(x)$ is a factor of the $p(x)$ by applying the division algorithm.

$p(x) = x^5 - 4x^3 + x^2 + 3x + 1$, $g(x) = x^3 - 3x + 1$

29. Solve graphically the system of linear equations

$2x + y = 8$; $x + 1 = 2y$.

Also, find the co-ordinates of the points where the lines meet the y-axis.

30. Find the value of sin 30° geometrically

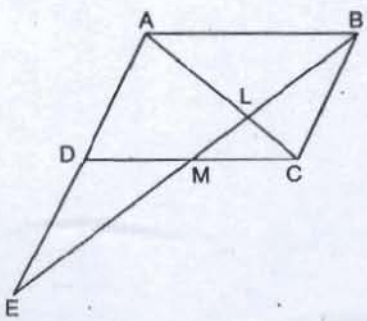
Or

Without using trigonometric table evaluate $\frac{\cos 58^\circ}{\sin 32^\circ} + \frac{\sin 22^\circ}{\cos 68^\circ} - \frac{\cos 38^\circ \operatorname{cosec} 52^\circ}{\tan 18^\circ \cdot \tan 35^\circ \tan 60^\circ \cdot \tan 72^\circ \cdot \tan 55^\circ}$

31. A fraction becomes 6/5 if 1 is added to each of the numerator and the denominator. However, if we subtract 5 from each, the fraction becomes 3/2. Find the fraction.

32. 3 chairs and 2 tables cost Rs. 700 and 5 chairs and 3 tables cost Rs. 1100. What is the cost of 2 chairs and 2 tables ?

33. In the given figure, M is the mid-point of the side CD of parallelogram ABCD. BM when joined meets AC in L and AD produced in E. Prove that EL = 2BL.



34. Draw 'less than ogive' and 'more than ogive' for the following distribution and hence find its median.

Class	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90
Frequency	10	8	12	24	6	25	15

ANSWERS

1. (*c*) 2. (*d*) 3. (*b*) 4. (*a*) 5. (*b*)
6. (*b*) 7. (*b*) 8. (*c*)
10. A = 45°, B = 45° or yes. 11. True
12. ₹ 4300 13. 72 14. $\frac{15}{7}$ 15. HCF = 3, LCM = 2808
19. $v = \frac{1}{2}, u = \frac{1}{3}$ Or $v = 80$ km/hr; $u = 70$ km/hr 20. $\frac{1}{2}, 1$ 22. ₹ 1847.826
27. 51.75. 28. $4x^2 + 7x + 2$ Or No. 29. $x = 3, y = 2, (0, 8), (0, \frac{1}{2})$
30. $\frac{1}{2}$ Or $\left(\frac{2\sqrt{3}-1}{\sqrt{3}}\right)$ 31. $\frac{11}{9}$ 32. ₹ 600 34. Median = 58.3

PRACTICE PAPER - 4

General Instructions— As given in Practice Paper - 1

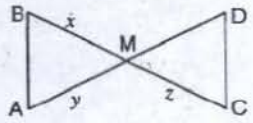
***Maximum Marks* : 90**

Time Allowed* : 3 *Hours

SECTION-A

Question number 1 to 8 carry 1 mark each.

1. The value of k for which the pair of linear equations $2x - 3y + 7 = 0$ and $4x - ky - 14 = 0$ will have infinite solutions is
   (*a*) 2 (*b*) 1 (*c*) 3 (*d*) no value of k
2. The value of $2\sin^2 45° - 4\cos^2 60° + 4\tan^2 45°$ is
   (*a*) 1 (*b*) 2 (*c*) 3 (*d*) 4
3. If mean = 5 and median = 4, then mode =
   (*a*) 4 (*b*) 3 (*c*) 2 (*d*) 1
4. If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, then $\cos\theta - \sin\theta =$
   (*a*) $\sqrt{2}\cos\theta$ (*b*) $\sqrt{2}\tan\theta$ (*c*) $\sqrt{2}\sin\theta$ (*d*) $\sqrt{2}\sec\theta$
5. If $\Delta AMB \sim \Delta CMD$, then DM =
   (*a*) $x \cdot y \cdot z$ (*b*) $\frac{xy}{z}$
   (*c*) $\frac{xz}{y}$ (*d*) $\frac{y}{xz}$

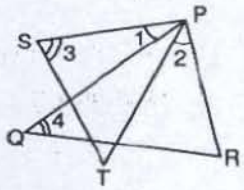


6. If $A = 2n + 13$, $B = n + 7$, where n is a natural number then HCF of A and B is
   (*a*) 2 (*b*) 1 (*c*) 3 (*d*) 4
7. If $\tan^2\theta + \cot^2\theta = 2$, θ is an acute angle, then $\tan^3\theta + \cot^3\theta$ is equal to
   (*a*) 2 (*b*) 3 (*c*) 4 (*d*) 8
8. $\frac{1+\cot^2 A}{1+\tan^2 A} =$
   (*a*) $\tan^2 A$ (*b*) $\sec^2 A$ (*c*) $\operatorname{cosec}^2 A - 1$ (*d*) $1 - \sin^2 A$

SECTION-B

Question number 9 to 14 carry 2 marks each.

9. In figure, $\angle 1 = \angle 2$, $\angle 3 = \angle 4$,
   show that : PT . QR = PR . ST.



10. Can we have any natural number n for which 6^n ends with the digit zero ? Justify your answer.

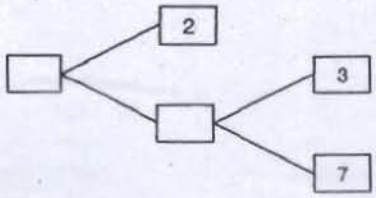
Or

The HCF and LCM of two numbers are 9 and 360 respectively. If one number is 45, write the other number.

11. If $A = 30°$, then verify : $\tan 2A = \frac{2\tan A}{1-\tan^2 A}$.
12. If the mean of the following distribution is 2.6, then the value of y will be ?

Variable	1	2	3	4	5
Frequency	4	5	y	1	2

13. Complete the missing entries in the following factor tree :



14. If $\cot\theta = \frac{7}{8}$, evaluate $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$

SECTION-C

Question number 15 to 24 carry 3 marks each.

15. State whether 10.064 is rational or not. If rational, express in $\frac{p}{q}$ form.

Or

Show that $2+\sqrt{5}$ is an irrational number.

16. Using division algorithm, find the quotient and remainder on dividing $8x^4 + 14x^3 - 2x^2 + 8x - 12$ by $4x^2 + 3x - 2$.

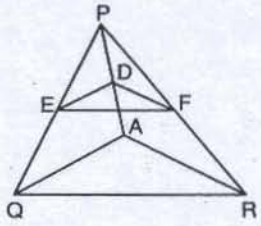
17. Show that : $\frac{1}{\sec x - \tan x} - \frac{1}{\cos x} = \frac{1}{\cos x} - \frac{1}{\sec x + \tan x}$

18. Evaluate : $\sin\theta\cos\theta - \frac{\sin\theta\cos(90°-\theta)\cos\theta}{\sec(90°-\theta)} - \frac{\cos\theta\sin(90°-\theta)\sin\theta}{\operatorname{cosec}(90°-\theta)}$.

Or

Evaluate : $\frac{\sin^2 20° + \sin^2 70°}{\sin\theta\cos(90°-\theta) + \cos\theta\sin(90°-\theta)}$

19. In figure, DE || AQ and DF || AR. Prove that EF || QR.



20. Draw the graphs of the following equations :

$$3x - 4y + 6 = 0;\ 3x + y - 9 = 0$$

Also determine the co-ordinates of the vertices of the triangle formed by these lines and the x-axis.

21. Show that intercepts on a transversal by three equidistant parallel lines are always equal.

Or

L and M are the mid-points of AB and BC respectively of ΔABC, right-angled at B. Prove that $4LC^2 = AB^2 + 4BC^2$.

22. Calculate the arithmetic mean of the following grouped distribution.

Class	10 — 30	30 — 50	50 — 70	70 — 90	90 — 110	110 —130	Total
Frequency	5	8	12	20	3	2	50

23. The average score of boys in an examination of a school is 71 and that of girls is 73. The average score of the school in the examination is 71.8, find the ratio of the number of boys to the number of girls who appeared in the examination.

24. Show that any positive odd integer is of the form $4q + 1$ or $4q + 3$, where q is some integer.

SECTION-D

Question number 25 to 34 carry 4 marks each.

25. In a right triangle, prove that the square on the hypotenuse is equal to the sum of the squares of the other two sides.

26. Prove that : $\frac{\tan\theta + \sec\theta - 1}{\tan\theta - \sec\theta + 1} = \frac{1+\sin\theta}{\cos\theta}$

27. In a ΔABC, $\angle A = x°$, $\angle B = (3x-2)°$, $\angle C = y°$. Also $\angle C - \angle B = 9°$. Find the three angles.

A bag contains 94 coins of 50 paise and 25 paise denominations. If the total worth of these coins be ₹ 29.75. Find the number of coins in each kind.

28. The following table gives the marks obtained by 80 students in a selection test :

Marks	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60
No. of students	3	12	27	57	75	80

Find the median marks.

29. Apply the division algorithm to find the quotient and remainder on dividing $p(x)$ by $g(x)$, where

$p(x) = x^4 - 5x + 6, g(x) = 2 - x$

30. Prove that : $\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = 1 + \tan\theta + \cot\theta$

Or

Without using trigonometric tables, evaluate :

$$\frac{3\tan 25°\tan 40°\tan 50°\tan 65° - \frac{1}{2}\tan^2 60°}{4(\cos^2 29° + \cos^2 61°)}$$

31. Solve the following pairs of equations for x and y :

$$\frac{15}{x-y} + \frac{22}{x+y} = 5, \quad \frac{40}{x-y} + \frac{55}{x+y} = 13$$

$x \neq y, x \neq -y$

32. A part of monthly expenses of a family is constant and the remaining varies with the price of wheat. When the rate of wheat is ₹ 250 a quintal, the total monthly expenses of the family are ₹ 1000 and when it is ₹ 240 a quintal, the total monthly expenses are ₹ 980. Find the total monthly expenses of the family when the cost of wheat is ₹ 350 a quintal.

33. ABCD is a trapezium such that BC ∥ AD and AB = 4cm. If the diagonal AC and BD intersects at E. Such that $\frac{AE}{EC} = \frac{DE}{BE} = \frac{1}{2}$. Then find BC.

34. Find the mean, mode and median of the following frequency distribution :

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Frequency	8	7	15	20	12	8	10

ANSWERS

1. (*d*) 2. (*d*) 3. (*c*) 4. (*c*) 5. (*c*)
6. (*b*) 7. (*a*) 8. (*c*)

10. No Or 72 12. 8 13. 42, 21 14. $\frac{49}{64}$ 15. yes

16. Quotient = $2x^2 + 2x - 1$; Remainder = $15x - 14$

18. 0 Or 1 20. (–2, 0), (3, 0), (2, 3) 22. 65.6 23. 2 : 3

27. 25°, 73°, 82° Or 50 paise coin = 25, 25 paise coin = 69 28. 144.3

29. Quotient = $-x^2 - 2$; Remainder = $-5x + 10$ 30. Or $\frac{3}{8}$ 31. $x = 8, y = 3$

32. ₹ 1200 33. 8 cm 34. mean = 35.63, median = 35, mode = 33.85

PRACTICE PAPER - 5

General Instructions— As given in Practice Paper - 1

Maximum Marks : 9

Time Allowed : 3 Hour

SECTION-A

Question number 1 to 8 carry 1 mark each.

1. Zeroes of $p(x) = 4x^2 + 12$ are

   (*a*) ± 2 (*b*) $\pm\sqrt{3}$ (*c*) ± 3 (*d*) none of these

2. $\sec\theta(1 - \sin^2\theta) =$

   (*a*) $\sec\theta$ (*b*) $\tan\theta$ (*c*) $\cos\theta$ (*d*) none of these

3. Value of $\frac{\tan 60°}{\cot 30°} + \frac{\sec 70°}{\text{cosec}20°} - 3$ is

   (*a*) 0 (*b*) 1 (*c*) 2 (*d*) -1

4. Mean of n observations is 30 and their mode is 45, then median is

   (*a*) 30 (*b*) 35 (*c*) 25 (*d*) none of these

5. In ΔABC, $AB = 6\sqrt{3}$ cm, $AC = 12$ cm and $BC = 6$ cm, then $\angle B =$

   (*a*) 30° (*b*) 60° (*c*) 90° (*d*) 45°

6. If $\tan 2A = \cot(A - 18°)$ where $2A$ and $(A - 18°)$ are acute angles, then $2A =$

   (*a*) 36° (*b*) 72° (*c*) 18° (*d*) 54°

7. The LCM of 2.5, 0.5 and 0.175 is

   (*a*) 2.5 (*b*) 5 (*c*) 7.5 (*d*) 1.75

8. If A, B and C are interior angles of a triangle ABC, then $\tan\left(\frac{A+B}{2}\right) =$

   (*a*) $\sin\frac{C}{2}$ (*b*) $\cos\frac{C}{2}$ (*c*) $\tan\frac{C}{2}$ (*d*) $\cot\frac{C}{2}$

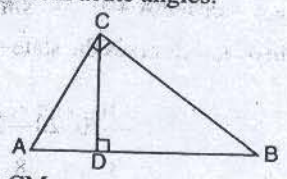
SECTION-B

Question number 9 to 14 carry 2 marks each.

9. If $\sin\alpha = \frac{1}{\sqrt{2}}$ and $\tan\beta = 1$, Find the value of $\sin(\alpha + \beta)$ where α and β are both acute angles.

10. In the given figure, $\angle ACB = 90°$, $CD \perp AB$.

    Prove that $\frac{CB^2}{CA^2} = \frac{BD}{AD}$.



11. Find HCF of 96 and 404 by prime factorisation method. Hence, find their LCM.

12. Find the median.

x_i	5	7	9	11	13	15	17
f_i	4	6	7	8	3	2	1

13. Express $\left(\frac{17}{8} + \frac{7}{80}\right)$ as a decimal representation.

14. If $\sin\theta = \frac{1}{3}$, then find the value of $(2\cot^2\theta + 2)$.

Or

Prove geometrically that $\cos 60° = \frac{1}{2}$.

SECTION-C

Question number 15 to 24 carry 3 marks each.

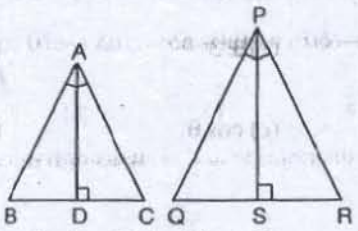
15. Find zeroes of the quadratic polynomial $3x^2 - x - 4$ and verify the relationship between the zeroes and the coefficients.

16. Solve the following, by the method of cross multiplication :

$(a - b)x + (a + b)y = a^2 - 2ab - b^2$, $(a + b)(x + y) = a^2 + b^2$

17. Show that $5 - \sqrt{3}$ is an irrational number.

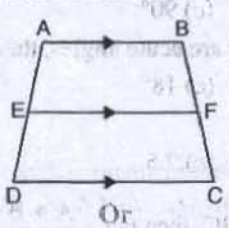
18. Prove that the ratio of the areas of two similar triangles is equal to the squares of their corresponding sides. Using the above, do the following :



In fig., ΔABC and ΔPQR are isosceles triangles in which $\angle A = \angle P$.

If $\frac{\text{area } (\Delta ABC)}{\text{area } (\Delta PQR)} = \frac{9}{16}$, find $\frac{AD}{PS}$.

19. In the given figure, if ABCD is a trapezium in which AB || DC || EF, then $\frac{AE}{ED} = \frac{BF}{FC}$.



Or

If two sides and a median bisecting one of these sides of a triangle are respectively proportional to the two sides and the corresponding median of another triangle, prove that the triangles are similar.

20. Prove that : $\sin^4\theta - \cos^4\theta = \sin^2\theta - \cos^2\theta$.

21. If $a \operatorname{cosec} A = p$ and $b \cot A = q$, then prove that $\frac{p^2}{a^2} - \frac{q^2}{b^2} = 1$.

Or

Prove that : $\frac{\cot A + \operatorname{cosec} A - 1}{\cot A - \operatorname{cosec} A + 1} = \frac{1 + \cos A}{\sin A}$.

22. The following distribution gives the state-wise teacher - student ratio in higher secondary schools of India. Find the mode of this data.

Number of Students per teacher	15—20	20—25	25—30	30—35	35—40	40—45	45—50	50—55
	3	8	9	10	3	0	0	2

23. Find the missing frequencies and the median for the following distribution if the mean is 1.46.

No. of accidents	0	1	2	3	4	5	Total
Frequency (No. of days)	46	?	?	25	10	5	200

24. Show that a number and its cube leaves the same remainder when divided by 6.

Or

On a morning walk, three persons step off together and their steps measure 40 cm, 42 cm and 45 cm, respectively. What is the minimum distance each should walk so that each can cover the same distance in complete steps ?

SECTION-D

Question number 25 to 34 carry 4 marks each.

25. Show that : $\frac{\tan^3\theta}{1+\tan^2\theta}+\frac{\cot^3\theta}{1+\cot^2\theta}=\sec\theta\,\text{cosec}\,\theta-2\sin\theta\cos\theta$.

26. State and prove converse of Pythagoras Theorem.

27. Draw the graphs of the equations $x-y+1=0$ and $3x+2y-12=0$. Determine the coordinates of the vertices of the triangle formed by these lines and the x-axis and shade the triangular region.

28. The following table gives production yield per hectare of wheat of 100 farms of a village.

Production yield (in kg/ha)	50 — 55	55 — 60	60 — 65	65 — 70	70 — 75	75 —80
Number of farms	2	8	12	24	38	16

Change the distribution to a more than type distribution and draw its ogive.

Or

The median of the following data is 525.

Class Interval	Frequency
0 — 100	2
100 — 200	5
200 — 300	x
300 — 400	12
400 — 500	17
500 — 600	20
600 — 700	y
700 — 800	9
800 — 900	7
900 — 1000	4

Find the values of x and y if the total frequency is 100.

29. Find k so that x^2+2x+k is a factor of $2x^4+x^3-14x^2+5x+6$. Also find all the zeroes of the two polynomials.

30. Prove that : $(\sin\theta+\text{cosec}\,\theta)^2+(\cos\theta+\sec\theta)^2=7+\tan^2\theta+\cot^2\theta$

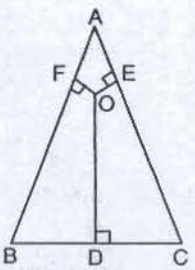
Or

Prove that : $\sin\theta(1+\tan\theta)+\cos\theta(1+\cot\theta)=\sec\theta+\text{cosec}\,\theta$.

31. A train covered a certain distance at a uniform speed. If the train would have been 6 km/hr. faster, it would have taken 4 hours less than the scheduled time. And if the train were slower by 6 km/hr., it would have taken 6 hours more than the scheduled time. Find the length of the journey.

32. The sum of the digits of a two digit number is 15. The number is decreased by 27 if the digits are reversed. Find the number.

33. In the given figure, perpendiculars OD, OE and OF are drawn to sides BC, CA and AB respectively from a point O in the interior of a ΔABC. Prove that :



$AF^2+BD^2+CE^2=OA^2+OB^2+OC^2-OD^2-OE^2-OF^2$.

Class	Frequency
0 – 30	12
30 – 60	21
60 – 90	f_1
90 – 120	52
120 – 150	f_2
150 – 180	11
Total	150

[Foreign 2010]

ANSWERS

1. (*d*) 2. (*c*) 3. (*d*) 4. (*b*) 5. (*c*)
6. (*b*) 7. (*d*) 8. (*d*) 9. 1 11. HCF = 4, LCM = 9696
12. 9 13. 2.125 14. 18° 15. $-1, \frac{4}{3}$ 16. $x = a + b, y = \frac{-2ab}{a+b}$
18. 3 : 4 22. 30.6 23. Frequencies = 76, 38; median = 1 24. Or 2520
27. (2, 3), (4, 0) and (–1, 10). 28. Or $x = 9, y = 15$ 29. $1, 2, -\frac{1}{2}, -3$
31. Distance = 720 km 32. 69 34. $f_1 = 34, f_2 = 20$

General Instructions— As given in Practice Paper - 1

Maximum Marks : 90

Time Allowed : 3 Hours

SECTION-A

Question number 1 to 8 carry 1 mark each.

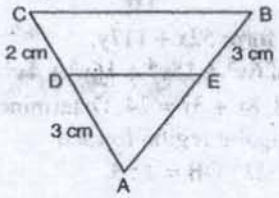
1. Which of the following will have a terminating decimal expansion ?

   (*a*) $\frac{77}{210}$ (*b*) $\frac{23}{330}$ (*c*) $\frac{125}{441}$ (*d*) $\frac{57}{8}$

2. If $(x + 1)$ is a factor of $x^2 - 3ax + 3a - 7$, then the value of a is

   (*a*) 1 (*b*) -1 (*c*) 0 (*d*) -2

3. In the adjoining figure, DE ∥ CB. What is the length of AE ?



   (*a*) 5 cm (*b*) 4.5 cm (*c*) 4 cm (*d*) 3 cm

4. If θ is an acute angle and $\cos\theta = \frac{9}{41}$, then the value of $\tan\theta$ is

   (*a*) $\frac{40}{41}$ (*b*) $\frac{9}{40}$ (*c*) $\frac{40}{9}$ (*d*) $\frac{9}{41}$

5. $9\sec^2 A - 9\tan^2 A$ is equal to

   (*a*) 0 (*b*) 1 (*c*) 9 (*d*) -9

6. The class mark of a class interval is equal to

   (*a*) lower limit + upper limit (*b*) upper limit – lower limit

   (*c*) $\frac{1}{2}$ (upper limit – lower limit) (*d*) $\frac{1}{2}$ (upper limit + lower limit)

7. The value of $\sin^2 5° + \sin^2 10° + \sin^2 15° + ... + \sin^2 90°$ is equal to

   (*a*) 8 (*b*) 8.5 (*c*) 9 (*d*) 9.5

8. If $0 < \theta < 90°$, then $\sec\theta$ is

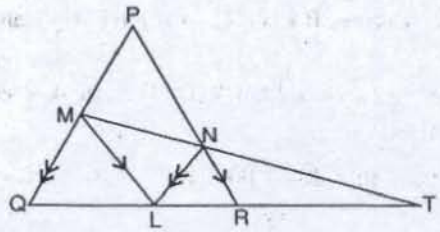
   (*a*) > 1 (*b*) < 1 (*c*) $= 1$ (*d*) 0

SECTION-B

Question number 9 to 14 carry 2 marks each.

9. Find the greatest number which when divided by 2053 and 967 leaves remainders 5 and 7 respectively.

10. L is point on side QR of a triangle PQR. If LM ∥ PR and LN ∥ PQ and a line MN meets the produced line QR in T as given in figure. Prove that $LT^2 = RT \times TQ$.



11. If $\sin(2A + 45°) = \cos(30° - A)$ and $0° < A < 90°$. Find the value of A.

Life span (in hours)	0–20	20–40	40–60	60–80	80–100	100–120
Frequency	10	35	52	61	38	29

Find the modal life span of the components.

13. Explain why $7 \times 11 \times 13 + 11$ is a composite number ?

14. If $\sin 3\theta = \cos(\theta - 6°)$ and 3θ and $\theta - 6°$ are acute angles, find the value of θ.

Or

If $\sin A = \cos B$, can you say A and B are complementary ?

SECTION-C

Question number 15 to 24 carry 3 marks each.

15. Find the LCM and HCF of 510 and 92 and verify that LCM × HCF = product of the two numbers.

Or

Find the HCF of 52 and 117 and express it in form $52x + 117y$.

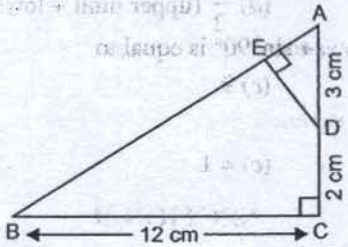
16. Using division show that $3y^2 + 5$ is a factor of $6y^5 + 15y^4 + 16y^3 + 4y^2 + 10y - 35$.

17. Draw the graphs of the equations $2x - y = -8$, $8x + 3y = 24$. Determine the vertices of the triangle by the lines representing these equations and the x-axis. Shade the triangular region formed.

18. In the given figure, DE is parallel to BC and AD : DB = 2 : 3.
Determine area (ΔADE) : area (ΔABC).

Or

In the given figure, ABC is a right-angled triangle at C. Prove that $\Delta ABC \sim \Delta ADE$ and find the lengths of AE and DE.



19. If $\cos A = \frac{12}{13}$, then verify that $\sin A(1 - \tan A) = \frac{35}{156}$.

20. ABC is a triangle and PQ is a straight line meeting AB in P and AC in Q. If AP = 1 cm, PB = 3 cm, AQ = 1.5 cm, QC = 4.5 cm. Prove that area of ΔAPQ is one-sixteenth of the area of ΔABC.

21. Evaluate : $\cot\theta \cdot \tan(90° - \theta) - \sec(90° - \theta)\operatorname{cosec}\theta + \sin^2 25° + \sin^2 65° + \sqrt{3}\tan 6° \tan 16° \tan 74° \tan 84°$.

Or

Show that : $(\tan A + \operatorname{cosec} B)^2 - (\cot B - \sec A)^2 = 2 \tan A \cot B (\operatorname{cosec} A + \sec B)$.

22. Calculate the median for the following data :

Class	20—40	40—60	60—80	80—100	100—120	120—140	140—160
Frequency	12	15	23	18	12	12	8

23. The ages of employees in two factories A and B are given below :

Age of Employees (in Years)		20—30	30—40	40—50	50—60	60—70
Number of Employees in Factories	A	5	26	78	104	98
	B	8	40	58	90	83

Find the modal age of employees in factory A and factory B.

24. Prove that $5 + \sqrt{2}$ is an irrational number.

SECTION-D

Question number 25 to 34 carry 4 marks each.

25. Prove that , if a line is drawn parallel to one side of a triangle, the other two sides are divided in the same ratio.

26. Prove that : $\sqrt{\frac{\sec A - 1}{\sec A + 1}} + \sqrt{\frac{\sec A + 1}{\sec A - 1}} = 2 \operatorname{cosec} A$

27. In a ΔABC, $\angle C = 3\angle B = 2(\angle A + \angle B)$. Find the three angles.

Or

The age of father is equal to the sum of ages of his 6 children. After 15 years, twice the age of the father will be the sum of the ages of his children. Find the age of father.

28. The heights (in cm) of 60 persons of different age groups are shown in the following table :

Height (in cm)	145 — 150	150 — 155	155 — 160	160 — 165	165 — 170	170 — 175
No. of persons	8	10	9	15	10	8

Using the above table, draw (*i*) less than ogive (*ii*) more than ogive.

Or

The following table gives the daily income of 50 workers of a factory :

Daily income (in ₹)	100 — 120	120 — 140	140 — 160	160 — 180	180 — 200
Number of workers	12	14	8	6	10

Find the Mean, Mode and Median of the above data.

29. If $x + a$ is a factor of the polynomial $x^2 + px + q$ and $x^2 + mx + n$, prove that $a = \frac{n-q}{m-p}$.

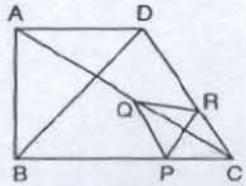
30. Show that $\frac{\cot A + \operatorname{cosec} A - 1}{\cot A - \operatorname{cosec} A + 1} = \frac{1 + \cos A}{\sin A}$.

31. Solve the following system of equations for x and y :

$$\frac{5}{x-1} + \frac{1}{y-2} = 2, \quad \frac{6}{x-1} - \frac{3}{y-2} = 1$$

32. Places A and B are 100 km apart from each other on a highway. A car starts from A and another from B at the same time. If they move in same direction, they meet in 10 hours and if they move in opposite direction, they meet in 1 hour and 40 minutes. Find the speed of the cars.

33. In figure, two triangles ABC and DBC lie on the same side of base BC. P is a point on BC such that PQ ‖ BA and PR ‖ BD. Prove that QR ‖ AD.



Class interval	Frequency
0 — 100	2
100 — 200	5
200 — 300	x
300 — 400	12
400 — 500	17
500 — 600	20
600 — 700	y
700 — 800	9
800 — 900	7
900 — 1000	4

Find the values of x and y if the total frequency is 100.

ANSWERS

1. (*d*) 2. (*a*) 3. (*b*) 4. (*c*) 5. (*c*)
6. (*d*) 7. (*d*) 8. (*a*) 9. 30, 720 11. $A = 15°$
12. 60 – 80 14. 24 Or yes. 15. LCM = 23460, HCF = 2 Or 13, $13 = 52(-2) + 117 \times 1$; $x = -2$, $y = 1$
17. (–4, 0), (3, 0) and (0, 8) 18. 4 : 25 Or $AE = \frac{15}{13}$cm, $DE = \frac{36}{13}$cm 21. $\sqrt{3}$
22. 70 23. Factory A : 58.125; Factory B : 58.205 25. $x = 8$ or 9
27. 20°, 40°, 120° Or 60 years 28. Or Mean = 145.20, Mode = 125, Median = 138.57.
31. $x = 4$, $y = 5$ 32. 35 km/hr, 25 km/hr 34. $x = 9$, $y = 15$

PRACTICE PAPER - 7

General Instructions— As given in Practice Paper - 1

Maximum Marks : 90

Time Allowed : 3 Hours

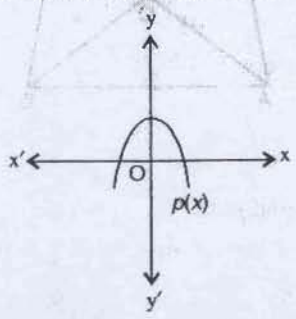
SECTION-A

Question number 1 to 8 carry 1 mark each.

1. For any two positive integers a and b, there exist unique integers q and r such that $a = bq + r$, $0 \le r < b$, if $b = 4$ then which is not the value of r ?

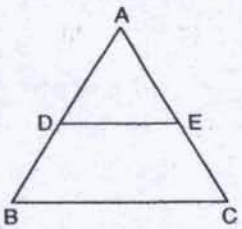
   (*a*) 1 (*b*) 2 (*c*) 3 (*d*) 4

2. In figure, the graph of a polynomial $p(x)$ is shown, the number of zeroes of $p(x)$ is :



   (*a*) 0 (*b*) 2 (*c*) 1 (*d*) None of these

3. In figure below DE || BC, if AB = 7.6 cm, AD = 1.9 cm, then AE : EC is :



   (*a*) 1 : 3 (*b*) 1 : 4 (*c*) 4 : 1 (*d*) 3 : 1

4. If $\tan A = \frac{5}{12}$, find the value of $(\sin A + \cos A) \times \sec A$:

   (*a*) $\frac{6}{13}$ (*b*) $\frac{7}{12}$ (*c*) $\frac{17}{12}$ (*d*) $\frac{12}{17}$

5. The value of $\cos\theta \cos(90° - \theta) - \sin\theta \sin(90° - \theta)$ is :

   (*a*) 1 (*b*) 0 (*c*) 2 (*d*) –1

6. If $\cos x = \cos 60° \cos 30° + \sin 60° \sin 30°$, then the value of x is

   (*a*) 30° (*b*) 15° (*c*) 45° (*d*) 60°

7. The maximum value of $\frac{1}{\text{cosec}\,\theta}$ is :

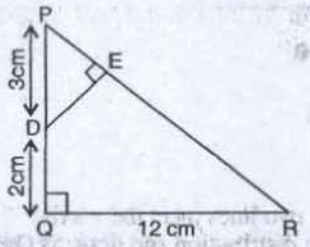
   (*a*) 0 (*b*) 1 (*c*) $\frac{\sqrt{3}}{2}$ (*d*) $\frac{1}{\sqrt{2}}$

8. The lower limit of the modal class of the following data is :

Classes	0 — 10	10 — 20	20 — 30	30 — 40	40 — 50
Frequency f	5	8	13	7	6

   (*a*) 10 (*b*) 30 (*c*) 20 (*d*) 50

22. In the given figure, ΔPQR is right angled triangle right angled at Q. $DE \perp PR$. Prove $\Delta PQR \sim \Delta PED$ and find the lengths of PE and DE if PD = 3 cm, QD = 2 cm and QR = 12 cm.



23. If the mean of the following frequency distribution is 54, find the value of P.

Classes	0 — 20	20 — 40	40 — 60	60 — 80	80 — 100
Frequency f	7	P	10	9	13

Or

Find the median of the following data.

Classes	500 — 600	600 — 700	700 — 800	800 — 900	900 — 1000
Frequency	40	28	35	22	25

24. Find the mean of the following data :

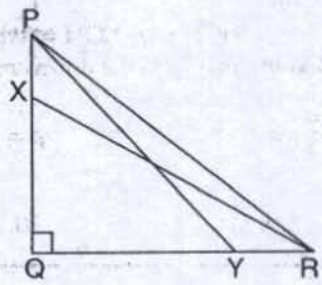
Classes	25 — 30	30 — 35	35 — 40	40 — 45	45 — 50	50 — 55	55 — 60
Frequency	14	22	16	6	5	3	4

SECTION-D

Question number 25 to 34 carry 4 marks each.

25. If the polynomial $f(x) = 3x^4 + 3x^3 - 11x^2 - 5x + 10$ is completely divisible by $3x^2 - 5$, find all its zeroes.

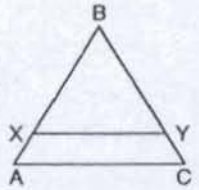
26. In given figure, a right triangle PQR, right angled at Q. X and Y are the points on PQ and QR such that PX : XQ = 1 : 2 and QY : YR = 2 : 1. Prove that $9(PY^2 + XR^2) = 13PR^2$.



Or

In the given figure, in ΔABC, XY ‖ AC and XY divides the ΔABC into two regions such that ar (ΔBXY) = 2ar (ACYX).

Determine $\frac{AX}{AB}$.



27. Prove that $\frac{1}{(\sec\theta - \tan\theta)} - \frac{1}{\cos\theta} = \frac{1}{\cos\theta} - \frac{1}{(\sec\theta - \tan\theta)}$

If $x = a\cos\theta + b\sin\theta$ and $y = b\cos\theta - a\sin\theta$, then prove that $x^2 + y^2 = a^2 + b^2$.

28. Prove that $\dfrac{\cot\theta}{\text{cosec}\,\theta + 1} + \dfrac{\text{cosec}\,\theta + 1}{\cot\theta} = 2\sec\theta$.

29. Find graphically the solution of the equations :
$x + 2y = 8$
$y - x = 1$
Find the co-ordinates of the points where the two lines meet the y-axis.

30. Convert the following data to a less than type distribution and draw its Ogive. Also find median from the graph.

Classes	100 — 120	120 — 140	140 — 160	160 — 180	180 — 200
Frequency	12	14	8	6	10

31. Divide $2x^4 - 9x^3 + 5x^2 + 3x - 8$ by $x^2 - 4x + 1$ and verify the division algorithm.

32. Calculate the mode of the following data :

Classes	0 — 10	10 — 20	20 — 30	30 — 40	40 — 50	50 — 60	60 — 70
Frequency f	5	10	18	30	20	12	5

33. PQRS is a trapezium with PQ||SR. Diagonals PR and SQ intersect at M. $\Delta PMS \sim \Delta QMR$. Prove that PS = QR.

34. Find graphically area of the region bounded by these lines and x-axis
$x - y = -1$, and $2x + y = 10$.

ANSWERS

1. (*d*) 2. (*b*) 3. (*a*) 4. (*c*) 5. (*b*)
6. (*a*) 7. (*b*) 8. (*c*) 10. 1 12. $p = 20°$
13. 90° 14. 74.7 16. Or HCF = 18, LCM = 918
17. $a = 5, b = 1$ Or speed of boat upstream = 4 km/h, speed of boat downstream = 12 km/h
18. $a = -1, b = -4$ 22. PE = $\frac{15}{13}$ cm, DE = $\frac{36}{13}$ cm 23. $p = 11$ Or 720 24. 36.85
25. $\frac{2}{3}$, and -1 29. (0, 4) and (0, 1) 30. 138.57 32. 30.90 34. 12 square.unit

General Instructions— As given in Practice Paper - 1

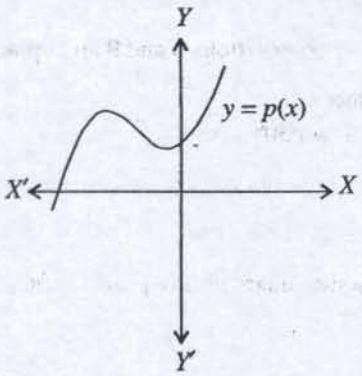
Maximum Marks : 90

Time Allowed : 3 Hours

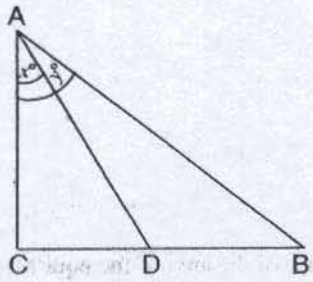
SECTION-A

Question number 1 to 8 carry 1 mark each.

1. If H.C.F. of 65 and 117 is expressible in the form of $65m - 117$, then the value of m is :
   (*a*) 4 (*b*) 2 (*c*) 1 (*d*) 3
2. The number of zeroes for the polynomial $y = p(x)$ from the given graph is :



   (*a*) 3 (*b*) 1 (*c*) 2 (*d*) 0
3. If in ΔABC and ΔDEF, $\frac{AB}{DE} = \frac{BC}{FD}$, then they will be similar if :
   (*a*) $\angle B = \angle E$ (*b*) $\angle A = \angle D$ (*c*) $\angle B = \angle D$ (*d*) $\angle A = \angle F$
4. $\cos 1° \cos 2° \cos 3° ..... \cos 90°$ is equal to :
   (*a*) 1 (*b*) 0 (*c*) 1/2 (*d*) –1
5. If $3\cos\theta = 2\sin\theta$, then the value of $\frac{4\sin\theta - 3\cos\theta}{2\sin\theta + 6\cos\theta}$ is :
   (*a*) $\frac{1}{8}$ (*b*) $\frac{1}{3}$ (*c*) $\frac{1}{2}$ (*d*) $\frac{1}{4}$
6. If $\cos(40° + A) = \sin 30°$, the value of A is :
   (*a*) 30° (*b*) 40° (*c*) 60° (*d*) 20°
7. In fig., if D is mid-point of BC, the value of $\frac{\cot y°}{\cot x°}$ is :



   (*a*) 2 (*b*) $\frac{1}{4}$ (*c*) $\frac{1}{3}$ (*d*) $\frac{1}{2}$
8. The mean and median of a data are 14 and 15 respectively. The value of mode is :
   (*a*) 16 (*b*) 17 (*c*) 13 (*d*) 18

Question number 9 to 14 carry 2 marks each.

9. The HCF and LCM of two numbers are 9 and 90 respectively. If one number is 18, find the other.

10. If $3\cot A = 4$, find the value of $\dfrac{\operatorname{cosec}^2 A + 1}{\operatorname{cosec}^2 A - 1}$

Or

Evaluate : $\dfrac{\operatorname{cosec}^2(90^\circ - \theta) - \tan^2\theta}{4(\cos^2 48^\circ + \cos^2 42^\circ)} - \dfrac{2\tan^2 30^\circ \sec^2 52^\circ \sin^2 38^\circ}{\operatorname{cosec}^2 70^\circ - \tan^2 20^\circ}$

11. If one diagonal of a trapezium divides the other diagonal in the ratio 1 : 3. Prove that one of the parallel sides is three times the other.

12. The mean of 10 observations is 15.3. If two observations 6 and 9 are replaced by 8 and 14 respectively. Find the new mean.

13. Prove that $15 + 17\sqrt{3}$ is an irrational number.

14. Evaluate (*i*) $\sin^2 30^\circ - \cos^2 30^\circ$ (*ii*) $\sec^2 30^\circ - \tan^2 30^\circ$

SECTION-C

Question number 15 to 24 carry 3 marks each.

15. Use Euclid's division lemma to show that the square of any positive integer is either of the form $5m$, $5m + 1$ or $5m + 4$ for some integer m.

16. Prove that $\sqrt{6} + \sqrt{2}$ is irrational.

Or

Prove that $\sqrt{5}$ is irrational.

17. The sum of the numerator and denominator of a fraction is 12. If 1 is added to both the numerator and the denominator the fraction becomes $\dfrac{3}{4}$. Find the fraction.

Or

Eight times a two digit number is equal to three times the number obtained by reversing the order of its digits. If the difference between the digit is 5, find the number.

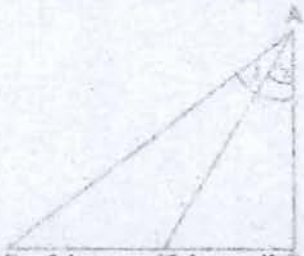
18. Obtain all zeroes of $f(x) = x^4 - 3x^3 - x^2 + 9x - 6$ if two of its zeroes are $(-\sqrt{3})$ and $\sqrt{3}$.

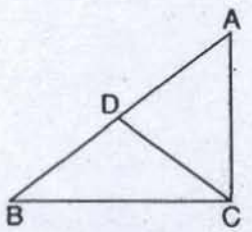
19. Prove that $\dfrac{1+\cos A}{\sin A} + \dfrac{\sin A}{1+\cos A} = 2\operatorname{cosec} A$

20. Evaluate : $\dfrac{2\sin 68^\circ}{\cos 22^\circ} - \dfrac{2\cot 15^\circ}{5\tan 75^\circ} - \dfrac{3\tan 45^\circ \tan 20^\circ \tan 40^\circ \tan 50^\circ \tan 70^\circ}{5}$

21. If figure ABC is a right triangle, right angled at C. Let $BC = a$, $CA = b$, $AB = c$ and let p be the length of perpendicular from C on AB. Prove that.

(*i*) $cp = ab$ (*ii*) $\dfrac{1}{p^2} = \dfrac{1}{a^2} + \dfrac{1}{b^2}$





22. ΔABC is an equilateral triangle. Find the ratio of the area of the equilateral triangle described on a side of the triangle to the area of the equilateral triangle described on one of its altitude.

23. Find the mean of given data upto two places of decimals:

Classes	15—25	25—35	35—45	45—55	55—65
Frequency	60	35	12	18	15

Or

Find the median daily expenses from the following data.

Daily Expenses in (in ₹)	No. of families
20 — 40	6
40 — 60	9
60 — 80	11
80 — 100	14
100 — 120	20
120 — 140	15
140 — 160	10
160 — 180	8
180 — 200	7
Total	100

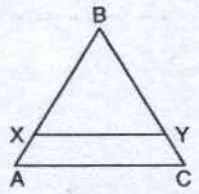
24. The mean of the following data is 53, find the missing frequencies.
Find the sum of the deviations of the variate values 3, 4, 6, 7, 8, 14, from their mean

SECTION-D

Question number 25 to 34 carry 4 marks each.

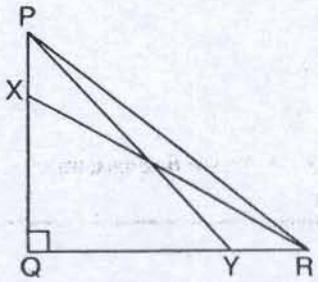
25. Divide $2x^4 - 9x^3 + 5x^2 + 3x - 8$ by $x^2 - 4x + 1$ and verify the division algorithm.

26. In the given figure, in ΔABC, XY||AC and XY divides the ΔABC into two regions such that ar(ΔBXY) = 2ar (ACYX).
Determine $\frac{AX}{AB}$



Or

In given figure, right triangle PQR, right triangle PQR, right angled at Q. X and Y are the points on PQ and QR such that PX : XQ = 1 : 2 and QY : YR = 2 : 1. Prove that $9(PY^2 + XR^2) = 13PR^2$.



27. If $\sec\theta = x + \frac{1}{4x}$, then prove that $\sec\theta + \tan\theta = 2x$ or $\frac{1}{2x}$

Or

If $\tan\theta + \tan\theta = m$ and $\tan\theta - \sin\theta = n$. Show that $(m^2 - n^2)^2 = 16\,mn$.

General Instructions— As given in Practice Paper - 1

Maximum Marks : 90

Time Allowed : 3 Hours

SECTION-A

Question number 1 to 8 carry 1 mark each.

1. A pair of irrational numbers whose product is a rational number is :

   (*a*) $\sqrt{16}, \sqrt{4}$ (*b*) $\sqrt{5}, \sqrt{2}$ (*c*) $\sqrt{3}, \sqrt{27}$ (*d*) $\sqrt{36}, \sqrt{2}$

2. If α, β are zeroes of polynomial $f(x) = x^2 + px + q$ then polynomial having $\frac{1}{\alpha}$ and $\frac{1}{\beta}$ as its zeroes is :

   (*a*) $x^2 + qx + p$ (*b*) $x^2 - px + q$ (*c*) $qx^2 + px + 1$ (*d*) $px^2 + qx + 1$

3. If the diagonals AC and BD of a quadrilateral ABCD intersect at O such that AO. OD = OB.OC, then the quadrilateral is a :

   (*a*) parallelogram (*b*) trapezium (*c*) rectangle (*d*) square

4. Which of the following is not defined ?

   (*a*) cos 0° (*b*) tan 45° (*c*) sec 90° (*d*) sin 90°

5. $(4\tan^2 A - 4\sec^2 A)$ is equal to:

   (*a*) –1 (*b*) –4 (*c*) 0 (*d*) 4

6. If $\sin\theta = \cos\theta$, then the value of cosec θ is :

   (*a*) 2 (*b*) 1 (*c*) $\frac{2}{\sqrt{3}}$ (*d*) $\sqrt{2}$

7. The value of tan1°.tan2°.tan3°.....tan89° is :

   (*a*) 0 (*b*) 1 (*c*) 2 (*d*) $\frac{1}{2}$

8. Which measure of central tendency is given by the *x* co-ordinate of the point of intersection of the more than Ogive and less than Ogive.

   (*a*) Mean (*b*) Median (*c*) Mode (*d*) All the above

SECTION-B

Question number 9 to 14 carry 2 marks each.

9. Find the LCM of 336 and 54 by prime factorisation method.

10. If LCM (91, 26) = 182, then HCF =

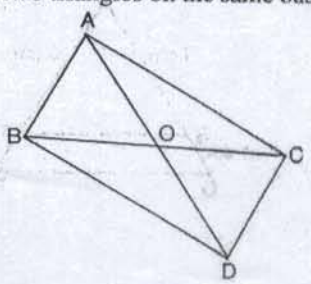
11. Prove that $\sqrt{\frac{1+\sin A}{1-\sin A}} = \sec A + \tan A$

Or

If $\sin(A + B) = \cos(A - B) = \frac{\sqrt{3}}{2}$ and A, B (A > B) are acute angles, find the values of A and B.

12. In the figure given below, ABC and DBC are two triangles on the same base BC. If AD intersect BC at O then show that :

$$\frac{ar(ABC)}{ar(DBC)} = \frac{AO}{DO}$$



13. Construct the frequency distribution table for the given data :

Marks obtained	Less than 10	Less than 20	Less than 30	Less than 40	Less than 50	Less than 60
Number of students	14	22	37	58	67	75

14. Evaluate $\dfrac{\tan^2 60° + 4\sin^2 45° + 3\sec^2 30° + 5\cos^2 90°}{\text{cosec } 30° + \sec 60° - \cot^2 30°}$

SECTION-C

Question number 15 to 24 carry 3 marks each.

15. There are 156, 208 and 260 students in Groups A, B, C respectively. Buses are to be hired to take them for a field trip. Find the minimum number of buses to be hired if the same number of students should be accommodated in each bus.

16. Prove that $2\sqrt{3} - 7$ is an irrational.

Or

Prove that $\sqrt{3} + \sqrt{5}$ is an irrational.

17. Solve for x and y : $mx - ny = m^2 + n^2$; $x - y = 2n$

Or

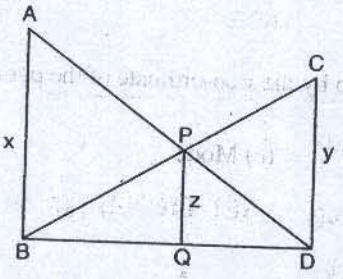
Seven times a two digit number is equal to four times the number obtained by reversing the order of digits. If the sum of both the digits is 9, find the number.

18. Obtain all other zeroes of $x^4 + 5x^3 - 2x^2 - 40x - 48$, if two of its zeroes are $2\sqrt{2}$ and $-2\sqrt{2}$.

19. Prove that : $\sec^2\theta + \cot^2(90 - \theta) = 2\text{cosec}^2(90 - \theta) - 1$.

20. If $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$, prove that $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$.

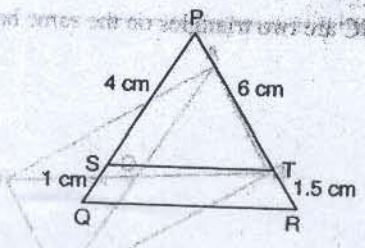
21.



In figure above, AB ∥ PQ ∥ CD, AB = x units, CD = y units and PQ = z units. prove that,

$$\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$$

22. In the given figure PS, SQ, PT and TR are 4 cm, 1 cm, 6cm, and 1.5 cm respectively, prove that ST ∥ QR. Also, find the ratio of $\dfrac{\text{ar}(\Delta PST)}{\text{ar}(\text{trap QRTS})}$



23. Find the mode of the following data :

Marks	Number of Students
Less than 10	3
Less than 20	8
Less than 30	24
Less than 40	36
Less than 50	49
Less than 60	69
Less than 70	75
Less than 80	80

Or

The mean of the following frequency distribution is 52. Find the missing frequency.

C.I.	10 — 20	20 — 30	30 — 40	40 — 50	50 — 60	60 — 70	70 — 80
Number of People	5	3	4	f	2	6	13

24. 200 surnames were randomly picked up from a local telephone directory and the frequency distribution of the number of letters in English alphabets in the surnames was obtained as follows.

Number of letters	1 — 5	5 — 10	10 — 15	15 — 20	20 — 25
Number of surnames	20	60	80	32	8

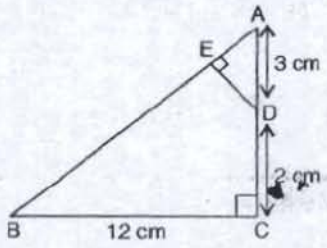
Find the median.

SECTION-D

Question number 25 to 34 carry 4 marks each.

25. If two of the zeroes of the polynomial $f(x) = 5x^4 - 5x^3 - 33x^2 + 3x + 18$ are $\sqrt{\frac{3}{5}}$ and $-\sqrt{\frac{3}{5}}$ find the other two zeroes.

26. In the given figure, ΔABC is right angled at C and $DE \perp AB$. Prove that $\Delta ABC \sim \Delta ADE$ and find the lengths of AE and DE.



Or

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

27. Prove that

$$\frac{\tan\theta}{1-\cot\theta} + \frac{\cot\theta}{1-\tan\theta} = \sec\theta \operatorname{cosec}\theta + 1$$

Or

If $p = \operatorname{cosec}\theta + \cot\theta$ then show that $\frac{p^2-1}{p^2+1} = \cos\theta$

28. Evaluate : $\frac{}{2(\sin^2 25° + \sin^2 65°)} + \frac{}{3(\sec^2 33 - \cot^2 57)}$

29. Find graphically the solution of the equations :

$x + 2y = 8; y - x = 1$

Find the co-ordinates of the points where the two lines meet the y-axis.

30. The following table gives the height of 40 trees in metres :

Height in metres	0 — 8	8 — 16	16 — 24	24 — 32	32 — 40	40 — 48
Number of trees	3	7	13	9	9	2

Change the above distribution to less than type distribution and draw its ogive. Hence obtain the median value.

31. Solve for x and y ; $\frac{57}{x+y} + \frac{9}{x-y} = 6, \frac{38}{x+y} + \frac{21}{x-y} = 9$.

32. Find the zeroes of the polynomial, if one zero of the polynomial $7x - x^3 - 6$ is one.

33. The areas of two similar triangles are 49 cm^2 and 64 cm^2 respectively. If the difference of the corresponding altitudes is 10cm, then find the lengths of altitudes (in centimeters).

34. Find the median of the following data.

Classes	0 — 20	20 — 40	40 — 60	60 — 80	80 — 100	100 — 120
Frequency	7	8	12	10	8	5

ANSWERS

1. (c) 2. (c) 3. (b) 4. (c) 5. (b)
6. (d) 7. (b) 8. (b) 9. HCF = 6, LCM = 1008
10. 13 11. Or A = 45°, B = 15° 14. 9 15. No. of Buses = 2
17. $x = m + n, y = m - n$ Or 36 18. Other zeroes are -2 and -3 22. $\frac{16}{9}$
23. 53.33 Or 7 24. 11.25 25. $x = -2$ and 3 26. AE = $\frac{15}{13}$, DE = $\frac{36}{13}$
28. $\frac{2}{3}$ 29. (0, 4), (0, 1) 31. $x = 11, y = 8$ 32. –3, 2 33. 70, 80
34. 56.66

PRACTICE PAPER - 10

General Instructions— As given in Practice Paper - 1

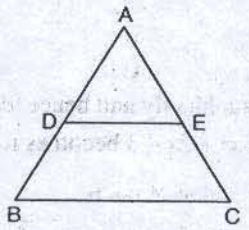
Maximum Marks : 90

Time Allowed : 3 Hours

SECTION-A

Question number 1 to 8 carry 1 mark each.

1. For some integer 'm' every odd integer is of the from :
   (*a*) m (*b*) $m + 1$ (*c*) $2m$ (*d*) $2m + 1$
2. If the polynomial $p(x)$ is divisible by $x - 4$ and 2 is a zero of $p(x)$ then which of the following is a factor of $p(x)$?
   (*a*) $x^2 + 6x - 8$ (*b*) $x^2 - 6x - 8$ (*c*) $x^2 - 6x + 8$ (*d*) $x^2 + 6x + 8$
3. In figure given below, DE || BC, if AB = 5.6 cm, AD = 1.6 cm, then AE : EC is :



   (*a*) 2 : 5 (*b*) 5 : 2 (*c*) 2 : 7 (*d*) 7 : 2
4. The value of cos 60° cos 30° + sin 60° sin 30° is :
   (*a*) $\frac{1}{4}$ (*b*) $\frac{3}{4}$ (*c*) $\frac{\sqrt{3}}{2}$ (*d*) $\frac{2}{4}$
5. If cos (40° + A) = sin 30°, the value of A is :
   (*a*) 30° (*b*) 40° (*c*) 60° (*d*) 20°
6. If $x = 2\sin^2\theta$, $y = 2\cos^2\theta + 1$, then the value of $x + y$ is :
   (*a*) 2 (*b*) 3 (*c*) $\frac{1}{2}$ (*d*) 1
7. If sec $2x$ = cosec $(x - 42°)$, where $2x$ is acute, then value of x is :
   (*a*) 16° (*b*) 33° (*c*) 42° (*d*) 44°
8. The mode is equal to :
   (*a*) 2 Median – 3Mean (*b*) 3 Median + 2Mean (*c*) 3 Median – 2Mean (*d*) 2 Median – 3Mean

SECTION-B

Question number 9 to 14 carry 2 marks each.

9. Explain why $5 \times 4 \times 3 \times 2 \times 1 + 3$ is a composite number.
10. Find the value of tan 60° geometrically.
11. ABCD is a trapezium in which AB || DC and its diagonals intersect each other at O. Prove that $\frac{AO}{BO} = \frac{CO}{DO}$

Or

If the areas of two similar triangles are equal, then show that triangles are congruent.

12. Construct the cumulative frequency distribution of the following distribution and find the median class.

Class	12.5 – 17.5	17.5 – 22.5	22.5 – 27.5	27.5 – 32.5	32.5 – 37.5
Frequency	2	22	19	19	13

13. Without using trigonometric tables prove that :
    tan 1° tan11° tan 21° tan 69° tan 79° tan 89° = 1
14. Use Euclid's division algorithm to find the LCM of 96 and 404.

Question number 15 to 24 carry 3 marks each.

15. Prove that $\frac{1}{2}-\frac{\sqrt{5}}{3}$ is irrational.

16. Use Euclid's division algorithm to find the HCF of 10224 and 9648.

Or

Prove that $3-\sqrt{5}$ is an irrational number.

17. Solve : $\frac{2}{x}+\frac{3}{y}=13$

$\frac{5}{x}-\frac{4}{y}=-2$ $\quad x, y \neq 0$

Or

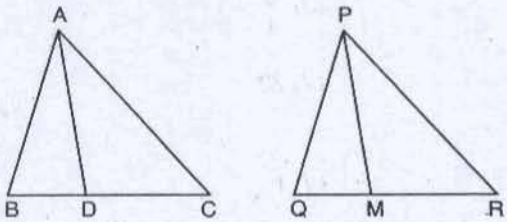
Represent the following system of equations graphically and hence identify the type of solution : $4x + 3y = 12; x - 3y = 9$

18. What must be added to $x^3 - 4x^2 + x - 6$ so that $x^2 + 2x - 3$ becomes its factor.

19. If $\sin\theta + \cos\theta = \sqrt{2}\sin(90° - \theta)$, then find the value of $\tan\theta$.

20. Given that $\sin(A + B) = \sin A \cos B + \cos A \sin B$, find the value of $\sin 75°$

21. In figure (*a*) and (*b*) sides AB, BC and median AD of ΔABC are respectively proportional to sides PQ, QR and median PM of ΔPQR. Prove that $\Delta ABC \sim \Delta PQR$



(*a*) (*b*)

22. In an equilateral triangle ABC, D is a point on side BC such taht $BD = \frac{1}{3}BC$. Prove that $9AD^2 = 7AB^2$.

23. The arithmetic mean of the following data is 25. Find the value of *p*.

Classes	0 — 10	10 — 20	20 — 30	30 — 40	40 — 50
Frequency *f*	3	*p*	3	6	2

Or

Find the median of the following data :

Class	0 — 10	10 — 20	20 — 30	30 — 40	40 — 50	Total
Frequency	8	16	36	34	6	100

24. The mean of the following frequency distribution is 50. Find the value of *p*.

Classes	0 — 20	20 — 40	40 — 60	60 — 80	80 — 100
Frequency	17	28	32	*p*	19

SECTION-D

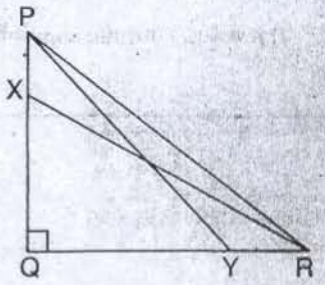
Question number 25 to 34 carry 4 marks each.

25. Divide $2x^4 - 9x^3 + 5x^2 + 3x - 8$ by $x^2 - 4x + 1$ and verify the division algorithm.

26. Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

Or

In given figure, right triangle PQR, right angled at Q. X and Y are the points on PQ and QR such that PX : XQ = 1 : 2 and QR : YR = 2 : 1. Prove that $9(PY^2 + XR^2) = 13PR^2$.



27. If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$, show that $m^2 - n^2 = 4\sqrt{mn}$

Or

Prove that $\sqrt{\frac{1+\cos\theta}{1-\cos\theta}} + \sqrt{\frac{1-\cos\theta}{1+\cos\theta}} = 2\text{cosec}\,\theta$

28. Prove that $\sqrt{\frac{1+\cos A}{1-\cos A}} = \text{cosec}\,A + \cot A$.

29. Solve $x - y = 1$ and $2x + y = 8$ graphically and find the area of the region bounded by these lines and the x-axis.

30. The following distribution gives the annual profit earned by 30 shops of a shopping complex.

Profit (in lakhs ₹)	0 — 5	5 — 10	10 — 15	15 — 20	20 — 25
Number of shops	3	14	5	6	2

Change the above distribution to more than type distribution and draw its ogive.

31. Divide $x^4 - 3x^2 + 4x + 5$ by $x^2 - x + 1$, find quotient and remainder.

32. (*i*) For what values of p, the pair of linear equations given below has unique solution.

$4x + py = -8$, $2x + 2y = -2$

(*ii*) The pair of linear equations represents what type of solutions.

$x - 2y = 5$ and $2x - 4y = 10$

33. State and prove converse of pythagoras theorem.

34. For the following data, find mode

Class	1 — 3	3 — 5	5 — 7	7 — 9	9 — 11
Frequency	14	16	4	4	2

ANSWERS

1. (*d*) 2. (*c*) 3. (*a*) 4. (*c*) 5. (*d*)
6. (*b*) 7. (*d*) 8. (*c*) 10. $\sqrt{3}$ 12. 22.5 – 27.5
14. 3552 16. HCF = 144 17. $x = \frac{1}{2}, y = \frac{1}{3}$ Or unique solution 18. $-16x + 24$
19. $\sqrt{2} - 1$ 20. $\frac{\sqrt{3}+1}{2\sqrt{2}}$ 23. $p = 4$ Or 27.22 24. $p = 24$ 29. $x = 3, y = 2$, area = 3 sq. unit
31. quotient = $x^2 + x - 2$, remainder = $2x + 3$ 32. (*i*) $p \neq 4$ (*ii*) infinite solution
34. 3.285

SECTION-B

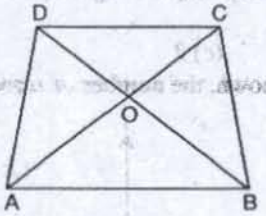
Question number 9 to 14 carry 2 marks each.

9. Show that, any positive integer is of the form $3q$, $3q + 1$ or $3q + 2$, where q is some integer.
10. If $\sin\theta + \sin^2\theta = 1$, then find the value of $\cos^2\theta + \cos^4\theta$.

Or

Show taht : $\dfrac{\cos^2 49° + \cos^2 41°}{\sin^2 31° + \sin^2 59°} + 2\tan 35° \tan 55° = 3$

11. In the given figure, ABCD is a trapezium in which AB ∥ DC. The diagonals AC and DB intersect at O.



Prove that $\dfrac{OA}{OC} = \dfrac{OB}{OD}$

12. If HCF $(6, p) = 2$ and LCM $(6, p) = 60$ then find p.
13. If sec B = cosec A = $\dfrac{15}{7}$. Then A + B =
14. Find the mode of the following data

Class	50 — 60	60 — 70	70 — 80	80 — 90	90 — 100
Frequency	9	12	20	11	10

SECTION-C

Question number 15 to 24 carry 3 marks each.

15. Prove that $7 - 2\sqrt{2}$ is irrational.
16. Show that the cube of any positive integer is of the form $9m$, $9m + 1$ or $9m + 8$, for some integer m.

Or

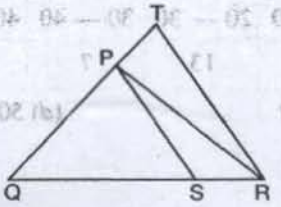
Find the HCF and LCM of 306 and 54. Verify that HCF × LCM = Product of the two numbers.

17. For what values of a and b does the following pairs of linear equations have an infinite number of solutions.
$2x + 3y = 7$; $a(x + y) - b(x - y) = 3a + b - 2$.

Or

A boat goes 16 km upstream and 24 km downstream in 6 hrs. Also it covers 12 km upstream and 36 km downstream in the same time. Find the speed of the boat upstream and downstream.

18. On dividing the polynomial $p(x) = 9x^4 - 4x^2 + 4$ by the polynomial $g(x) = 3x^2 + x - 1$, the remainder is $ax - b$. Find a and b.
19. Prove that $\dfrac{\sin A}{1 + \cos A} + \dfrac{1 + \cos A}{\sin A} = 2\,\text{cosec}\,A$.
20. Prove that : $\dfrac{\cot(90° - \theta)}{\tan\theta} + \dfrac{\text{cosec}(90° - \theta) \cdot \sin\theta}{\tan\theta(90° - \theta)} = \sec^2\theta$.
21. In the figure given below, if $\dfrac{QR}{QS} = \dfrac{QT}{PR}$ and $\angle PQR = \angle PRQ$. Prove that $\Delta PQS \sim \Delta TQR$.



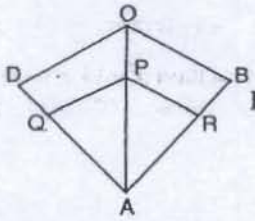
29. Determine graphically, the coordinates of the vertices of a triangle whose equations are $2x - 3y + 6 = 0$; $2x + 3y - 18 = 0$; $y - 2 = 0$. Also find the area of this triangle.

30. Find the median by drawing both types of ogives.

Class Interval	50 — 60	60 — 70	70 — 80	80 — 90	90 — 100
Frequency	3	5	9	12	6

31. Find the zeroes of quadratic polynomial $x^2 + 5x + 6$ and verify the relationship between the zeroes and the coefficients.

32. A man travels 600 km partly by train and partly by car. It takes 8 hours and 40 minutes if he travel 320 km by train and rest by car. It would take 30 minutes more if he travels 200 km by train and rest by car. Find the speed of train and car separately.

33. In figure, 

PQ ∥ CD and PR ∥ CB. Prove that $\frac{AQ}{QD} = \frac{AR}{RB}$.

34. The mean of the following data is 50, find the missing frequencies.

Age in years	0 — 20	20 — 40	40 — 60	60 — 80	80 — 100	Total
Number of People	17	f_1	32	f_2	19	120

ANSWERS

1. (*b*) 2. (*b*) 3. (*c*) 4. (*b*) 5. (*b*)

6. (*d*) 7. (*a*) 8. (*b*) 9. 45 10. $\frac{17}{8}$ OR $\frac{-5}{12}$

12. 60 14. (*i*) $-\frac{1}{2}$ (*ii*) 1 17. Fraction = $\frac{5}{7}$ OR 27.

18. All zeroes are $-\sqrt{3}$, $\sqrt{3}$, 1, and 2. 20. 1 22. $\frac{4}{3}$ 23. 32.35 OR Median = 110

24. 0 25. $q(x) = 2x^2 - x - 1$, $r(x) = -7$, 26. $\frac{\sqrt{3}-\sqrt{2}}{\sqrt{3}}$

28. $x = 3$ 29. (0, 2), (6, 2) and (3, 4), Area = 6 square units 30. 80.4

31. $-2, -3$ 32. 80 km/hr, 60 km/hr 34. $f_1 = 28, f_2 = 24$