Class X - CBSE 2020

Mathematics

Quick Notes

[List of probable questions for Board Exams - Question no. wise]

Section - A

Q. 1 & 3 (From L : 1- Real Numbers) **For 1 mark**

1) Find the greatest number of 5 digits, that will give us remainder of 5, when divided by 8 and 9 respectively.
a) 99921 b) 99931 c) 99941 d) 99951

2) For some integers p and 5, there exist unique integers q and r such that p = 5q + r. Possible values of r are
a) 0 or 1 b) 0, 1 or 2 c) 0, 1, 2 or 3 d) 0, 1, 2, 3, or 4

3) If the HCF of 55 and 99 is expressible in the form $55m - 99$, then the value of m is _____.
a) 7 b) -2 c) 2 d) 5

4) If two positive integers a and b are written as $a = x^3y^2$ and $b = xy^3$, where x, y are prime numbers, then HCF (a, b) is
a) xy b) xy^2 c) x^3y^3 d) x^2y^2

5) Two natural numbers whose difference is 66 and the least common multiple is 360, are:
a) 120 and 54 b) 90 and 24 c) 180 and 114 d) 130 and 64

6) 4 Bells toll together at 9.00 am. They toll after 7, 8, 11 and 12 seconds respectively. How many times will they toll together again in the next 3 hours ?
a) 3 b) 4 c) 5 d) 6

7) Which of the following rational numbers have a terminating decimal expansion ?
a) $\frac{125}{441}$ b) $\frac{77}{210}$ c) $\frac{15}{1600}$ d) $\frac{129}{2^2 \times 5^2 \times 7^2}$

8) A forester wants to plant 66 apple trees, 88 banana trees & 110 mango trees in equal row (in terms of no of trees) Also be wants to make distinct rows of trees (only one type of trees in one row) The no of minimum rows required are
a) 2 b) 3 c) 10 d) 12

9) If p is a prime no & p divides K^2, then p divides
a) $2K^2$ b) K c) $3K^3$ d) None of these

10) LCM of 23×32 and 22×33 is
a) 23 b) 33 c) 23×33 d) 22×32

Q. 2 (From L : 14 - Statistics) : **For 1 mark**

1) Mean of 100 items is 49. It was discovered that three items which should have been 60, 70, 80 were wrongly read as 40, 20, 50 respectively. The correct mean is
a) 48 b) 49 c) 50 d) 60

2) While computing mean of grouped data, we assume that the frequencies are
a) evenly distributed over all the classes b) centred at the classmarks of the classes
c) centred at the upper limits of the classes d) centred at the lower limits of the classes

3) In the formula $\bar{x} = a + h\left(\frac{\sum f_i u_i}{\sum f_i}\right)$, for finding the mean of grouped frequency distribution, u_i =

a) $\frac{x_i + a}{h}$ b) $h(x_i - a)$ c) $\frac{x_i - a}{h}$ d) $\frac{a - x_i}{h}$

4) Mode is the value of the variable which has :
a) maximum frequency b) minimum frequency
c) mean frequency d) middlest most frequency

5) Mode and mean of a data are 12 k and 15 k. Median of the data is
a) 12 k b) 14 k c) 15 k d) 16 k

6) The abscissa of the point of intersection of the less then type and of the more than type cumulative frequency curves of a grouped data gives its
a) mean b) median c) mode d) all the three above

7) The relationship between mean, median and mode for a moderately skewed distribution is
a) mode = median - 2 mean b) mode = 3 median - 2 mean
c) mode = 2 median - 3 mean d) mode = median - mean

8) Which of the following can not be determined graphically ?
a) Mean b) Median c) Mode d) None of the these

9) The mean of 10 numbers is 15 and that of another 20 numbers is 24, then the mean of all 30 observations is
a) 20 b) 15 c) 21 d) 24

10) What should be the frequency of 30 - 40 in this case

Marks obtained		**No. of students**
Less than or equal to	50	30
Less than or equal to	40	26
Less than or equal to	30	15
Less than or equal to	20	10
Less than or equal to	10	7
Less than or equal to	0	0

a) 15 b) 26 c) 11 d) 30

11) If $\sum f_i = 11$, $\sum f_i . x_i = 2p + 52$ and mean is 6 then the value of P is
a) 5 b) 7 c) 22 d) 11

Q. 3 (From L : 3 - Linear Equations in Two Variables) : For 1 mark

1) The pair of linear equations $2x + 3y = 5$ and $4x + 6y = 10$ is
a) inconsistent b) consistent c) parallel d) none of these

2) The pair of equations $x = a$ and $y = b$ graphically represents lines which are
a) parallel b) intersecting at (b, a) c) coincident d) intersecting at (a, b)

3) The father's age is six times of his son's age. Four years hence, the age of the father will be four times of his son's age. The present ages, in years, of the son and the father are , respectively.
a) 4 and 24 b) 5 and 30 c) 6 and 36 d) 3 and 24

4) The pair of equations $ax + 2y = 7$ and $3x + by = 16$ represent parallel lines if

a) $a = b$ b) $3a = 2b$ c) $2a = 3b$ d) $ab = 6$

5) For which values of p, does the pair of equation given below has unique solution ?
$4x + py + 8 = 0$ and $2x + 2y + 2 = 0$

a) $p \neq 3$ b) $p \neq 4$ c) $p \neq -4$ d) none of these

6) If the lines given by $2x + ky = 1$ & $3x - 5y = 7$ are parallel then the value of K is

a) $-10/3$ b) $10/3$ c) -13 d) -7

Q. 5, 6 , 7 ((From L : 9 - Trigonometry) : **For 1 mark**

1) If $\tan\theta = \frac{a}{b}$ then the value of $\frac{a\sin\theta + b\cos\theta}{a\sin\theta - b\cos\theta}$ is

a) $\frac{a^2 - b^2}{a^2 + b^2}$ b) $\frac{a^2 + b^2}{a^2 - b^2}$ c) $\frac{a}{a^2 + b^2}$ d) $\frac{b}{a^2 + b^2}$

2) The value of $\sin^2 30^\circ - \cos^2 30^\circ$ is

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

3) If $3\cot\theta = 2$, then the value of $\tan\theta$

a) $\frac{2}{3}$ b) $\frac{3}{2}$ c) $\frac{3}{\sqrt{13}}$ d) $\frac{2}{\sqrt{13}}$

4) If $\sin\theta = \sqrt{3}\cos\theta$, $0^\circ < \theta < 90^\circ$, then θ is equal to

a) 30° b) 45° c) 60° d) 90°

5) If $\cos 9\alpha = \sin\alpha$ and $9\alpha < 90^\circ$, then the value of $\tan 5\alpha$ is

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

6) $\sin(45^\circ + \theta) - \cos(45^\circ - \theta)$ is equal to

a) 2 cos θ b) 0 c) 2 sin θ d) 1

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

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

8) The value of the expression $[\text{cosec}(75^\circ + \theta) - \sec(15^\circ - \theta) - \tan(55^\circ + \theta) + \cot(35^\circ - \theta)]$

a) -1 b) 0 c) 1 d) $\frac{3}{2}$

9) If cosec $A - \cot A = \frac{4}{5}$, then cosec A =

a) $\frac{47}{40}$ b) $\frac{59}{40}$ c) $\frac{51}{40}$ d) $\frac{41}{40}$

10) If $\sin\theta - \cos\theta = 0$, then the value of $(\sin^4\theta + \cos^4\theta)$ is

a) 1 b) $\frac{3}{4}$ c) $\frac{1}{2}$ d) $\frac{1}{4}$

11) $\frac{1+\cot^2 A}{1+\tan^2 A} =$

a) $\tan^2 A$ b) $\sec^2 A$ c) $\text{cosec}^2 A - 1$ d) $1 - \sin^2 A$

12) The value of $\cos 0^\circ \cos 1^\circ \cos 2^\circ \ldots\ldots \cos 90^\circ$ is

a) 1 b) -1 c) 0 d) $1/\sqrt{2}$

13) If $x \tan 45^\circ . \sin 30^\circ = \cos 30^\circ . \tan 30^\circ$ then x is equal to

a) $\sqrt{3}$ b) $1/2$ c) $1/\sqrt{3}$ d) 1

14) sin 2B = 2 sin B is true then the value of B is

a) 90° b) 60° c) 30° d) 0°

15) If A & $(2A - 45^\circ)$ are acute angles such that $\sin A = \cos(2A - 45^\circ)$ then tan A is equal to

a) 0° b) $1/\sqrt{3}$ c) 1 d) $\sqrt{3}$

16) If $x = a\cos 0^\circ$ & $y = b\sin 0^\circ$ then $b^2x^2 + a^2y^2 =$

a) ab b) $b^2 + a^2$ c) a^2b^2 d) a^4b^4

Q. 8, 9, 10 (From L : 7 - Co-ordinate Geometry) **For 1 mark**

1) A triangle with vertices (4, 0), (– 1, – 1) and (3, 5) is a/an
a) equilateral triangle b) right-angled triangle
c) isosceles right-angled triangle d) none of these

2) The points (– 4, 0), (4, 0) and (0, 3) are the vertices of a/an
a) right triangle b) isosceles triangle
c) equilateral triangle d) scalene triangle

3) A circle drawn with origin as the centre passes through $\left(\frac{13}{2}, 0\right)$. The point which does not lie in the interior of the circle is

a) $\left(-\frac{3}{4}, 1\right)$ b) $\left(2, \frac{7}{3}\right)$ c) $\left(5, -\frac{1}{2}\right)$ d) $\left(-6, \frac{5}{2}\right)$

4) If the distance between the points (4, p) and (1, 0) is 5 units, then the value of p is
a) 4 only b) ± 4 c) -4 only d) 0

5) The perimeter of a triangle with vertices (0, 4), (0, 0) and (3, 0) is
a) 5 b) 12 c) 11 d) $7 + \sqrt{5}$

6) If P(1, 2), Q(4, 6), R(5, 7) and S(a, b) are the vertices of a parallelogram PQRS, then
a) a = 2, b = 4 b) a = 3, b = 4 c) a = 2, b = 3 d) a = 3, b = 5

7) The point P which divides the line segment joining the points A(2,−5) and B(5,2) in the ratio 2 : 3 lies in the quadrant
a) I b) II c) III d) IV

8) The area (in square units) of the triangle formed by the points A(a, 0), O(0, 0) and B(0, b) is
a) ab b) $\frac{1}{2}ab$ c) $\frac{1}{2}a^2b^2$ d) $\frac{1}{2}b^2$

9) Find the ordinate of a point whose abscissa is 10 and which is at distance of 10 units from points $P(2,-3)$
a) 3 b) -9 c) both a or b c) none of these

10) The distance at point (h, k) from x- axis is
a) h b) k c) |h| d) |k|

11) Distance of the point (4, 9) from x-axis is half it's distance from y-axis, then a =
a) 2 b) 8 c) 4 d) 6

12) The end points of diameter of circle are $(2,4)$ and $(-3,-1)$. The radius of circle is
a) $\frac{5\sqrt{2}}{2}$ b) $5\sqrt{2}$ c) $3\sqrt{2}$ d) $\pm\frac{5\sqrt{2}}{2}$

13) What point on x-axis is equidistant from A(7,6), B(−3,4)
a) (0, 4) b) (−4,0) c) (3, 0) d) (0, 3)

Q.11 - Q. 15 Fill in the blanks :- For 1 mark

Q.11 - (From L : 13 - Surface Area & Volume)

1) The length of diagonal of cube that can be inscribed in a sphere of radius 7.5 cm is _____.
2) If the heights of two cylinder are equal and their radii are in the ratio 7 : 5 then the ratio of their volumes is ____.
3) The volume and surface area of a sphere are numerically equal, then the radius of the sphere is _____ units.
4) If the volume of a cube is 64 cm^3, then the surface area is _____.
5) The volume of a cube with diagonal d is _____.
6) The total surface area of a cone whose radius is 2r and height is h/2 _____.
7) The radii of the bases of two right circular solid cone of same height are r1 r2, respectively. If both cones are melted and recasted into a solid sphere of radius R then the height of each cone is _____.
8) The circumference of a circle is equal to the sum of the circumference of two circles having diameter 34 & 28 cm. The radius of new circle is _____.
9) The longest diameter of a cone which can be fully fitted in a cube of edge 8 cm is _____.
10) If a semi-circle is rolled along a diameter, then the figure formed is _____.
11) If a cylinder is filled with water and spherical ball of radius r is dropped into the cylinder , the quantity of water spread out _____.

Q.12 - (From L : 2 - Polynomial)

1) If α & β are the zero of the quadratic polynomial ax^2+bx+c then $\alpha+\beta=\frac{-b}{\text{.....}}$ _____ and $\alpha\beta=\frac{c}{\text{....}}$

2) A quadratic polynomial can have at most 2 zeroes and cubic polynomial can have at most _____ zeroes.

3) If α, β, γ are the zeroes of the cubic polynomial $ax^3 + bx^2 + cx + d = 0$ then $\alpha + \beta + \gamma = \frac{-b}{\ldots\ldots}$.

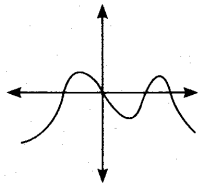
4) In polynomial p(x) , if the curve intersect the x-axis at three points, then number of zeros are _____.

5) The graph of linear polynomial is always a _____.

6) If graph of the polynomial p(x) does not intersect x-axis then the number of zeroes is _____.

7) Sum of zeroes of $2x^2 - 8x + 6$ is _____.

8) The no of zeroes in the given graph is _____.



9) If the product of the zeroes of $x^2 - 3kx + 2k^2 - 1$ is 7, then values of k are _____ and _____.

10) If zeroes of $p(x) = 2x^2 - 7x + k$ are reciprocal of each other, then value of k is _____.

11) The value of m, in order that $x^2 - mx - 2$ is the quotient when $x^3 + 3x^2 - 4$ is divided by $x + 2$ is _____.

12) If one factor of $x^3 + 7kx^2 - 4kx + 12$ is $(x + 3)$, then the value of k is _____.

Q.13 - (From L : 6 - Triangle) **For 1 mark**

1) If the areas of two similer triangles are equal then they are _____.

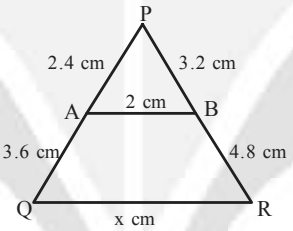
2) If D is a point on the side AB of Δ ABC such that AD : DB = 5 : 2 and E is a point on BC such that DE || AC the ratio of the areas of Δ ABC & Δ DBE is _____.

3) "If a line drawn parallel to one side of a triangle intersect the other two sides in distinct points , then the other two sides are divided in the same ratio" This statement is known as _____.

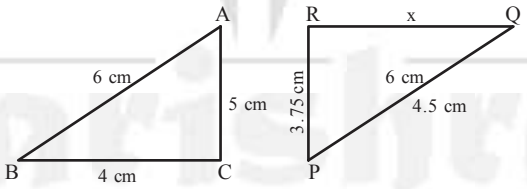
4) Ratio of the perimeter of two similar triangles is the same as the ratio of their _____.

5) If Δ ABC ~ Δ PQR, then $\angle$B is equal to _____.

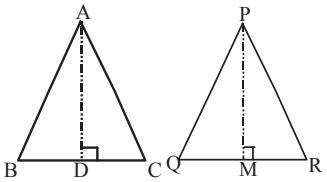
6) In the given figure,value of x (in cm) is _____.



7) In the given figure , if Δ ABC ~ Δ PQR The value of x is



8) Δ ABC ~ Δ PQR. Area of $\Delta ABC = 81\,cm^2$ and area of $\Delta PQR = 121\,cm^2$.
If altitude AD = 9 cm, then PM =



9) In $\Delta ABC, AB = 6\sqrt{3}$ cm, AC = 12 cm and BC = 6 cm. The angle B is _____.

10) The sides of a triangle are 30, 70 and 80 units. If an altitude is droped upon the side of length 80 units, the larger segment cut off on this side is _____.

Q.14 - (From L : 5 - Arithmetic Progressions) **For 1 mark**

1) Sum of natural numbers from 1 to 100 _____.
2) In an AP, if a = 3.5, d = 0, n = 101 then a_n = _____.
3) In an AP $-10, -6, -2, 2$ .....the first term (a) = _____ and common diff (d) = _____.
4) If $p-1, p+3, 3p-1$ are in AP, then p is equal to _____.
5) The next term of the AP $\sqrt{18}, \sqrt{50}, \sqrt{98}$ is _____
6) The common difference of the AP $\frac{1}{p}, \frac{1-p}{p}, \frac{1-2p}{p}$ is _____.
7) If the first term of an AP is 2 and common difference is 4, then sum of its first 40 terms is _____.
8) Three numbers in an AP have sum 24. Its middle term is _____.
9) The value of the expression $1-6+2-7+3-8+....$ to 100 terms is _____.
10) If sum of first n terms of an AP is $2n^2+5n$. Then S_{20} _____.
11) Three terms are in AP. If two terms are, $(a-d)$, a then the next term will be _____.
12) An AP consist of four terms. Two extream terms are $(a-3d)$ & $(a+3d)$ then two mean terms are _____.

Q.15 - (From L : 15 - Probability) **For 1 mark**

1) A dice is thrown once, the probability of getting prime no is _____.
2) p(E) = 0.05, then probability of "not E" is _____.
3) Someone is asked to select a number from 1 to 100. The probability that it is a prime is _____.
4) The probability of getting 101 marks out of 100 marks is _____.
5) The probability of getting a face card from a pack of cards is _____.
6) Sum of probabilities of all the elementary events is always _____.
7) The sum of the probabilities of happening of an event and not happening of an event is equal to _____.
8) In throwing of a die, the probability of getting multiple of 7 is _____.
9) The probability of getting same number on both dice, when two dice is thrown _____.
10) The probability that a non leap year has 53 Mondays is _____.
11) The maximum probability of any event is _____.
12) If the probability of an event is zero then it is called as _____ event

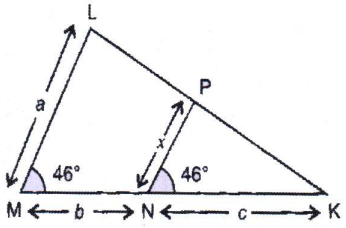
Q.16 - (From L : 1 - Real Number) **For 1 mark**

1) Find the LCM of smallest prime and smallest odd composite natural number.
2) The HCF of two numbers is 145 and their LCM is 2175. If one number is 725, then find the other number.
3) Can two numbers have 18 as their HCF and 380 as their LCM ? Give reason.
4) If a and b are two positive integers such that a = 14b. Find the HCF of a and b.
5) Explain why $(7\times13\times11)+11$ and $(7\times6\times5\times4\times3\times2\times1)+3$ are composite numbers.
6) Find the smallest natural number by which 1,200 should be multiplied so that the square root of the product is a rational number.

Q.17 - (From L : 6 - Triangles) **For 1 mark**

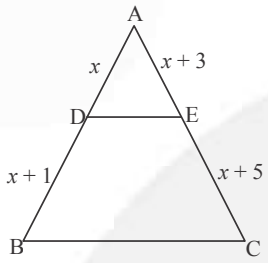
1) In Δ ABC, D and E are points on sides AB and AC respectively such that DE || BC and AD : DB = 3 : 1. If EA = 6.6 cm then find AC.

2) In fig. $\angle M = \angle N = 46^\circ$, express x in in terms of a, b and c, where a, b and c are lengths of LM, MN and NK respectively.



3) The perimeter of two similar triangles ABC and LMN are 60 cm and 48 cm respectively. If LM = 8 cm, then what is the length of AB ?

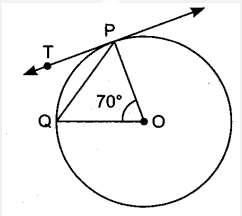
4) In Δ ABC, DE || BC, find the value of x.



5) Find the altitude of an equilateral triangle when each of its side is 'a' cm.

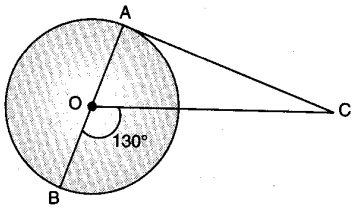
Q.18 - (From L : 10 - Circles) **For 1 mark**

1) In the given Fig. O is the centre of the circle, PQ is a chord and PT is tangent to the circle at P. $\angle POQ = 70^\circ$, find $\angle TPQ$.



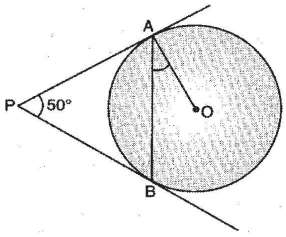
2) If the angle between two tangents drawn from an external point P to a circle of radius a and centre O, is 60°, then find the length of OP.

3) In the given figure, AOB is a diameter of the circle with centre O and AC is a tangent to the circle at A. If $\angle BOC = 130^\circ$, then $\angle ACO$.



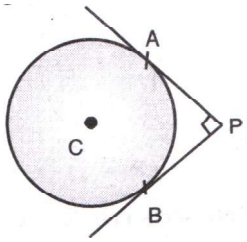
4) If PQ and PR are two tangents to a circle with centre O. If $\angle QPR = 46^\circ$. find $\angle QOR$.

5) In fig., PA and PB are tangents to the circle with centre O such that $\angle APB = 50^\circ$, Write the measure of $\angle OAB$.



6) What is the length of the tangent drawn from a point 8 cm away from the centre of a circle of radius 6 cm ?

7) In Fig., PA and PB are two tangent drawn from an external point P to a circle with centre C and radius 4 cm. If $PA \perp PB$, then find the length of each tangent.



Q.19 - (From L : 5 - AP) **For 1 mark**

1) In an A.P., if the common difference $(d) = -4$ and the seventh term (a_7) is 4, then find the first term.

2) Which term of the AP 21, 18, 15, ... , is zero ?

3) What is the common difference of an A.P. in which $a_{21} - a_7 = 84$?

4) If the sum of first m terms of an AP is $2m^2 + 3m$, then what is its second term ?

5) Find the sum of first ten multiples of 5.

6) If the sum of n terms of an A.P. is $2n^2 + 5n$, then find the 4th term.

7) The numbers 28, 22, x, y, 4 are in AP. Find x & y.

Q.20 - (From L : 4 - Quadratic Equations) **For 1 mark**

1) If $x = 3$ is one root of the quadratic equation $x^2 - 2kx - 6 = 0$, then find the value of k.

2) Write the nature of roots of quadratic equation $4x^2 + 4\sqrt{3}\,x + 3 = 0$.

3) Find the roots of the quadratic equation , $x^2 - 9x + 20 = 0$ by factorisation ?

4) Find the positive root of $\sqrt{3x^2 + 6} = 9$.

5) Find the values of k for which the quadratic equation $9x^2 - 3kx + k = 0$ has equal roots.

6) Find a if $a - 3 = \frac{10}{a}$.

Section - B

Q.21 - (From L : 5 - Arithmetic Progressions) **For 2 mark**

1) Find the 37th term of the A.P. $\sqrt{x}, 3\sqrt{x}, 5\sqrt{x}, ...$

2) Find the 7th term from the end of A.P. 7, 10, 13,..... 184.

3) The fourth term of an A.P. is 11. The sum of the fifth and seventh terms of the A.P. is 34. Find the common difference.

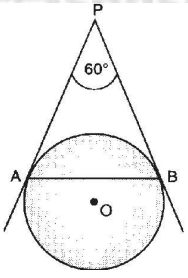
4) Find the values of a, b and c, such that the numbers a, 10, b, c, 31 are in A.P.

5) If the sum of n terms of an A.P. is $2n^2 + 5n$, then find the 4th term.

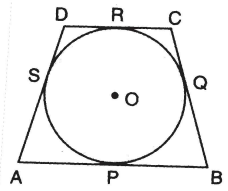
Q.22 - (From L : 10 - Circles) **For 2 mark**

1) Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of larger circle (in cm) which touches the smaller circle.

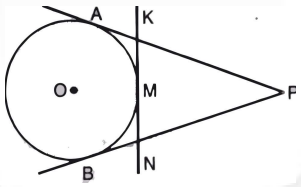
2) In Fig.., AP and BP are tangents to a circle with centre O, such that AP = 5 cm and $\angle APB = 60^\circ$. Find the length of chord AB.



3) In Fig. a quadrilateral ABCD is drawn to circumscribe a circle, with centre O, in such way that the sides AB, BC, CD and DA touch the circle at the points P, Q, R and S respectively. Prove that AB + CD = BC + DA.



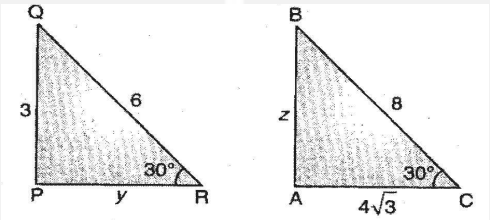
4) PA and PB are tangents from point P to the circle with centre O as shown in figure. At point M, a tangent is drawn cutting PA at K and PB at N. Prove that KN = AK + BN.



5) Prove that tangents drawn at the ends of a diameter of a circle are parallel.

Q.23 (From L : 6 - Triangles) **For 2 mark**

1) In the given figure $\Delta ABC \sim \Delta PQR$. Find the value of y + z.



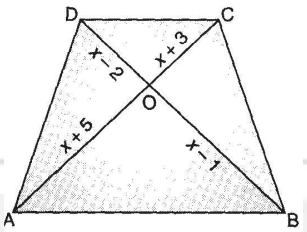
2) In an equilateral triangle of side 24 cm, find the length of the altitude.

3) Let $\Delta ABC \sim \Delta DEF$. If ar $(\Delta ABC) = 100\,cm^2$, $ar(\Delta DEF) = 196\,cm^2$ and DE = 7 , then find AB.

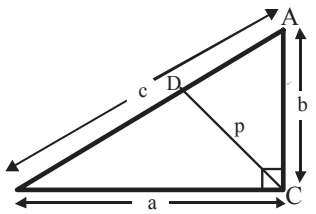
4) ABCD is a trapezium in which AB | | DC and its diagonals intersect each other at the point O.

Show that $\frac{AO}{BO} = \frac{CO}{DO}$.

5) In the given figure, if AB | | DC, find the value of *x*.



6) ABC is a right triangle right angled at C, Let BC = a, CA = b, AB = c and p be the length of perpendicular from C to AB. Prove that cp = ab.



7) ABC is an isosceles triangle right-angled at C. Prove that $AB^2 = 2AC^2$

Q.24 (From L : 9 - Height & Distance) : For 2 mark

1) A kite is flying at a height of 90 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 60°. Find the length of the string assuming that there is no slack in the string.
2) The angle of elevation of the top of a tower from a point on the ground , which is 30 m away from the foot of the tower is 30°. Find the height of the tower.
3) An observe 1.5 m tall is 28.5 m away from a tower 30 m high. Find the angle of elevation of the top of the tower from his eye.
4) The angle of depression of a car parked on the road from the top of a 150 m high tower is 30°. Find the distance of the car from the tower (in m).
5) A tree breaks due to storm and the broken part bends so that the top of the tree touches the ground making an angle 30° with it. The distance between the foot of the tree to the point where the top touches the ground is 8 m. Find the height of the tree.

Q.25 (From L : 15 - Probability) : For 2 mark

1) A bag contains 5 red, 8 green and 7 white balls. One ball is drawn at random from the bag, find the probability of getting :
   i) not a white ball ii) neither a green nor a red ball.
2) Harpreet tosses two diferent coins simultaneously. What is the probability that she gets :
   i) atleast one head ? ii) one head and one tail ?
3) A box contains cards numbered 11 to 123. A card is drawn at random from the box. Find the probability that the number of the drawn card is
   i) A perfect Square number ii) A multiple of 7
4) A bag contains 15 white and some black balls. If the probability of drawing a black ball from the bag is thrice that of drawing a white ball, find the number of black balls in the bag.
5) One card is drawn from a well shuffled deck of 52 cards. Find the probability of getting :
   i) a non face card ii) a black king
6) A game consists of tossing a one-rupee coin three times and noting its outcome each time. Find the probability of getting :
   i) three heads ii) at least two tails

Q.26 (From L : 13 - Surface Areas & Volume) : For 2 mark

1) A cylinder and a cone have base radii 5 cm and 3 cm respectively and their respective heights are 4 cm and 8 cm. Find the ratio of their volumes.
2) A sphere of maximum volume is cut out from a solid hemisphere of radius 6 cm. Find the volume of the cut out sphere.
3) A right circular cone of radius 3 cm, has a curved surface area of 47.1 cm^2. Find the volume of the cone. (Use $\pi = 3.14$)
4) Metallic spheres of radii 6 cm, 8 cm and 10 cm respectively, are melted to form a single solid sphere. Find the radius of the resulting sphere.
5) A glass cylinder with diameter 20 cm has water to a height of 9 cm. A metal cube of 8 cm edge is immersed in it completely. Calculate the height by which water will rise in the cylinder. $\left[\text{Use } \pi = \frac{22}{7}\right]$
6) A circus tent is cylindrical upto a height of 3 m and conical above it. If the diameter of the base is 105 m and the slant height of the conical part is 53 m, find the total canvas used in making the tent.

Section - C

[3 Marks]

Q.27 (From L : 1 - Real Numbers) : **For 3 mark**

1) Show that the square of any positive integer is of the form 3m or, 3m + 1 for some integer m.
2) If the HCF of 210 and 55 is expressible in the form $210 \times 5 + 55y$, find y.
3) In a seminar, the number of participants in Hindi, English and Mathematics are 60, 84 and 108, respectively. Find the minimum number of rooms required if in each room the same number of participants are to be seated and all of the them being in the same subject.
4) Find the greatest number which divides 285 and 1249 leaving remainders 9 and 7 respectively.
5) Prove that $\sqrt{5}$ is an irrational number.

Q.28 (From L : 5 - Arithmatic Progression) : **For 3 mark**

1) If the 8^{th} term of an A.P. is 31 and the 15^{th} term is 16 more than the 11^{th} term, find the A.P.
2) The sum of 5^{th} and 9^{th} terms of an A.P. is 72 and the sum of 7^{th} and 12^{th} terms is 97. Find the A.P.
3) If five times the fifth term of an A.P. is equal to 8 times its eighth term, show that its 13^{th} term is zero.
4) The sum of three numbers in A.P. is -3, and their product is 8. Find the numbers.
5) The sum of first six terms of an arithmetic progression is 42. The ratio of its 10th term to its 30th term is 1 : 3. Calculate the first and the thirteenth term of the A.P.
6) Ramkali would need ₹ 1800 for admission fee and books etc., for her daughter to start going to school from next year. She saved ₹ 50 in the first month of this year and increaseed her monthly saving by ₹ 20. After a year, how much money will she save ? Will she be able to fulfil her dream of sending her daughter to school ?

Q.29 (From L : 3 -Linear Equations in Two Variables) : **For 3 mark**

1) Solve for x and y :

$$\frac{6}{x-1} - \frac{3}{y-2} = 1$$

$$\frac{5}{x-1} - \frac{1}{y-2} = 2, \text{ Where } x \neq 1, y \neq 2$$

2) For what value of k , will the following system of equations have infinitely many solutions ?

$$2x + 3y = 4$$

$$(k+2)x + 6y = 3k + 2$$

3) A fraction becomes $\frac{1}{3}$, when 1 is subtracted from the numerator and it becomes $\frac{1}{4}$, when 8 is added to its denominator. Find the fraction.
4) The sum of a two-digit number and the number obtained by reversing the order of its digits is 165. If the digits differ by 3, find the number.
5) Ten years ago, father was twelve times as old as his son and ten years hence, he will be twice as old as his son will be. Find their present ages.
6) 2 men and 7 boys can do a piece of work in 4 days. It is done by 4 men and 4 boys in 3 days. How long would it take for one man or one boy to do it ?

Q.30 (From L : 2 - Polynomials) : **For 3 mark**

1) Find the zeroes of the quadratic polynomial $5x^2 + 8x - 4$ and verify the relationship between the zeroes and the coefficients of the polynomial.
2) Quadratic polynomial $2x^2 - 3x + 1$ has zeroes as α and β. Now form a quadratic polynomial whose zeroes are 3α and 3β .
3) If one of the zero of a polynomial $3x^2 - 8x + 2k + 1$ is seven times the other, find the value of k.
4) Find all the zeroes of the polynomial $f(x) = 2x^4 - 3x^3 - 3x^2 + 6x - 2$. if two of its zeros are $\sqrt{2}$ and $-\sqrt{2}$.
5) On dividing the polynomial $f(x) = x^3 - 3x^2 + x + 2$ by a polynomial g(x), the quotient q (x) and remainder

r(x) where $q(x) = x - 2$ and $r(x) = -2x + 4$ respectively. Find the polynomial g(x).

6) If sum of the squares of zeros of the quadratic polynomial $f(x) = x^2 - 8x + k$ is 40, find the value of k.

Q.31 (From L : 7 - Co-ordinate Geometry) : For 3 mark

1) Find the co-ordinate of a point P on the line segment joining A(1, 2) and B(6, 7) such that $AP = \frac{2}{5}AB$.

2) Find the ratio in which the line segment joining the points $A(3,-3)$ and $B(-2,7)$ is divided by x-axis. Also find the co-ordinates of point of division.

3) Find the ratio in which the line $2x + 3y - 5 = 0$ divides the line segment joining the points $(8,-9)$ and $(2,1)$. Also find the co-ordinates of the point of division.

4) Find the area of the rhombus of vertices (3, 0), (4, 5), $(-1, 4)$ and $(-2, -1)$ taken in order.

5) Prove that the points $(2, -2)$, $(-2, 1)$ and (5, 2) are the vertices of a right angled triangle. Also find the area of this triangle.

6) Find the area of the triangle PQR with Q(3, 2) and mid-points of the sides throught Q being $(2, -1)$ and (1, 2).

Q.32 (From L : 8 - Trigonometry) : For 3 mark

1) Evaluate the following : $\frac{\sec^2(90^\circ - \theta) - \cot^2\theta}{2(\sin^2 25^\circ + \sin^2 65^\circ)} - \frac{2\cos^2 60^\circ \tan^2 28^\circ \tan^2 62^\circ}{3(\sec^2 43^\circ - \cot^2 47^\circ)}$

2) If A, B, C are the interior angles of a triangle ABC, prove that : $\tan\frac{B+C}{2} = \cot\frac{A}{2}$.

3) If $\sin(A + B) = 1$ and $\cos(A - B) = \frac{\sqrt{3}}{2}, 0^\circ < A + B \le 90^\circ, A > B$ then find A and B.

4) A rhombus of side 20 cm has two angles of 60° each. Find the length of the diagonals.

5) Prove that : $\frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A} = \sin A + \cos A$.

6) Prove that : $(\cot\theta - \operatorname{cosec}\theta)^2 = \frac{1 - \cos\theta}{1 + \cos\theta}$

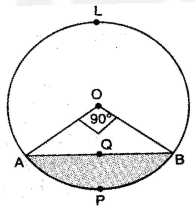
7) Prove that : $(\operatorname{cosec}\theta - \sin\theta)(\sec\theta - \cos\theta)(\tan\theta + \cot\theta) = 1$

Q.33 (From L : 12 - Areas Related to Circles) : For 3 mark

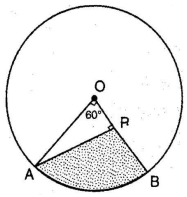
1) A wire when bent in the form of an equilateral triangle encloses an area of $121\sqrt{3}$ cm^2. If the wire is bent in the form a circle, find the area enclosed by the circle, $\left(\text{Use } \pi = \frac{22}{7}\right)$

2) 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.

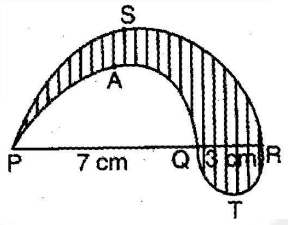
3) In the given figure, a chord AB of the circle with centre O and radius 10 cm, that subtends a right angle at the centre of the circle. Find the area of the minor segment AQBP. Hence find the area of major segment.



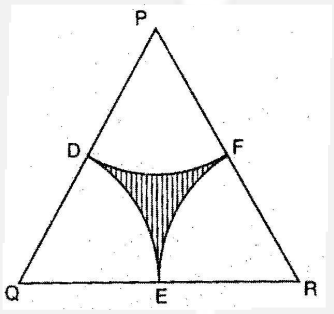
4) In the given figure, AOB is a sector of angle 60° of a circle with centre O and radius 17 cm. It $AP \perp OB$ and AP = 15 cm, find the area of the shaded region.



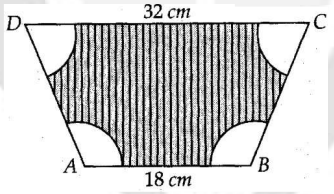
5) In the fig., PSR, RTQ and PAQ are three semicircles of diameters 10 cm, 3 cm and 7 cm respectively. Find the perimeter of shaded region $\left(\text{Use } \pi = \frac{22}{7}\right)$



6) In the give figure, ΔPQR is an equilateral triangle of side 8 cm and D, E, F are centres of circular arcs, each of radius 4 cm. Find the area of shaded region. $(\text{Use } \pi = 3.14 \text{ and } \sqrt{3} = 1.732)$



7) In the given figure ABCD is a trapezium whith AB | | DC, AB = 18 cm and DC = 32 cm and the distance between AB and AC is 14 cm. If arcs of equal radii 7 cm taking A, B, C and D have been drawn, then find the area of the shaded region.



Q.34 (From L : 14 - Statistics) : For 3 mark

1) The mean of the following distribution is 48 and sum of the all the frequencies is 50. Find the missing frequencies *x* and *y*.

Class	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70
Frequency	8	6	*x*	11	*y*

2) Following frequency distribution show the daily expenditure on milk of 30 households in a locality :

Daily expenditure on milk (in ₹)	0 - 30	30 - 60	60 - 90	90 - 120	120 - 150
Number of households	5	6	9	6	4

Find mode for above data.

3) If the median of the following data is 240, then find the value of f :

Class	0 - 100	100 - 200	200 - 300	300 - 400	400 - 500	500 - 600	600 - 700
Frequency	15	17	f	12	9	5	2

4) The following table shows the weights (in gms) of a sample of 100 apples, taken from a large consignment :

Weight (in gms)	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100	100 - 110	110 - 120	120 - 130
No. of Apples	8	10	12	16	18	14	12	10

Find the median weight of apples.

5) The given distribution show the number of runs scored by the batsman in inter-school cricket matches :

Runs scored	0 - 50	50 - 100	100 - 150	150 - 200	200 - 250
Number of batsmen	4	6	9	7	5

Draw a 'more than type' ogive for the above data.

6) Draw an ogive and the cumulative frequency polygon for the following frequency distribution by less than method.

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
Number of batsmen	7	10	23	51	6	3

7) Find the median of the following observation.

Daily income (in Rs.)	**Number of workers**
Less than 120	12
Less than 140	26
Less than 160	34
Less than 180	40
Less than 200	50

Section - D

Q. 35. (From L : 11 - Construction) **For 4 marks**

1) Draw an equilateral ΔABC of each side 4 cm. Construct a triangle similar to it and of scale factor $\frac{3}{5}$. Is the new triangle also an equilateral ?

2) Construct a triangle similar to a given ΔABC such that each of its sides is $\frac{2}{3}$rd of the corresponding sides of ΔABC . It is given that $AB = 4$ cm, $BC = 5$ cm and $AC = 6$ cm.

3) Draw a ΔABC with side $BC = 7$ cm, $\angle B = 45°$ and $\angle A = 105°$. Then, construct another triangle whose sides are $\frac{3}{4}$ times the corresponding sides of ΔABC

4) Construct a right angled ΔABC , right-angled at B such that $BC = 6$ cm and $\angle BCA = 30°$. Construct another triangle whose sides are $\frac{5}{4}$ times the corresponding sides of the given triangle.

5) Draw a right angled triangle, in which sides (other than hypotenuse) are of lengths 8 cm and 6 cm. Then, construct another triangle whose sides are $\frac{4}{3}$ times the corresponding sides of the given triangle.

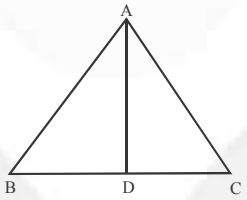
6) Construct a pair of tangents to circle whose radius is 6.5 cm are inclined to each other at angle of 30^o.

7) Construct a ΔABC in which AB = 5 cm, $\angle B = 60^0$, altitude CD = 3 cm. Construct a ΔAQR similar to ΔABC such that side of ΔAQR is 1.5 times that of the correspoinding sides of ΔABC.

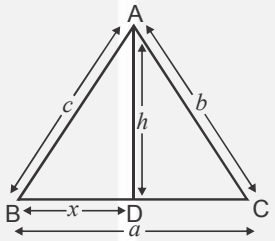
8) Draw a line segment AB of length 8 cm. Taking A as centre, draw a circle of radius 4 cm and taking B as centre, draw another circle of radius 3 cm. Construct tangents to each circle from the centre of the other circle.

Q. 36 (From L : 6 - Triangles) **For 4 marks**

1) Basic Proportionality Theorem
2) Theorem on Areas of Similar Triangles
3) Pythagoras Theorem
4) Converse of Pythagoras Theorem
5) Prove that the tangent drawn to a circle is perpendicular to radius at the point of contact.
6) Prove that the length of tangents drawn to a circle from an external point are equal.
7) In a right angled ΔABC, right angled at C, P and Q are the points on the sides CA and CB respectively which divide these sides in the ratio 2 : 1. Prove that (a) $9BP^2 = 9BC^2 + 4AC^2$ (b) $9(AQ^2 + BP^2) = 13AB^2$
8) In the figure, ΔABC is drawn such that $AD \perp BC$, then show that $AC^2 = AB^2 + BC^2 - 2BC.BD$.

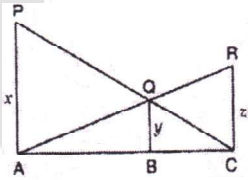


9) In the given figure, $\angle B < 90°$ and segment $AD \perp BC$.
Show that (a) $b^2 = h^2 + a^2 + x^2 - 2ax$ (b) $b^2 = a^2 + c^2 - 2ax$



10) ΔABC is a right triangle in which $\angle C = 90°$ and $CD \perp AB$. If $BC = a$, $CA = b$, $AB = c$ and $CD = p$, then prove that (a) $cp = ab$ (b) $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$.

11) In Fig. PA, QB and RC are each perpendicular to AC.
Prove that $\frac{1}{x} + \frac{1}{z} = \frac{1}{y}$.



Q. 37 (From L : 4 - Quadratic Eqns.) **For 4 marks**

1) The area of a right angled triangle is 480 cm^2. If the base of the triangle is 8 cm more than twice the height (altitude) of the triangle, then find the sides of the triangle.
2) Some students planned a picnic. The total budget for food was ₹.2000. But 5 students failed to attend the picnic and thus the cost of food for each member increased by ₹.20. How many students attended the picnic and how much did each student pay for the food ?
3) In a flight of 600 km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/h and the time of flight increased by 30 min. Find the duration of the flight.
4) A motor boat whose speed is 24 km/h in still water takes 1 h more to go 32 km upstream than to return downstream to the same spot. Find the speed of the stream.
5) Two pipes running together can fill a cistern in $11\frac{1}{9}$ min. If one pipe takes 5 min more than the other to fill it. Find the time in which each pipe would fill the cistern.
6) Had Ajita scored 10 more marks in her Mathematics test out of 30 marks, 9 times these marks would have been the square of her actual marks. How many marks did she get in the test ?
7) A motorboat whose speed in still water is 18 km/h, takes 1 h more to go 24 km upstream than to return downstream to the same spot. Find the speed of the steam.

8) In a group of children, each child gives a gift to every other child. If the number of gifts is 132, then find the number of children.

9) A two-digit number is such that the product of its digit is 35. When 18 is added to the number, the digits interchange their places. Find the number.

10) Twenty seven years hence Sanjay's age will be square of what it was 29 yr ago. Find his present age.

11) In a cricket match. Harbhanjan took three wickets less than twice the number of wickets taken by Zaheer. The product of the numbers of wickets taken by these two is 20. Represent the above situation in the form of a quadratic equation.

12) At t min past 2 pm, the time needed by the minute hand of a clock to show 3 pm was found to be 3 min less than $\frac{t^2}{4}$ min. Find t.

13) Three consecutive natural numbers are such that the square of the middle number exceeds the difference of the squares of other two by 60. Find the numbers.

14) Solve for x : $\frac{1}{a+b+x} = \frac{1}{a} + \frac{1}{b} + \frac{1}{x}$, where a, b, x $\neq$ 0 and a + b + x $\neq$ 0.

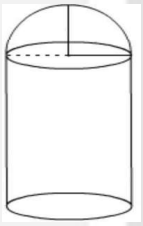
Q. 38 (From L : 13 - Surf. Area and Vol.) **For 4 marks**

1) A solid cone of base radius 10 cm is cut into two parts through the mid-point of its height by a plane parallel to its base. Find the ratio of the volumes of the two parts of the cone.

2) From a circular cylinder of diameter 10 cm and height 12 cm, a conical cavity of the same base radius and of the same height is hollowed out. Find the volume of the remaining solid. (take, $\pi = 3.14$) .

3) A wooden article was made by scooping out a hemisphere from one face of a cubical wooden block. If each edge of cube is 10 cm and diameter of base of hemisphere is 7 cm, then find the volume of wooden article.

4) A building is in the form of a cylinder surmounted by a hemispherical dome (see the figure). The base diameter of the dome is equal to $\frac{2}{3}$ of the total height of the building. Find the height of the building, if it contains 67 $\frac{1}{21}$ m^3 of air.



5) A tank is 225 m long, 162 m broad. With what velocity per second must water flow into it through an aperture 60 cm by 45 cm that the level may be raised by 20 cm in 5 h ?

6) A hollow cone is cut by a plane parallel to the base and upper part is removed to make a Turkish cap. If the curved surface area of the remainder is $\frac{24}{25}$ of the curved surface area of the whole cone, then find the ratio of the line segments into which the cone's height is divided by the plane from which the cut is made.

7) A well of diameter 3 m is dug 14 m deep. The Earth taken out of it has been spread evenly all around it in the shape of a circular ring of width 4 m to form an embankment. Find the height of the embankment.

8) A right circular cone is divided by a plane parallel to its base into small cone to volume V_1 at the top and a frustum of volume V_2 as second part at the bottom, If $V_1 : V_2 = 1 : 3$, then find the ratio of the height of the altitude of small cone and that of frustum.

m

9) An open container made up of a metal sheet in the form of frustum of a cone of height 8 cm with radii of its lower and upper ends as 4 cm and 10 cm, respectively. Find the cost of oil which can completely filled the container at the rate of ₹ 50 per L. Also, find the cost of metal used, if it costs ₹ 50 per 100 cm^2.

10) A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 4 cm and the diameter of the base is 8 cm. Determine the volume of the toy. If a cube circumscribes the toy, then find the difference of the volumes of cube and the toy. Also, find the total surface area of the toy.

11) A cylindrical bucket, 32 cm high and with radius of base 18 cm, is filled with sand. This bucket is emptied on the ground and a conical heap of sand is formed. If the height of the conical heap is 24 cm, find the radius and slant height of the heap.

Q. 39 (From L : 9 - Appl. of Trig.) **For 4 marks**

1) The shadow of a flag staff is three times as long as the shadow of the flag staff, when the Sun rays meet the ground at an angle of 60^o. Find the angle between the Sun rays and the ground at the time of longer shadow.

2) From the top of a tower of height 50 m, the angles of depression of the top and bottom of a pole are 30^o and 45^o, respectively. Find (a) how far the pole is from the bottom of the tower. (b) the height of the pole. (take, $\sqrt{3} = 1.732$) .

3) The angle of elevation of an aeroplane from a point on the ground is 45^o. After flying for 15 s, the angle of elevation changes to 30^o. If the aeroplane is flying at a constant height of 2500 m, then find the average speed of the aeroplane.

4) A balloon is connected to an electric pole. It is inclined at 60^o to the horizontal by a cable of lenght 215 m. Determine the height of the balloon from the ground. Also, find the height of balloon, if the angle of inclination is changed from 60^o to 30^o.

5) A statue 1.46 m tall is standing on the top of a pedestal. From a point on the ground, the angle of elevation of the top of the statue is 60^o and from the same point, the angle of elevation of the top of the pedestal is 45^o. Find the height of pedestal. (take, $\sqrt{3} = 1.732$) .

6) 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^o. The bird flies away from the point of observation horizontally and remains at a constant height. After 2 s, the angle of elevation of the bird from the point of observation becomes 30^o. Find the speed of flying of the bird.

7) A highway leads to the foot of 300 m high tower. An observatory is set at the top of the tower. It sees a car moving towards it with an angle of depression of 30^o. After 15 s angle of depression becomes 60^o.
   (a) Find the distance travelled by the car during this time.
   (b) How this observatory is helpful to regulate the traffic on the highway ?

8) There is a small island in the middle of a 100 m wide river and a tall tree stands on the island. P and Q are points directly opposite to each other on two banks and in line with the tree. If the angles of elevation of the top of the tree from P and Q are respectively 30^o and 45^o, then find the height of the tree. (take, $\sqrt{3} = 1.732$) .

9) The angles of elevation of the top of a tower from two points on the ground at a distance a *m* and b *m* from the base of the tower and in the same straight line are complementary. Prove that the height of the tower is $\sqrt{ab}$ m.

10) A vertical tower stands on a horizontal plane and is surmounted by a vertical flag staff of height h. At a point on the plane, the angles of elevation of the bottom and the top of the flag staff are α and β respectively. Prove that the height of the tower is $\left(\frac{h\tan\alpha}{\tan\beta - \tan\alpha}\right)$.

Q. 40 (From L : 14 - Statistics) **For 4 marks**

1) If median of the number of patients attending a hospital is 36, then find the missing frequencies f_1 and f_2 in the following frequency distribution. When it is given that total number of days is 100.

Number of patients	0--10	10--20	20--30	30--40	40--50	50--60	60--70
Number of days	5	12	f_1	f_2	15	11	14

2) If the median of the following distribution is 58 and the sum of all the frequencies is 140. Find the values of x and y.

Variable	15-25	25-35	35-45	45-55	55-65	65-75	75-85	85-95
Frequency	8	10	x	25	40	y	15	7

3) The weights (in kg) of 45 students of a class are given in the following distribution table. Determine the value of weight x which is such that the number of students having weight less than x kg is same as the number of students having weight more than x kg.

Weight (in kg)	Cumulative frequency
Below 45	5
Below 50	11
Below 55	15
Below 60	22
Below 65	38
Below 70	45

4) The following distribution gives the daily income of 60 workers of a factory.

Daily income (in ₹)	Number of workers
300 - 400	6
400 - 500	12
500 - 600	14
600 - 700	10
700 - 800	8
800 - 900	7
900 - 1000	3

Draw a 'more than type' ogive for the above data.

5) Following table shows marks of students.

Marks	No. of the students
Above 0	80
Above 10	77
Above 20	72
Above 30	65
Above 40	55
Above 50	43
Above 60	23
Above 70	16
Above 80	11
Above 90	8
Above 100	0

Draw less than ogive and find the median from the graph.

6) Draw a 'less than type ogive' for the following data.

Marks (Less than)	20	30	40	50	60	70	80	90	100
Number of candidates	0	4	16	30	46	66	82	92	100

Find the median of the data from the graph and verify the result using the formula.

7) The frequency distribution of scores obtained by 53 students in an entrance test is an follows :

Scores	Number of Students
0 -- 10	5
10 -- 20	3
20 -- 30	4
30 -- 40	3
40 -- 50	3
50 -- 60	4
60 -- 70	7
70 -- 80	9
80 -- 90	7
90 -- 100	8

Draw cumulative frequency curves by less than and more than method separately. Also, find the median.

~ 0 ~ 0 ~ 0 ~ 0 ~ 0 ~ 0 ~