

**IMPORTANT QUESTIONS PREPARED FROM 16  
CHAPTER BASED ON THE UPCOMING EXAM IN JUNE**



***IMPORTANT  
QUESTIONS***

**anon's**

**ACADEMY FOR MATHS**

have maths in your path

**MOST IMPORTANT QUESTION**

**CHAPTER 1**

**SETS**

1. Write all subset of the set  $\{3,4,5\}$
2. If A and B are two sets such that  $A \subset B$ , then  $A \cup B$  is
3. The set builder form of  $(6, 12)$
4. Draw the ven diagram for  $B-A$
5. Let  $u = \{1,2,3,4,5,6,7,8\}$ ,  $A = \{2,4,6,8\}$  and  $B = \{2,4,8\}$ 
  - a. Find  $A'$  and  $B'$
  - b. Also find  $(A \cup B)'$
  - c. Verify  $(A \cup B)' = A' \cap B'$
6. In a group of 400 people 250 can speak Hindi 200 can speak English how many people can speak both Hindi and English
7. in a survey of 600 students in a school 150 students were found to be taking tea and 225 taking coffee, 100 were taking both tea and coffee. Find how many students were taking neither tea nor coffee.
8. let  $A = \{x: x \in N, 1 \leq x \leq 5\}$   
 $B = \{2,3,6,9\}$  and  $C = \{1,4,5,8,9,10\}$ 
  - a. find the number of element of A
  - b. Verify  $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
  - c. If X and Y are two sets such that  $n(x) = 17$ ,  $n(Y) = 23$  and  $n(X \cup Y) = 38$  then find  $n(X \cap Y)$

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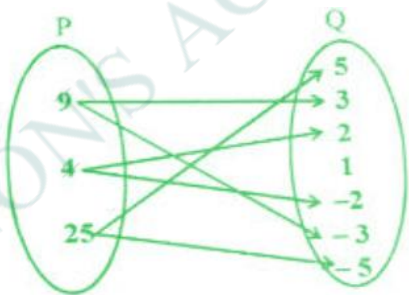
**CHAPTER 2**

**RELATION AND FUNCTIONS**

1. If  $(x + 1, y - 2) = (3, 1)$  find the value of  $x$  and  $y$
2. If  $A = \{-1, 1\}$  find  $A \times A \times$
3. Let  $A = \{1, 2\}$  and  $B = \{3, 4\}$  find the number of relation from  $A$  TO  $B$
4. Determine the domain and range of the relation  $R$  defined by

$$R = \{(x, x + 5) : x \in \{0, 1, 2, 3, 4, 5\}\}$$

5. Find the domain of the function  $f(x) = \frac{x^2 + 3x + 5}{x^2 - 5x + 4}$
6. Sketch the graph of the function, find domain and range
  - a.  $|x + 1|$
  - b.  $-|x|$
  - c.  $|x + 3|$
  - d.  $|x| + 1$
7. The figure shows a relation between the sets  $P$  and  $Q$



- a. Write the relation in set builder form
- b. Write the relation in roster form
- c. Write its domain and range.

8. If  $f(x) = x^3 + 5x$ ,  $g(x) = 2x + 1$ . Then find  $f + g$ ,  $f \cdot g$  and  $f/g$

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**CHAPTER 3**

**TRIGONOMETRIC FUNCTIONS**

1. Find the values of other five trigonometric function  $\sin x = \frac{3}{5}$   $x$  lies in second
2. Find the value of
  - a.  $\sin 765^\circ$
  - b.  $\operatorname{Cosec}(-1410)$
  - c.  $\tan \frac{19\pi}{3}$
  - d.  $\sin 75^\circ$
3. Solve  $\sin 2x - \sin 4x + \sin 6x = 0$
4.  $\cos 4x = 1 - 8\sin^2 x \cos^2 x$
5.  $\frac{\sin 3x + \sin x}{\cos 3x + \cos x} = \tan 2x$
6. The maximum value of the function  $f(x) = \sin x$  is
7. Prove that  $\frac{\tan\left(\frac{\pi}{4}+x\right)}{\tan\left(\frac{\pi}{4}-x\right)} = \left(\frac{1+\tan x}{1-\tan x}\right)^2$
8. **A.  $\sin^2 8x - \sin^2 4x = \sin 12x \sin 4x$**   
**B. For any  $\triangle ABC$ , prove that  $\frac{a+b}{c} = \frac{\cos\left(\frac{A-B}{2}\right)}{\sin\frac{C}{2}}$**

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**CHAPTER 4 PRINCIPLES OF MATHEMATICAL INDUCTION**

1. using principle of mathematical induction prove that

$$p(n): 1 + 3 + 3^2 + \dots + 3^{n-1} = \frac{3^n - 1}{2}$$

2. consider the statement  $p(n): 7^n - 3^n$  is divisible by 4

a. show  $p(1)$  is true

b. verify by using principle of mathematical induction for all  $n \in \mathbb{N}$

3. using principle of mathematical induction prove that

$$\frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots + \frac{1}{2^n} = 1 - \frac{1}{2^n}$$

4. Prove that  $1 \cdot 2 + 2 \cdot 3 + 3 \cdot 4 + \dots + n(n+1) = \frac{n(n+1)(n+2)}{3}$

5. consider the following statement prove that

$$p(n): a + ar + ar^2 + \dots + ar^{n-1} = \frac{a(r^n - 1)}{r - 1}$$

**CHAPTER 5 COMPLEX NUMBERS QUADRATIC EQUATIONS**

1. Express  $a + ib$

a.  $\frac{(2+i)}{(1+i)(1+2i)}$

b.  $\frac{3-\sqrt{-16}}{1-\sqrt{-9}}$

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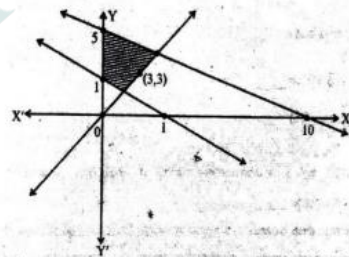
2. Solve the quadratic equation
  - a.  $\sqrt{5}x^2 + x + \sqrt{5} = 0$
  - b.  $ix^2 - x + 12i = 0$
3. Find the multiplicative inverse
  - a.  $4 - 3i$
4. Find the polar form of the complex
  - a.  $\sqrt{3} + i$
  - b.  $1 - i$
5. if  $(a + ib)(c + id)(e + if) = A + iB$ , show that  
 $(a^2 + b^2) + (c^2 + d^2) + (e^2 + f^2) = A^2 + B^2$
6. find the square root of the complex number
  - a.  $-8-6i$
  - b.  $1+i$
7. consider the complex number  $z=1 + i + i^2 + i^4 \dots$ 
  - a. write  $z$  in the form  $a+ib$
  - b. find conjugate of  $z$
  - c.  $z^2$

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**CHAPTER 6**

**LINEAR INEQUALITIES**

1. solve  $\frac{x}{3} > \frac{x}{2} + 1$
2. Solve the following system of inequalities graphically:  
 $x + 2y \leq 8$ ;  $2x + y \leq 8$ ;  $x \geq 0$ ;  $y \geq 0$
3. solve the following system of inequalities graphically  
 $3x + 4y \leq 12$ ;  $x \geq 0$ ;  $y \geq 0$
4. Solve the following system of inequalities graphically.  
 $x - 2y \leq 3$ ;  $3x + 4y \geq 12$ ;  $x \geq 0$ ,  $y \geq 0$
5. Solve  $\frac{3(x-2)}{5} \leq \frac{5(2-x)}{3}$
6. Shaded region in the graph shows solution of a system of linear inequalities. Find the inequalities.





1. Find the value of  $n$ , If  ${}^{2n}C_3 = 11 {}^nC_3$ , find 'n'.
2. Find the number of different 8 letter arrangement that can be made from the letters of the word 'DAUGHTER' so that all vowels occur together.
3. Find the number of ways of choosing 4 cards from a pack of 52 playing cards. How many of these
  - a. Four cards of the same suits?
  - b. Four cards belong to different suits?
  - c. Two cards red cards and two are black cards?
4. In how many ways can the letters of the word, PERMUTATIONS be arranged if:
  - a. the words start with P and end with S?
  - b. there are always 4 letters between P and S?
5. how many 3-digit numbers can be formed from the digits 1,2,3,4 and 5 assuming that
  - a. repetition of the digits is not allowed
  - b. repetition of the digits is allowed
6. how many chords can be drawn through 21 points on a circle
7. A bag contains 5 white, 6 red and 4 blue balls. Determine the number of ways in which 2 white, 3 red and 2 blue balls can be selected
8. If  $\frac{1}{6!} + \frac{1}{7!} = \frac{x}{8!}$  Then x is .....



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**CHAPTER 8**

**BIOMIAL THEOREM**

1. A. write the general term of the expansion of  $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^6$   
B.find the independent OF x in the expansion  $\left(\frac{3x^2}{2} - \frac{1}{3x}\right)^6$
2. find  $(a + b)^4 - (a - b)^4$ . hence evaluate  
 $(\sqrt{3} + \sqrt{2})^4 - (\sqrt{3} - \sqrt{2})^4$
2. expand  $(1 - 2x)^5$
3. find the middle term in the expansion of  $\left(\frac{x}{3} + 9y\right)^{10}$
4. consider the expansion  $\left(\frac{x}{9} + 9y\right)^{2n}$ 
  - a. the number of term in above expansion
  - b. what is the  $(n+1)^{\text{th}}$  term
  - c. if  $n=5$  middle term

**CHAPTER 9**

**SEQUENCE AND SERIES**

1. Insert 6 arithmetic means between 3 and 24
2. Find the sum of odd integer from 1 to 2001
3. Find the sum of the sequence  $7+77+777\dots\dots\dots$
4. The sum of first three terms of a Geometric progression is  $\frac{13}{12}$   
and their product is  $-1$  . Find the common ratio and the terms.

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5. How many terms of the GP  $3, \frac{3}{2}, \frac{3}{4}, \dots$  are needed to give the sum  $\frac{3069}{12}$
6. Find the sum n terms of the series  $1 \times 2 + 2 \times 3 + 3 \times 4 + \dots$
7. Find the sum of all natural numbers lying between 100 and 1000 which are multiples 5

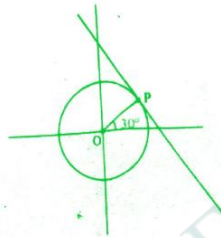
**CHAPTER 10**

**STRAIGHT LINES**

1. Consider the equation  $3x + 4y - 12 = 0$ 
  - a. Reduce the equation in intercept form ‘
  - b. Reduce the equation in slope –intercept form
  - c. Find the slope x-intercept y – intercept of the above equation
2. Consider the points A(-2,6),B(4,8),C(8,12) and D(x, 24)
  - a. Find the slopes AB and CD
  - b. Find the value of x, when AB and CD are parallel
  - c. Find the value of x when AB and CD are perpendicular
3. Convert the equation of the line  $2x - 3y + 6 = 0$  into intercept form

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4. Reduce the equation of the line  $\sqrt{3}x + y - 8 = 0$  into normal form. Find the value of  $p$  and  $\omega$
5. Consider the circle  $x^2 + y^2 = 1$ , given in figure. Let  $OP$  makes an angle  $30^\circ$  with the  $x$  axis



- a. Find the equation of the tangent line to the circle passing through the point  $P$
- b. Find the  $x$  intercept and  $y$  intercept made by the line
- c. Find the equation of the other tangent to the circle parallel to the first one.
6. Consider the straight line  $3x - 4y - 16 = 0$ .
- a. Find the slope of the line
- b. Slope of a line which is perpendicular to the above line
- c. Find the equation of the line passing through  $(-1, 3)$  to this line.
- d. Find the coordinates of the foot of the perpendicular from the point  $(-1, 3)$  to this line.

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**CHAPTER 11**

**CONIC SECTIONS**

1. Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the length of the latus rectum of the ellipse
  - a.  $\frac{x^2}{25} + \frac{y^2}{9} = 1$
  - b.  $100x^2 + 25y^2 = 2500$
  - c.  $\frac{x^2}{25} + \frac{y^2}{100} = 1$
2. Let S and S' foci of the ellipse  $\frac{x^2}{25} + \frac{y^2}{16} = 1$ . Let P be a point on the ellipse, then
  - a. a.  $PS + PS' = \dots\dots\dots$
  - b. b. Find the coordinates of S and S'
  - c. c. Find the length of the latus rectum
3. If an ellipse passing through (3,1) having foci  $(\pm 4, 0)$ , **find**
  - a. The length of major axis
  - b. The standard equation of the ellipse
  - c. The eccentricity and length of the latus rectum
4. Find the area of a triangle formed by the line joining the vertex of parabola  $y^2 = 12x$  to the ends of its latus rectum
5. Equation of the parabola given in the figure is  $y^2 = 8x$ , Find the focus and length of latus rectum of the parabola

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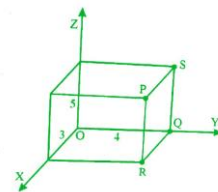
6. Find the coordinates of the focus, axis, the equation of the directrix and the length of the latus rectum of the following parabolas:
- $x^2 = 16y$
  - $y^2 = -8x$
7. Find the equation of the parabola that satisfies the given conditions
- Focus (6, 0); directrix  $x = -6$
  - Vertex (0, 0) passing through (5, 2) and axis is along y-axis.
  - Vertex(0, 0); Focus (0, 2)
8. The line  $x-1=0$  is the directrix of a parabola  $y^2=kx$  then
- Find the value of k.
  - Find the vertex, focus , axis of parabola and length of latus rectum of the parabola
9. Find the equation of the circle with
- Centre (-3,2) and radius 4
10. Find the center and radius of the following circle.
- $x^2 + y^2 + 8x + 10y - 8 = 0$

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**CHAPTER 12**

**INTRODUCTION TO THREE DIMENSIONAL GEOMETRY**

1. Let  $A(0,7,10)$ ,  $B(-1,6,6)$  And  $C(-4,9,6)$  are the vertices of a triangle
  - a. Show that it is a right triangle
  - b. Find the coordinates of the center of the circle passing through the point A,B and C
2. Given three points  $A(-4,6,10)$   $B(2,4,6)$  and  $C(14,0,-2)$ 
  - a. Find AB
  - b. Prove that the points A,B and C are collinear
3. A point R with coordinate 4 lies on x coordinate the line segment joining the points  $P(2, -3,4)$  and  $Q(8, 0, 10)$ .
  - a. Find the ratio in which R divides PQ
  - b. Find the coordinates of R
4. Consider the points  $A(-2,4,7)$  and  $B(3,-5,8)$ 
  - A. If P divides AB in the ratio  $K:1$  find the coordinate of p
  - B. Find the coordinate of the point where line segment AB crosses the YZ plane
5. A.orgin is centroid of triangle PQR with vertices  $P(2a,2,6)$   $Q(-4,3b,-10)$  &  $R(8,14,2c)$  find the values of a,b,c
  - B.find the length of the sides PQ of triangle PQR
  - C.the ratio in which YZ plane divides the segments joining the points  $(-2,4,7)$  &  $(3,-5,8)$  is .....
6. Consider the following figure.
  - a. Find the distance PQ.
  - b. Find the coordinates of the point divides the line segment joining the points P and Q internally in the ratio 2:3.



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**CHAPTER 13**

**LIMITS AND DERIVATIVES**

1. Find the derivative of  $\cos x$  from first principle

2. Evaluate  $\lim_{x \rightarrow 2} \frac{x^3 - 8}{x - 2}$

3. Evaluate  $\lim_{x \rightarrow 4} \frac{4x + 3}{x - 2}$

4. Evaluate  $\lim_{x \rightarrow 0} \frac{\sin ax}{\sin bx}$

5. Find  $\lim_{x \rightarrow 0} f(x)$  and  $\lim_{x \rightarrow 1} f(x)$  where

$$f(x) = \begin{cases} 2x + 3 & x \leq 0 \\ 3(x + 1) & x > 0 \end{cases}$$

6. Find the derivative of  $\sin x$  from first principle

7. Find the derivative of following

a.  $\sin x \cdot \cos x$

b.  $5\sin x - 6\cos x + 7$

c.  $\frac{\sin x - \cos x}{\sin x + \cos x}$

d.  $\frac{x^2 \cdot \tan x}{1 + x}$

8. Find the derivative of  $x \cdot \sin x$  from first principle

**CHAPTER 14**

**MATHEMATICAL REASONING**

1. Write the contra-positive of the statement

a. If a number is divisible by 9, then it is divisible by 3

2. Write the converse of the statement:

a. If a number  $n$  is even,  $n^2$  is even



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3. Verify the method of contradiction that
  - a.  $\sqrt{2}$  is irrational "
  - b.  $\sqrt{7}$  is irrational
4. Consider the statement. if  $x$  is an integer and  $x^2$  is even, then  $x$  is also even
  - a. Write the converse of this statement
  - b. Prove the statement by the contra positive method

**CHAPTER 15**

**STATISTICS**

1. From the following table

Classes		30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency		3	7	12	15	8	3	2

- a. Mean
- b. Variance
- c. Coefficient of variation

2. Find the standard deviation of the following data

$x_i$	3	8	13	18	23
$f_i$	7	10	15	10	6

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3. find the mean, standard deviation and coefficient of variation for the following frequency distribution

<i>mark</i>	0-10	10-20	20-30	30-40	40-50
<i>frequency</i>	5	8	15	16	6

4. Calculate mean variance and standard deviation for the following distribution

<i>score</i>	300-400	400-500	500-600	600-700	700-800	800-900	900-1000
<i>frequency</i>	3	7	12	15	8	3	2

**CHAPTER 16**

**PROBABILITY**

- if A and B are events such that  $p(A)=\frac{1}{4}$ ,  $p(B)=\frac{1}{2}$   $p(A \cap B)=\frac{1}{6}$ 
  - $P(A \text{ or } B)$
  - $p(\text{not } A \text{ and not } B)$
- In a class of 60 students, 30 opted for NCC, 32 opted for NSS and 24 opted for both NCC and NSS. If one of this student is selected at random, find.
  - The probability that student opted for NCC or NSS.
  - The probability that the student opted for exactly one of NCC or NSS.

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3. One card is drawn from a well s shuffled pack of 52 cards. If each outcome is equally likely, calculate the probability that the card will be a diamond.
4. A bag contains 9 discs of which 4 are red, 3 are blue, and 2 are yellow. A disc is drawn at random from the bag. Calculate the probability that it will be
  - a. Red
  - b. Not yellow
5. A. A coin is drawn repeatedly until a tail comes up. What is the sample space for this random experiment?
  - b. Three coins are tossed once. Find the probability of getting:
    - i) No head
    - ii) Exactly one head
    - iii) Atleast one head
    - iv) Atleast two heads