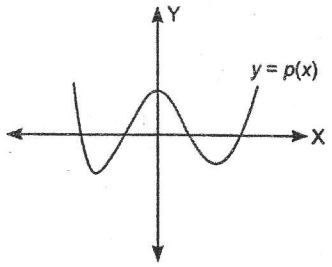
1 Practice Paper

Time Allowed : 3 hours] [*Max. Marks* : 80

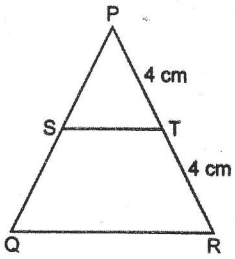
General Instructions — Questions 1-6 (1 Mark), 7-12 (2 Marks), 13-22 (3 Marks), 23-30 (4 Marks)

SECTION A

1. The graph of a polynomial $y = p(x)$ is given below. By looking at the graph, find the number of zeros of $p(x)$.



2. If the mid-point of the line segment joining the points P(6, b – 2) and Q(–2, 4) is (2, –3). Find the value of b.
3. In figure, S and T are the points on the sides PQ and PR respectively of ΔPQR, such that PT = 4 cm, TR = 4 cm and ST is parallel to QR. Find the ratio of the areas of ΔPST and ΔPQR.



4. In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find the length of the arc.
5. A letter is chosen from the word TRIANGLE. What is the probability that it is a vowel?
6. What is the upper limit of the modal class of the data given below:

Classes	Frequency
0 – 10	8
10 – 20	12
20 – 30	10
30 – 40	9
40 – 50	9

SECTION B

7. A positive number when divided by 88 gives the remainder 8. What will be the remainder when this number is divided by 11.

8. On comparing the ratios $\frac{a_1}{a_2}, \frac{b_1}{b_2}$ and $\frac{c_1}{c_2}$, find out whether the following pair of linear equations is consistent or inconsistent:

$$2x - 3y = 8$$

$$4x - 6y = 9.$$

9. A boy is cycling such that the wheels of the cycle are making 140 revolutions per minute. If the diameter of the wheel is 60 cm, calculate the speed per hour with which the boy is cycling.

10. If A = 15°, verify that 4 sin 2A. cos 4A sin 6A = 1.

11. The vertices of a triangle are A(1, 2), B(5, 7) and C(11, 13). Find the length of the median passing through the vertex A.

12. Find the mode of the following distribution:

Height (in cm)	No. of plants
30 — 40	4
40 — 50	3
50 — 60	8
60 — 70	11
70 — 80	6
80 — 90	2

SECTION C

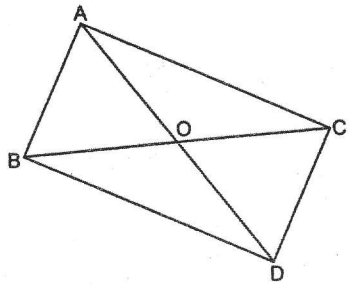
13. Determine the vertices of the triangle formed by the lines representing the equations:

$x + y = 5, x - y = 5$ and $x = 0$.

14. Find the ratio in which the line 3x + y – 9 = 0 divides the line segment joining the points (1, 3) and (2, 7).

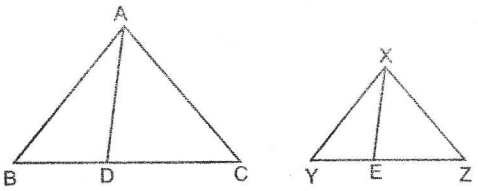
15. In a ΔABC, AB = AC and D is a point on side AC, such that $BC^2 = AC \times CD$. Prove that BD = BC.

16. 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

In given figure ΔABC is similar to ΔXYZ and AD and XE are angle bisectors of $\angle A$ and $\angle X$ respectively such that AD and XE in centimetres are 4 and 3 respectively, find the ratio of area of ΔABD and area of ΔXYE.



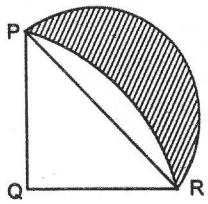
17. Prove that : $\cos\theta \sin\theta - \dfrac{\sin\theta\cos(90^\circ-\theta)\cos\theta}{\sec(90^\circ-\theta)} - \dfrac{\cos\theta\sin(90^\circ-\theta)\sin\theta}{\operatorname{cosec}(90^\circ-\theta)} = 0.$

OR

Evaluate without using trigonometric tables: $\dfrac{\sin^2\theta + \sin^2(90^\circ-\theta)}{3(\sec^2 61^\circ - \cot^2 29^\circ)} - \dfrac{3\cot^2 30^\circ \sin^2 54^\circ \sec^2 36^\circ}{2(\operatorname{cosec}^2 65^\circ - \tan^2 25^\circ)}$.

18. The sum of the ages of a father and his son is 45 years. Five years ago, the product of their ages (in years) was 124. Determine their present ages.

19. In the given fig., PQR is a quadrant of a circle of radius 14 cm. A semicircle with PR as diameter is drawn, determine the area of the shaded region.



OR

In the fig., find the perimeter of shaded region where ADC, AEB and BFC are semicircles on diameters AC, AB and BC respectively.

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

21. Solve the quadratic equation: $\dfrac{x+1}{x-1} + \dfrac{x-2}{x+2} = 3, (x \neq 1, -2)$

OR

Solve for x: $9x^2 - 9(a+b)x + (2a^2 + 5ab + 2b^2) = 0$.

22. A box contains 20 cards bearing numbers 1, 2, 3 ... 20. A card is drawn random from the box. Find the probability that the number on the card is

(*i*) Prime number (*ii*) neither divisible by 5 nor by 10 (*iii*) an even number

SECTION D

23. Find the sum of all 3-digit numbers which leave the remainder 3 when divided by 5.

OR

How many multiples of 4 lie between 10 and 250? Also find their sum.

24. Show that for a odd positive integer to be a perfect square, it should be of the form $8k + 1$.

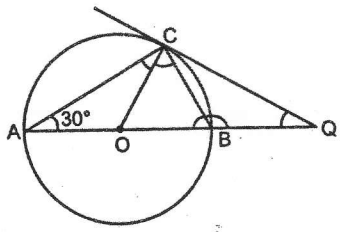
25. Construct a triangle ABC, such that AB = 5 cm, BC = 6 cm and AC = 7 cm. Draw another triangle AB′C′ similar to ΔABC such that AB′ = 3.2 cm.

26. A trader bought a number of articles for ₹ 900, five articles were found damaged. He sold each of the remaining articles at ₹ 2 more than what he paid for it. He got a profit of ₹ 80 on the whole transaction. Find the number of articles he bought.

27. Two tangents PA and PB are drawn to the circle with centre O, such that $\angle APB = 120°$. Prove that OP = 2AP.

OR

In the figure, AB is diameter of a circle with centre O and QC is a tangent to the circle at C. If $\angle CAB = 30°$, find $\angle CQA$ and $\angle CBA$.



28. An aircraft is flying along a horizontal path PQ directly towards an observer on the ground at O and maintaining an altitude of 3000 m. When the aircraft is at P, the angle of depression is 30° and when at Q, the angle of depression is 60°. Find the distance of PQ.

29. The internal and external radii of a hollow sphere are 3 cm and 5 cm respectively. The sphere is melted to form a solid cylinder of height $2\frac{2}{3}$ cm. Find the diameter and curved surface area of the cylinder.

30. 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
90 and above	8
100 and above	0

OR

The table below gives the percentage distribution of female teachers in the primary schools of rural areas of various states and union territories of India. Find the mean percentage of female teachers by assumed mean method.

Percentage of female teachers	Number of states/U.T.
15 – 25	6
25 – 35	11
35 – 45	7
45 – 55	4
55 – 65	4
65 – 75	2
75 – 85	1

Practice Paper 2

Time Allowed : 3 hours] [*Max. Marks* : 80

General Instructions — Questions 1-6 (1 Mark), 7-12 (2 Marks), 13-22 (3 Marks), 23-30 (4 Marks)

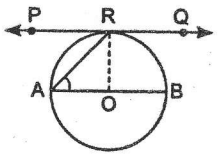
SECTION A

1. On comparing the ratios $\frac{a_1}{a_2}, \frac{b_1}{b_2}$ and $\frac{c_1}{c_2}$, find out whether the following pair of linear equations are consistent or inconsistent:

   $\frac{3}{2}x + \frac{5}{3}y = 7\,;\, 9x - 10y = 14$

2. Show that the points A(–1.5, 3), B(6, –2), C(–3, 4) are collinear.

3. In figure, PQ is tangent to the circle at R and AB is diameter of the circle. If $\angle RAB = 30°$, find $\angle ARP$.



4. A rectangular sheet of paper 44 cm × 18 cm is rolled along its length and a cylinder is formed. Find the volume of the cylinder thus formed. [Use $\pi = 22/7$]

5. Find the value of x, if the mode of the following data is 25.

   15, 20, 25, 18, 14, 15, 25, 15, 18, 16, 20, 25, 20, x, 18

6. If the probability of winning a game is 0.3, what is the probability of losing it?

SECTION B

7. An army contingent of 616 members is to march behind an army band of 32 members in a parade. The two groups are to march in the same number of columns. What is the maximum number of columns in which they can march?

8. The 17th term of an AP exceeds its 10th term by 7. Find the common difference.

9. Prove that the points (1, 7), (4, 2), (–1, –1) and (–4, 4) are the vertices of a square.

10. Prove that: $\frac{2\cos^2\theta - 1}{\sin\theta\cos\theta} = \cot\theta - \tan\theta$

11. A coin is tossed. If it shows head, we draw a ball from a bag consisting of 3 red balls and 4 black balls. If it shows a tail, we throw a dice. What is the sample space of this experiment? What are the favourable cases representing the events:

    (*i*) the throw of the coin resulted in a head. (*ii*) a red ball is drawn.

12. A toy is in the form of a cone of radius 3.5 cm mounted on a hemisphere of same radius. The total height of the toy is 15.5 cm. Find the total surface area of the toy.

SECTION C

13. Draw the graphs of the following equations:

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

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

14. Find the area of the triangle whose sides are along the lines $x = 3, y = 0$ and $4x + 5y = 20$.

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

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

OR

Prove that: $\frac{\sin\theta + \cos\theta}{\sin\theta - \cos\theta} + \frac{\sin\theta - \cos\theta}{\sin\theta + \cos\theta} = \frac{2\sec^2\theta}{\tan^2\theta - 1}$.

17. 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. Also, find the mean monthly expenditure.

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

OR

The data on number of patients attending a hospital in a month are given below. Find the average number of patients attending the hospital in a day.

Numbers of Patients	Number of days attending hospital
0 – 10	2
10 – 20	6
20 – 30	9
30 – 40	7
40 – 50	4
50 – 60	2

18. Using division algorithm, find the quotient and remainder on dividing

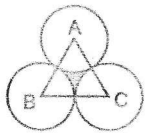
$8x^4 + 14x^3 - 2x^2 + 8x - 12$ by $4x^2 + 3x - 2$.

19. Draw a line segment of length 7.6 cm and divide it in the ratio 5 : 8. Measure the two parts.

20. Without using trigonometric table, evaluate:

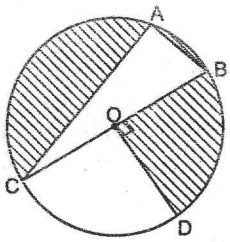
$$\frac{\sec(90° - \theta)\operatorname{cosec}\theta - \tan(90° - \theta)\cot\theta + \cos^2 25° + \cos^2 65°}{3\tan 27°\tan 63°}$$

21. The area of an equilateral triangle ABC is 17320.5 cm^2. With each vertex of the triangle as centre, a circle is drawn with radius equal to half the length of the side of the triangle (see figure). Find the area of the shaded region. (Use $\pi = 3.14$ and $\sqrt{3} = 1.73205$)



OR

In the given figure, O is the centre of the circle with AC = 24 cm, AB = 7 cm and $\angle BOD = 90°$. Find the area of the shaded region. [Use $\pi = 3.14$]



22. Some students planned a picnic. The budget for food was ₹ 480. But eight of these failedto go and thus the cost of food for each member increased by ₹ 10. How many students attended the picnic?

OR

If the price of a book is reduced by ₹ 5, a person can buy 5 more books for ₹ 300. Find the original list price of a book.

SECTION D

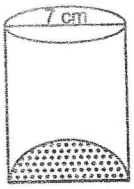
23. Prove that $15 + 17\sqrt{2}$ be an irrational number.
24. A manufacturer of laptop produced 6000 units in 3rd year and 7000 units in the 7th year. Assuming that production increases uniformly by a fixed number every year, find
    (*i*) the production in the 1st year,
    (*ii*) the production in the 5th year,
    (*iii*) the total production in 7 years.
25. A circle touches the side BC of ΔABC at P and touches AB and AC produced at Q and R respectively. Prove that $AQ = \frac{1}{2}$(perimeter of ΔABC).
26. A statue 1.6 m tall stands on the top of a pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60° and from the same point, the angle of elevation of the top of the pedestal is 45°. Find the height of the pedestal.

OR

A bird is sitting on the top of a tree, which is 80 m high. The angle of elevation of the bird, from a point on the ground is 45°. The bird flies away from the point of observation horizontally and remains at a constant height. After 2 seconds, the angle of elevation of the bird from the point of observation becomes 30°. Find the speed of flying of the bird.

27. A plane left 30 minutes later than the scheduled time and in order to reach its destination 1500 km away in time it has to increase its speed by 250 km/h from its usual speed. Find its usual speed.
28. If A be the area of a right angled triangle and x is one of the sides containing right angle. Prove that the length of altitude on the hypotenuse is $\frac{2Ax}{\sqrt{x^2 + 4A^2}}$.

29. A juice seller serves his customers using glasses shown in the figure. The bottom of the glass has a raised hemispherical portion. The inner diameter of the cylindrical glass is 7 cm and height is 12 cm. Find the actual capacity of the glass.



OR

A rectangular sheet of paper 30 cm × 18 cm can be transformed into the curved surface of a right circular cylinder in two ways either by rolling the paper along its length or by rolling it along its breadth. Find the ratio of the volumes of the two cylinders thus formed.

30. 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.

OR

Find mean, median and mode of the following data:

Classes	**Frequency**
0 – 20	6
20 – 40	8
40 – 60	10
60 – 80	12
80 – 100	6
100 – 120	5
120 – 140	3

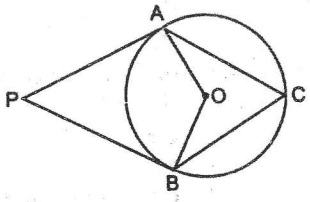
Practice Paper 3

Time Allowed : 3 hours] [*Max. Marks* : 80

General Instructions — Questions 1-6 (1 Mark), 7-12 (2 Marks), 13-22 (3 Marks), 23-30 (4 Marks)

SECTION A

1. Find the value of p for which the equation $px^2 - 5x + p = 0$ has equal roots.
2. Two vertices of a triangle are (3, 5) and (–2, 4). If the centroid is (5, 6), find the coordinate of the third vertex.
3. In the given fig., O is the centre of the circle and PA, PB are tangents to the circle. If $\angle APB = 60°$, find $\angle ACB$.



4. Area of a sector of a circle is $\frac{1}{6}$ of the area of the circle. Find the degree measure of its minor arc.
5. Find the probability of getting 53 sundays in a non-leap year.
6. Mean of n observations is 30 and median is 35. Find the mode of observations.

SECTION B

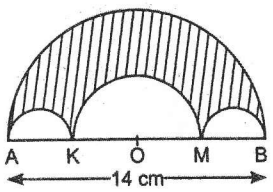
7. By using Euclid's division algorithm, find whether the pair of numbers 847, 2160 are coprimes or not.
8. Which term of the Arithmetic Progression 3, 10, 17, ... will be 84 more than its 13th term?
9. If the point P(x, y) is equidistant from the points A(5, 1) and B(–1, 5), prove that $3x = 2y$.
10. Without using Trigonometric table evaluate:

$$\frac{\sin 75° \cos 15° + \cos 75° \sin 15°}{\cot 5° \cot 30° \cot 35° \cot 55° \cot 85°}$$

11. Circumference of the edge of hemispherical bowl is 132 cm. Find the capacity of the bowl.
12. 1000 tickets of a lottery were sold and there are 5 prizes on these tickets. If Saket has purchased one lottery ticket, what is the probability of winning a prize?

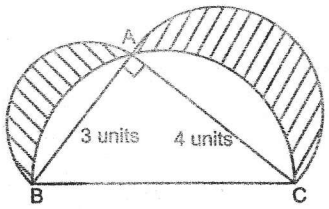
SECTION C

13. In the given figure, the diameter of largest semi-circular arc is 14 cm. Three semi-circles are drawn with diameter AK, KM and MB as shown and diameter of that of the two equal smallest semi-circular arcs are 3.5 cm. Calculate the area of the shaded region.



OR

In fig., ABC is a right-angled triangle, right-angled at A. Semicircles are drawn on AB, AC and BC as diameters. Find the area of the shaded region.



14. If the polynomial $6x^4 + 8x^3 - 5x^2 + ax + b$ is exactly divisible by the polynomial $2x^2 - 5$, then find the value of a and b.

15. Draw the graph of $2x + y = 6$ and $2x - y + 2 = 0$. Shade the region bounded by these lines and the x-axis. Find the area of the shaded region.

16. If 9th term of an AP is zero. Prove that its 29th term is double of its 19th term.

OR

Determine the AP whose fourth term is 18 and the difference of the ninth term from the fifteenth term is 30.

17. Determine the ratio in which the line $y - x + 2 = 0$ divides the line segment joining the points $(3, -1)$ and $(8, 9)$.

18. Draw a right triangle in which the sides (other than hypotenuse) are of lengths 4 cm and 3 cm. Then construct another triangle whose sides are $\frac{5}{3}$ times the corresponding sides of the given triangle.

19. From point P, two tangents PA and PB are drawn to a circle with centre O. If OP is equal to diameter of the circle. Prove that ΔPAB is an equilateral triangle.

20. If $\frac{\sin A + \cos A}{\sin A - \cos A} = \frac{5}{3}$, find the value of $\frac{7 \tan A + 2}{2 \tan A + 7}$.

21. One card is drawn from a well-shuffled pack of 52 cards. Find the probability of drawing:

(*i*) an ace (*ii*) '2' of spades (*iii*) '10' of black suit.

OR

A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball from the bag is thrice that of a red ball, find the number of blue balls in the bag.

22. If $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$. Prove that $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$.

OR

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

SECTION D

23. Use Euclid's division lemma, show that the cube of any positive integer is of the form $9m$, $9m + 1$, $9m + 8$.

24. Solve for x and y.

$$\frac{57}{x+y} + \frac{6}{x-y} = 5, \quad \frac{38}{x+y} + \frac{21}{x-y} = 9, x \neq \pm y.$$

25. Solve for x: $\frac{1}{2a+b+2x} = \frac{1}{2a} + \frac{1}{b} + \frac{1}{2x}$.

OR

Solve for x : $2\left(\frac{2x-1}{x+3}\right) - 3\left(\frac{x+3}{2x-1}\right) = 5$; given that $x \neq -3, x \neq \frac{1}{2}$.

26. State and prove Basic Proportionality theorem and hence show that the diagonals of a trapezium divide each other proportionally.

27. An aeroplane flying horizontally at a height of 2500 m above the ground is observed at an elevation of 60°. If after 15 seconds, the angle of elevation is observed to be 30°, find the speed of the aeroplane in km per hour.

OR

The angle of elevation of a cloud from a point 60 m above a lake is 30° and the angle of depression of the reflection of the cloud in the lake is 60°. Find the height of the cloud from the surface of the lake.

28. An ice-cream seller has two types of ice-cream containers one in the form of cylindrical shape and another in the shape of a frustum. Both have the same height 7 cm and the diameter of cylindrical container is 7 cm. Upper and lower radii of frustum are 3.5 cm and 3 cm respectively. Calculate the volume of both the containers. $[\pi = \frac{22}{7}]$

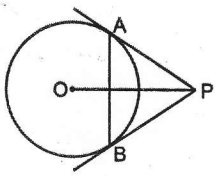
29. Using step-deviation method, calculate the arithmetic mean of the following grouped distribution.

Classes	Frequency
10 — 30	9
30 — 50	6
50 — 70	8
70 — 90	10
90 — 110	10
110 — 130	7
Total	50

30. Prove that the intercept of a tangent between two parallel tangents to a circle subtends a right angle at the centre.

OR

In figure, PA and PB are two tangents drawn from an external point P to a circle with centre O. Prove that OP is the right bisector of line segment AB.



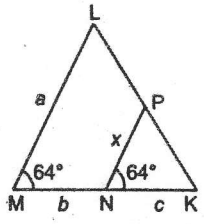
4 Practice Paper

Time Allowed : 3 hours] [*Max. Marks* : 80

General Instructions — Questions 1-6 (1 Mark), 7-12 (2 Marks), 13-22 (3 Marks), 23-30 (4 Marks)

SECTION A

1. The coach of a cricket team buys 7 bats and 6 balls for ₹ 3800. Next day he buys 3 bats and 5 balls for ₹ 1750. Represent the situation algebraically.
2. If P and Q are the points (–6, 7) and (–1, –5) respectively, then find the measurement 4PQ.
3. In given figure, express x in terms of a, b, c.



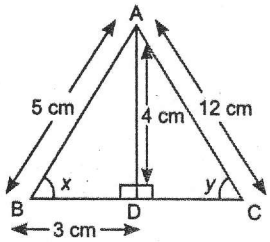
4. A chord of a circle of radius 12 cm subtends an angle of 120° at the centre. Find the length of corresponding arc.
5. If both 20 and 18 are changed to 15 in the given data 25, 15, 20, 25, 18, 14, 15, 25, 15, 18, 16, 20, 25, 20, 25, 18. Find the mode.
6. A die is thrown once, find the probability of getting a number more than 3.

SECTION B

7. For any integer a and 5, there exist a unique integer q and r, such that $a = 5q + r$. Find the possible values of a and r.
8. Find k, if the given value of x is the kth term of the given AP.

$$5\frac{1}{2}, 11, 16\frac{1}{2}, 22\ldots ; x = 550.$$

9. The points A(0, 3), B(–2, y) and C(–1, 4) are the vertices of a ΔABC right-angled at A. Find the value of y.
10. In the given figure, AD ⊥ BC, AB = 5 cm, AC = 12 cm, AD = 4 cm, BD = 3 cm, find the value of $\sin x + \sin y$.



11. The slant height of a frustum of a cone is 4 cm and perimeters (circumferences) of its circular ends are 18 cm and 6 cm. Find the curved surface area of frustum.

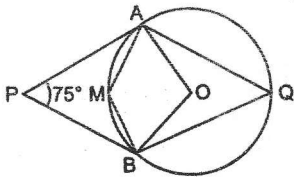
12. A card is drawn from a pack of 52 cards. Find the probability of having:
(*i*) a face card, and (*ii*) a black face card.

SECTION C

13. Draw the graphs of the following equations of lines: $4x - y = 4$ and $4x + y = 12$. Also, from the graph, find the point of intersection of both lines.

14. Find the point which is equidistant from the points (1, 1), (2, 3) and (–2, 2).

15. In the given figure, O is the centre of the circle. Determine ∠AQB and ∠AMB, if PA and PB are tangents.



16. The difference of the square of two numbers is 45. The square of the smaller number is 4 times the larger number. Determine the numbers.

OR

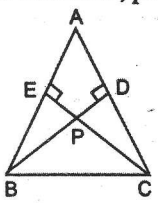
Seven years ago Varun's age was five times the square of Swati's age. Three years hence Swati's age will be two-fifth of Varun's age. Find their present ages.

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

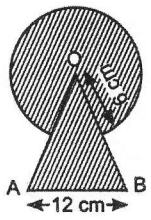
OR

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

18. In the given figure, considering triangles BEP and CPD, prove that BP × PD = EP × PC.



19. Find the area of the shaded region in the given figure, where a circular arc of radius 6 cm has been drawn with vertex O of an equilateral triangle OAB of side 12 cm as centre. $\left(\text{Use } \pi = \frac{22}{7}\right)$



OR

The area of an equilateral triangle is $49\sqrt{3}$ cm^2. Taking each angular point as centre, circles are drawn with radius equal to half the length of the side of the triangle. Find the area of triangle not included in the circles. (Use $\sqrt{3} = 1.73$)

20. Obtain all the zeros of $3x^4 + 6x^3 - 2x^2 - 10x - 5$. If two of its zeros are $\sqrt{\frac{5}{3}}$ and $-\sqrt{\frac{5}{3}}$.

21. Evaluate: $\frac{\sec^2(90° - \theta) - \cot^2\theta}{2(\sin^2 45° + \sin^2 45°)} + \frac{2\sin^2 30° \tan^2 38° \tan^2 52°}{3(\sec^2 43° - \cot^2 47°)}$.

22. Two dice are rolled once. Find the probability of getting such numbers on two dice, whose product is a perfect square.

OR

Two dice are thrown simultaneously. What is the probability that

(*i*) 5 will not come up on either of them? (*ii*) 5 will come up on at least one?

(*iii*) 5 will come up at both dice?

SECTION D

23. Use Euclid's division algorithm, to show that any positive odd integer is of the form $6m + 1$ or $6m + 3$ or $6m + 5$, where m is some integer.

24. The students of a class are made to stand in rows. If 3 students are extra in a row, there would be 1 row less. If 3 students are less in a row, there would be 2 rows more. Find the number of students in the class.

OR

4 men and 6 boys can finish a piece of work in 5 days, while 3 men and 4 boys can finish it in 7 days. Find the time taken by 1 man alone or that by 1 boy alone.

25. Draw a line segment PQ of length 9 cm. Taking P as centre, draw a circle of radius 5 cm and taking Q as centre, draw another circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle.

26. A man on a cliff observes a boat at an angle of depression of 30° which is approaching the shore to the point immediately beneath the observer with a uniform speed. Six minutes later, the angle of depression of the boat is found to be 60°. Find the total time taken by the boat to reach the shore.

27. There is a circular park in front of a shopping mall whose radius is 20 m. There is a gravel path of uniform width of 2 m around the park.

(*i*) A person takes five rounds of the circular park. What distance he covers?

(*ii*) What is the area of gravelled path? (Take $\pi = 3.14$)

28. The following distribution gives the state-wise teacher - student ratio in higher secondary schools of India. Find the mode and mean of this data. Interpret the two measures.

Number of students per teacher	Number of States/U.T.
15 — 20	3
20 — 25	8
25 — 30	9
30 — 35	10
35 — 40	3
40 — 45	0
45 — 50	0
50 — 55	2

OR

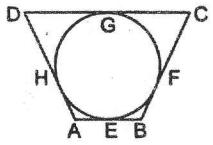
A survey regarding the heights (in cm) of 50 girls of class Xth of a school was conducted and the following data was obtained:

Height (in cm)	Number of girls
120 – 130	2
130 – 140	8
140 – 150	12
150 – 160	20
160 – 170	8
Total	**50**

Find the mean, median and mode of the above data.

29. Prove that length of the tangents drawn from an external point to the circle are equal in length. Using above theorem, solve the following:

In given figure, quadrilateral ABCD is circumscribed. If GC = 3 cm, BC = 7 cm, AH = 6 cm. Find AB.



30. Derive the formula for the sum of n terms of an AP.

OR

Find the sum of the integers between 100 and 200 that are

(*i*) divisible by 9. (*ii*) not divisible by 9.

[Hint (*ii*): These numbers will be: Total numbers – Total numbers divisible by 9]

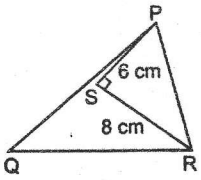
5 Practice Paper

Time Allowed : 3 hours] [*Max. Marks* : 80

General Instructions — Questions 1-6 (1 Mark), 7-12 (2 Marks), 13-22 (3 Marks), 23-30 (4 Marks)

SECTION A

1. Find a quadratic polynomial whose zeroes are $5 + \sqrt{2}$ and $5 - \sqrt{2}$.
2. Find the point on the *y*-axis which is equidistant from the points $(-5, -2)$ and $(3, 2)$.
3. In fig. find PR



4. The circumference of a circle A is 132 cm. It is equal to the sum of the circumference of two circles B and C. The radius of circle B is 14 cm. Find the radius of circle C.
5. Find the values of a, b, c and d in the following frequency distribution:

Class interval	Frequency	Cumulative frequency
0 – 20	5	a
20 – 40	10	15
40 – 60	b	23
60 – 80	c	30
80 – 100	4	d

6. A die is thrown once. Find the probability of getting a number lying between 2 and 6.

SECTION B

7. The HCF and LCM of two numbers are 50 and 250 respectively. If the first number is divided by 2, the quotient is 50. Find the second number.
8. If the sum of first n terms of an AP is $3n^2 - 2n$, find the AP and its 19th term.
9. A and B are the end-points of a diameter of a circle having its centre at (1, 2). If the coordinates of A are (–3, 5), find the coordinates of the point B.
10. Without using trigonometric tables, evaluate the following:

$$\text{cosec}^2 31° - \tan^2 59° + \frac{\sin 25° \cos 65° + \cos 25° \sin 65°}{3 \tan 30° \tan 45° \tan 60°}$$

11. A hemispherical bowl of internal diameter 36 cm contains a liquid. This liquid is to be filled in cylindrical bottles of radius 3 cm and height 6 cm. Find the number of bottles required to empty the bowl.

12. If the mean of the following frequency distribution is 188, find the missing frequencies f_1 and f_2.

Classes	0 – 80	80 – 160	160 – 240	240 – 320	320 – 400	Total
Frequency	20	25	f_1	f_2	10	100

SECTION C

13. Solve the following system of linear equations graphically:

$$3x + 2y + 4 = 0;\ 3x - 2y + 8 = 0$$

14. A point P is at a distance of $\sqrt{10}$ from the point (2, 3). Find the coordinates of the point P if its y-coordinate is twice of the x-coordinate.

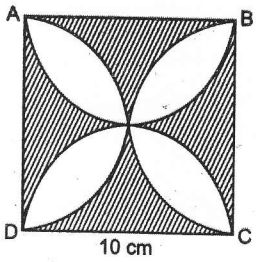
15. D, E and F are respectively the mid-points of the sides BC, CA and AB of ΔABC. Find the ratio of the areas of ΔDEF and ΔABC.

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

OR

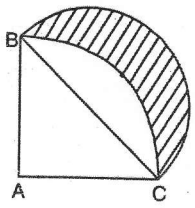
Prove that: $\left(\dfrac{1 + \sin\theta - \cos\theta}{1 + \sin\theta + \cos\theta}\right)^2 \sin\theta\,(1 + \tan\theta) + \cos\theta\,(1 + \cot\theta) = \sec\theta + \operatorname{cosec}\theta = \dfrac{1 - \cos\theta}{1 + \cos\theta}$.

17. Find the area of the shaded design in figure, where ABCD is a square of side 10 cm and semicircles are drawn with each side of the square as diameter. (Use $\pi = 3.14$)



OR

In the given figure, ABC is a quadrant of a circle of radius 14 cm and a semicircle is drawn with BC as diameter. Find the area of the shaded region.



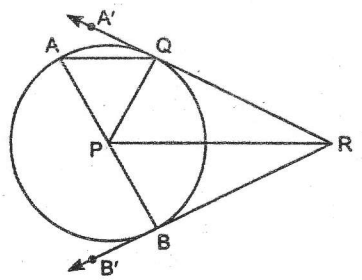
18. Derive formula for the nth term of an AP.

OR

Find the value of the middle term of the following AP:

$-6, -2, 2, ..., 58$.

19. QR is a tangent at Q. PR || AQ, where AQ is a chord through A and P is a centre, the end point of the diameter AB. Prove that BR is tangent at B.



20. Solve for x: $\frac{x-1}{x-2}+\frac{x-3}{x-4}=3\frac{1}{3}(x \neq 2, 4)$.

OR

Solve for x: $\frac{1}{a+b+x}=\frac{1}{a}+\frac{1}{b}+\frac{1}{x}; a \neq 0, b \neq 0, x \neq 0$.

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

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

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

22. Prove that $\left(\frac{1+\sin A-\cos A}{1+\sin A+\cos A}\right)^2 = \frac{1-\cos A}{1+\cos A}$.

SECTION D

23. Prove that $\sqrt{6}$ is an irrational.

24. If the ratio of the roots of the equation $lx^2 + nx + n = 0$ is $p : q$, prove that $\sqrt{\frac{p}{q}} + \sqrt{\frac{q}{p}} + \sqrt{\frac{n}{l}} = 0$

OR

Using quadratic formula, solve the following quadratic equation for x: $p^2x^2 + (p^2 - q^2)x - q^2 = 0$.

25. If the polynomial $x^4 - 6x^3 + 16x^2 - 25x + 10$ is divided by $(x^2 - 2x + k)$ the remainder comes out to be $x + b$. Find k and b.

OR

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

26. A vertical flagstaff stands on the top of a building. The height of the flagstaff above the building is 6m. The angles of elevation of the top and bottom of the flagstaff at a point on the level ground are 45° and 30° respectively. Find the height of the building.

27. The internal radii of the ends of a bucket, full of milk and of internal height 16 cm are 14 cm and 7 cm. If this milk is poured into a hemispherical vessel, the vessel is completely filled. Find the internal diameter of the hemispherical vessel.

OR

A bucket open at the top is of the form of a frustum of a cone. The diameters of its upper and lower circular ends are 40 cm and 20 cm respectively. If total 17600 cm^3 of water can be filled in the bucket, find its total surface area. [Use $\pi = \frac{22}{7}$]

28. A child's game has 8 triangles of which 3 are blue and rest are red, and 10 squares of which 6 are blue and rest are red. One piece is lost at random. Find the probability that it is a

(*i*) triangle

(*ii*) square

(*iii*) square of blue colour

(*iv*) triangle of red colour

29. Draw a right triangle in which the sides (other than hypotenuse) are of lengths 4 cm and 3 cm. Then construct another triangle whose sides are $\frac{5}{3}$ times the corresponding sides of the given triangle.

1

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

Using the above, prove the following:

1

Prove that the area of the equilateral triangle described on the side of a square is half the area of the equilateral triangle described on its diagonal.