GGSRDN
Educational Services Private Limited
9th, 10th, NEET, JEE(Main/Advanced)
अभ्यास ही सबसे बड़ा गुरू है।

CLASS : XI (MATHS)

DPP

DAILY PRACTICE PROBLEM

DPP-11 to 20

GGSRDN Educational Services Private Limited NEET, JEE(Main/Advanced)

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 11

Total Marks : 29

Max. Time : 31 min.

Topics : Fundamentals of Mathematics, Quadratic Equation, Complex Number

Type of Questions		M.M.,	Min.
Comprehension (no negative marking) Q.1 to Q.3	(3 marks, 3 min.)	[9,	9]
Single choice Objective (no negative marking) Q.4, 5, 6, 7	(3 marks, 3 min.)	[12,	12]
Subjective Questions (no negative marking) Q.8,9	(4 marks, 5 min.)	[8,	10]

COMPREHENSION (Q. No. 1 to 3)

Consider the equation $|2x - 1| - 2|x - 2| = \lambda$

1. If the above equation has only one solution, then λ belongs to

(A) $\{-3, 3\}$ (B) $[-3, 3]$ (C) $(-3, 3)$ (D) ϕ

2. If the above equation has more than one solutions then λ belongs to

(A) $\{-3, 3\}$ (B) $[-3, 3]$ (C) $(-3, 3)$ (D) ϕ

3. If $\lambda = 6$, then the above equation has

(A) only one solution (B) only two solutions. (C) no solution. (D) more than two solutions.

4. If the roots of the equation $x^2 + 2cx + ab = 0$ are real and unequal, then the roots of the equation $x^2 - 2(a + b)x + (a^2 + b^2 + 2c^2) = 0$ are :

(A) real and unequal (B) real and equal

(C) imaginary (D) rational

5. If $-3 + 5i$ is a root of the equation $x^2 + px + q = 0$, then the ordered pair (p, q) is $(p, q \in R)$

(A) $(-6, 34)$ (B) $(6, 34)$ (C) $(34, -6)$ (D) $(34, 6)$

6. If the quadratic equation $ax^2 + bx + a^2 + b^2 + c^2 - ab - bc - ca = 0$, where a , b , c are distinct reals, has imaginary roots then :

(A) $2(a - b) + (a - b)^2 + (b - c)^2 + (c - a)^2 > 0$

(B) $2(a - b) + (a - b)^2 + (b - c)^2 + (c - a)^2 < 0$

(C) $2(a - b) + (a - b)^2 + (b - c)^2 + (c - a)^2 = 0$

(D) none

7. If the quadratic equations $ax^2 + 2cx + b = 0$ & $ax^2 + 2bx + c = 0$ $(b \neq c)$ have a common root, then $a + 4b + 4c$ is equal to :

(A) -2 (B) -2 (C) 0 (D) 1

8. Solve the equation : $|x+1| - |x| + 3|x-1| - 2|x-2| = x+2$

9. Solve the equation : $\left|\dfrac{x+1}{x}\right| + |x + 1| = \dfrac{(x+1)^2}{x}$

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 12

Total Marks : 30

Max. Time : 30 min.

Topics : Fundamentals of Mathematics, Quadratic Equation, Parabola

Type of Questions		**M.M.,**	**Min.**
Comprehension (no negative marking) Q.1 to Q.3	**(3 marks, 3 min.)**	**[9,**	**9]**
Single choice Objective (no negative marking) Q.4, 5, 6, 7	**(3 marks, 3 min.)**	**[12,**	**12]**
Multiple choice objective (no negative marking) Q. 8	**(5 marks, 4 min.)**	**[5,**	**4]**
Subjective Questions (no negative marking) Q.9	**(4 marks, 5 min.)**	**[4,**	**5]**

COMPREHENSION (For Q.No. 1 to 3)

The coordinates of the vertex of the parabola $f(x) = 2x^2 + px + q$ are $(-3, 1)$, then

1. The value of p is
(A) 12 (B) – 12 (C) 19 (D) – 19

2. The value of q is
(A) – 19 (B) 19 (C) – 12 (D) none of these

3. The parabola
(A) touches the x-axis
(B) intersect the x-axis in two real and distinct points
(C) lies completely above the x-axis
(D) lies completely below the x-axis

4. The solution set of the inequation $\left|\frac{1}{x} - 2\right| < 4$, is
(A) $(-\infty, -1/2)$ (B) $(1/6, \infty)$ (C) $(-1/2, 1/6)$ (D) $(-\infty, -1/2) \cup (1/6, \infty)$

5. Minimum value of $f(x) = 2x^2 - 4x + 5$ is
(A) 1 (B) – 1 (C) 11 (D) 3

6. The least integral value of 'm' for which the expression $mx^2 - 4x + 3m + 1$ is positive for every $x \in R$ is :
(A) 1 (B) – 2 (C) – 1 (D) 2

7. The least integral value of 'a' for which the graphs $y = 2ax + 1$ and $y = (a - 6)x^2 - 2$ do not intersect
(A) – 6 (B) – 5 (C) 3 (D) 2

8. If the quadratic equations $x^2 - 5x + 4 = 0$ and $x^2 - 6x + k = 0$ have one common root, then 'k' is equal to
(A) 4 (B) 8 (C) 3 (D) 5

9. **Match the following**

Consider the parabola $f(x) = x^2 + kx + 4$

Column – I	**Column – II**
(A) Curve intersects the x-axis for	(p) $k \in (-\infty, -4) \cup (4, \infty)$
(B) Curve touches the x-axis for	(q) $k \in (-4, 4)$
(C) Curve neither intersect nor touches the x-axis for	(r) $k \in \{-4, 4\}$
(D) $f(x) > 0 \ \forall \ x \in R$ for	

MATHEMATICS DPP

DAILY PRACTICE PROBLEMS

DPP No. 13

Total Marks : 24

Max. Time : 27 min.

Topics : Fundamentals of Mathematics, Quadratic Equation

Type of Questions		M.M., Min.
Comprehension (no negative marking) Q.1 to Q.3	(3 marks, 3 min.)	[9, 9]
Single choice Objective (no negative marking) Q.4	(3 marks, 3 min.)	[3, 3]
Subjective Questions (no negative marking) Q.5,6,7	(4 marks, 5 min.)	[12, 15]

COMPREHENSION (For Q.No. 1 to 3)

Let $y = ax^2 + bx + c$ be a quadratic expression having its vertex at (3, –2) and value of c = 10, then

1. Value of 'b' is equal to

(A) 6 (B) –6 (C) 8 (D) –8

2. One of the roots of the equation $ax^2 + bx + c = 0$ is

(A) $\frac{6+\sqrt{6}}{2}$ (B) $\frac{3+\sqrt{6}}{2}$ (C) $3-\sqrt{6}$ (D) $3+\sqrt{6}$

3. If $y \ge -\frac{2}{3}$, then

(A) $x \in (-\infty, 2] \cup [4, \infty)$ (B) $x \in (-\infty, 3] \cup [4, \infty)$

(C) $x \in (-\infty, 1] \cup [3, \infty)$ (D) $x \in (-\infty, 4] \cup [6, \infty)$

4. Find the set of values of 'α' for which the expression $y = \frac{\alpha x^2 + 6x - 8}{\alpha + 6x - 8x^2}$ have a common linear factor in numerator and denominator

(A) {14} (B) {2} (C) {–8, 2, 14} (D) {0, 2, 14}

5. Solve the following equations $x^2 + xy + xz = 18$, $y^2 + yz + yx + 12 = 0$ and $z^2 + zx + zy = 30$

6. Solve the following inequations

(i) $(x - 5)(x + 9)(x - 8) < 0$ (ii) $x^2 - 4x + 9 > 0$

(iii) $x^4 - 5x^2 + 4 < 0$ (iv) $\frac{3}{x-2} < 1$

7. Consider the quadratic polynomial, $f(x) = x^2 - 4ax + 5a^2 - 6a$.

(a) Find the smallest positive integral value of 'a' for which f(x) is positive for every real x.

(b) Find the largest distance between the roots of the equation f(x) = 0.

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 14

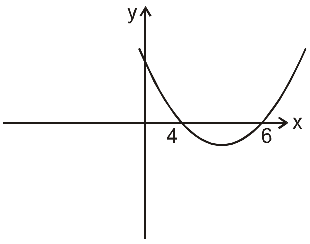
Total Marks : 23

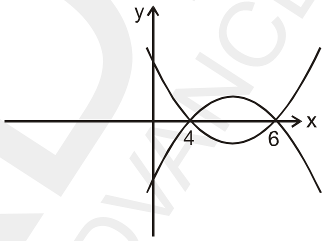
Max. Time : 25 min.

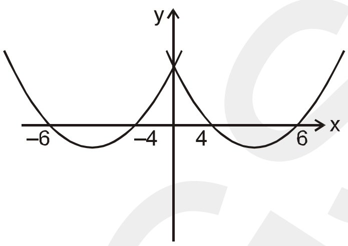
Topic : Quadratic Equation

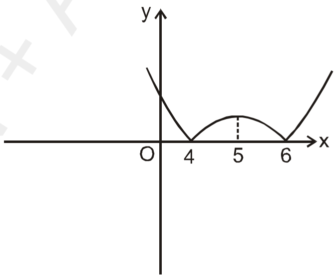
Type of Questions		**M.M., Min.**
Single choice Objective (no negative marking) Q.1,2,3,4, 5	**(3 marks, 3 min.)**	**[15, 15]**
Subjective Questions (no negative marking) Q.6,7	**(4 marks, 5 min.)**	**[8, 10]**

1. Which of the following is the graph of $y = |x^2 - 10x + 24|$

(A) 

(B) 

(C) 

(D) 

2. Solution set of the equation $3^{2x^2} - 2.3^{x^2+x+6} + 3^{2(x+6)} = 0$ is

(A) {–3, 2} (B) {6, –1} (C) {–2, 3} (D) {1, – 6}

3. The set of values of 'a' for which both roots of the equation $x^2 + 2(a + 1)x + (9a - 5) = 0$ are negative is :

(A) $[0, \infty)$ (B) $(-\infty, 6]$ (C) $(-\infty, 0]$ (D) $\left(\frac{5}{9}, 1\right] \cup [6, \infty)$

4. The set of all values of 'a' for which the quadratic equation $3x^2 + 2(a^2 + 1)x + (a^2 - 3a + 2) = 0$ possess roots of opposite sign, is

(A) $(-\infty, 1)$ (B) $(-\infty, 0)$ (C) $(1, 2)$ (D) $(3/2, 2)$

5. If roots of equation $x^2 - 2mx + m^2 - 1 = 0$ lie in the interval (–2, 4), then

(A) $m \in (-1, 3)$ (B) $m \in (1, 5)$ (C) $m \in (1, 3)$ (D) $m \in (-1, 5)$

6. Find the equation each of whose roots is greater by unity , than the roots of the equation $x^3 - 5x^2 + 6x - 3 = 0$.

7. Find all values of 'p' for which the root(s) of the equation $(p - 3)x^2 - 2px + 5p = 0$ are real and positive .

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 15

Total Marks : 22

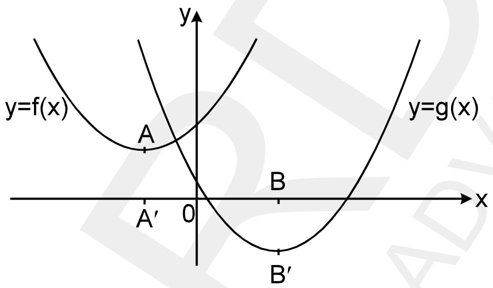
Max. Time : 23 min.

Topic : Quadratic Equation

Type of Questions		M.M., Min.
Comprehension (no negative marking) Q.1 to Q.3	(3 marks, 3 min.)	[9, 9]
Single choice Objective (no negative marking) Q.4,5,6	(3 marks, 3 min.)	[9, 9]
Subjective Questions (no negative marking) Q.7	(4 marks, 5 min.)	[4, 5]

COMPREHENSION (For Q.No. 1 to 3)

Let $f(x) = x^2 + 2ax + b$, $g(x) = cx^2 + 2dx + 1$ be quadratic expressions whose graph is as shown in the figure



Here it is given that $|AA'| = |BB'|$ and $|OA'| = |OB|$.

1. Which of the following statements is correct
(A) $a^2 + d = d^2 + c$ (B) $a + d = b + c$ (C) $a^2 + d^2 = c + b$ (D) $bc + c = a^2c + d^2$

2. Sum of roots of equations $f(x) = 0$ and $g(x) = 0$ is
(A) 0 (B) $2(a + d)$ (C) $1 + b$ (D) $2a - \dfrac{2d}{c}$

3. If $|OA'| = |AA'| = 1$, then the values of 'm' for which $(g(x))^2 + mg(x) + 4 = 0$ has two real roots which are distinct
(A) $(0, 4)$ (B) $(4, \infty)$ (C) $(4, 5)$ (D) $(5, \infty)$

4. If α & β are the roots of the quadratic equation $ax^2 + bx + c = 0$, then the quadratic equation,
$ax^2 - bx(x - 1) + c(x - 1)^2 = 0$ has roots :
(A) $\dfrac{\alpha}{1-\alpha}, \dfrac{\beta}{1-\beta}$ (B) $\alpha - 1, \beta - 1$ (C) $\dfrac{\alpha}{\alpha+1}, \dfrac{\beta}{\beta+1}$ (D) $\dfrac{1-\alpha}{\alpha}, \dfrac{1-\beta}{\beta}$

5. If α, β, γ are the roots of the equation $x^3 - px^2 + qx - r = 0$, then the value of $\sum \alpha^2\beta$ is equal to
(A) $pq + 3r$ (B) $pq + r$ (C) $pq - 3r$ (D) q^2/r

6. If α, β, γ are the roots of the equation $x^3 - px^2 + qx - r = 0$, then the value of

$\left(\dfrac{1}{\alpha^2} + \dfrac{1}{\beta^2} + \dfrac{1}{\gamma^2}\right)$ is :

(A) $\dfrac{p^2 - 2qr}{r^2}$ (B) $\dfrac{q^2 - 2pr}{r^2}$ (C) $\dfrac{r^2 - 2pq}{r^2}$ (D) none of these

7. Find all values of 'k' for which the inequality $(x - 3k)(x - k - 3) < 0$ is true $\forall\ x \in [1, 3]$.

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 16

Total Marks : 25

Max. Time : 26 min.

Topic : Quadratic Equation

Type of Questions		M.M.,	Min.
Comprehension (no negative marking) Q.1 to 3	(3 marks, 3 min.)	[9,	9]
Single choice Objective (no negative marking) Q.4,5,6,7	(3 marks, 3 min.)	[12,	12]
Subjective Questions (no negative marking) Q.8	(4 marks, 5 min.)	[4,	5]

COMPREHENSION (Q.No. 1 to 3)

Consider the equation $|x^2 - 2x - 3| = m$, $m \in R$

1. If the given equation has four solutions, then

(A) $m \in (0, \infty)$ (B) $m \in (-1, 3)$ (C) $m \in (0, 4)$ (D) none of these

2. If the given equation has three solutions, then

(A) $m \in (0, \infty)$ (B) $m \in \{4\}$ (C) $m \in (0, 4)$ (D) $m \in (-1, 3)$

3. If the given equation has two solutions, then

(A) $m \in [4, \infty)$ (B) $m \in (-1, 3)$ (C) $m \in (4, \infty) \cup \{0\}$ (D) $m = 0$

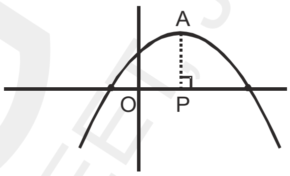
4. Let a, b, c be three roots of the equation $x^3 + x^2 - 333x - 1002 = 0$, then $(\Sigma (a^3) - 2\,\Sigma a)$ is equal to

(A) 2008 (B) 2000 (C) 2006 (D) 2002

5. Number of real solutions of the equation $x^2 + \left(\frac{x}{x-1}\right)^2 = 8$ is

(A) 3 (B) 4 (C) 6 (D) 0

6. If $y = ax^2 + bx + c$ represents the curve given in the figure and $b^2 = 2(b + 2ac)$, where $a \neq 0$ and AP = 3 units, then OP =



(A) $\frac{3}{2}$ (B) $\frac{3}{4}$ (C) 3 (D) 6

7. If $mx^2 - 9mx + 5m + 1 > 0$, $\forall x \in R$, then m lies in the interval

(A) $\left(-\frac{4}{61}, 0\right)$ (B) $\left[0, \frac{4}{61}\right)$ (C) $\left(\frac{4}{61}, \frac{61}{4}\right)$ (D) $\left(-\frac{61}{4}, 0\right)$

8. Find the range of values of 'a' such that $f(x) = \frac{ax^2 + 2(a+1)x + 9a + 4}{x^2 - 8x + 32}$ is always negative?

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 17

Total Marks : 58

Max. Time : 71 min.

Topic : Fundamentals of Mathematics

Type of Questions		**M.M.,**	**Min.**
Single choice Objective (no negative marking) Q.11, 12	**(3 marks, 3 min.)**	**[6,**	**6]**
Subjective Questions (no negative marking) Q.1 to 10 and 13,14,15	**(4 marks, 5 min.)**	**[52,**	**65]**

Solve the following inequality

1. $|x-3| < 5$

2. $2 \le |x-1| \le 3$

3. $|x-1| \le 5$ and $|x| \ge 2$

4. $|x-1| + |x-2| \ge 4$

5. $\dfrac{|x|+1}{|x|-2} \ge 0,\ \ x \in R,\ x \ne \pm 2$

6. $\dfrac{-1}{|x|-2} \ge 1$, where $x \in R,\ x \ne \pm 2$

7. $\dfrac{|x+3|+x}{x+2} > 1$

8. $||x-2|-1| \ge 3$

9. $|(x^2 + 2x + 2) + (3x + 7)| < |x^2 + 2x + 2| + |3x + 7|$

10. $|x^2 - 1| + |x^2 - 4| \le 3$

11. The soltuion of $|x^2 + 3x| + x^2 - 2 \ge 0$ is :

(A) $(-\infty, 1)$ (B) $(0, 1)$ (C) $\left(-\infty, -\dfrac{2}{3}\right] \cup \left[\dfrac{1}{2}, \infty\right)$ (D) None of these

12. The solution of $||x|-1| < |1-x|$, $x \in R$ is :

(A) $(-1, 1)$ (B) $(0, \infty)$ (C) $(-1, \infty)$ (D) None of these

13. Solve : $|x^2 + 4x + 3| + 2x + 5 = 0$

14. Solve $|x^2 - 3x - 4| = 9 - |x^2 - 1|$

15. Solve the inequality $|f(x) - g(x)| < |f(x)| + |g(x)|$, where $f(x) = x - 3$ and $g(x) = 4 - x$

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 18

Total Marks : 28

Max. Time : 29 min.

Topics : Fundamentals of Mathematics, Quadratic Equation

Type of Questions		**M.M., Min.**
Comprehension (no negative marking) Q.1 to 3	(3 marks, 3 min.)	[9, 9]
Single choice Objective (no negative marking) Q.4,5	(3 marks, 3 min.)	[6, 6]
Multiple choice objective (no negative marking) Q.6	(5 marks, 4 min.)	[5, 4]
Subjective Questions (no negative marking) Q.7,8	(4 marks, 5 min.)	[8, 10]

COMPREHENSION (For Q.1 to 3)

Consider the equation $||x-1|-2| = \lambda$

1. If the given equation has two solutions, then λ belongs to
(A) $(2, \infty) \cup \{0\}$ (B) $(2, \infty)$ (C) $(0, 2)$ (D) none of these

2. If the given equation has three solutions, then λ belongs to
(A) $(0, 2)$ (B) $\{2\}$ (C) $(0, \infty)$ (D) $(-\infty, 0)$

3. Number of integral values of λ so that the given equation has four solutions, is
(A) 0 (B) 1 (C) 2 (D) 3

4. If α, β, γ are the roots of the equation $x^3 - px^2 + qx - r = 0$, then the value of $\sum \frac{\alpha\beta}{\gamma}$ is equal to
(A) $pq + 3r$ (B) $pq + r$ (C) $pq - 3r$ (D) $\frac{q^2 - 2pr}{r}$

5. S_1 **:** For $ax^2 + bx + c = 0$ $(a \neq 0)$ if $a + b + c = 0$, then the roots are 1 and c/a
S_2 **:** If $f(x) = ax^2 + bx + c$ $(a \neq 0)$ has finite minimum value and both roots are of opposite sign, then $f(0) < 0$
S_3 **:** If α is repeated root of $ax^2 + bx + c = 0$, $a \neq 0$, then $ax^2 + bx + c = (x - \alpha)^2$
S_4 **:** For $ax^2 + bx + c = 0$ $(a \neq 0)$, irrational roots occur in conjugate pairs only

State in order, whether S_1, S_2, S_3, S_4 are true or false
(A) TFTF (B) TTFF (C) FTFT (D) TTTT

6. If α, β are the roots of the equation $x^2 + \alpha x + \beta = 0$ such that $\alpha \neq \beta$ and $||x - \beta| - \alpha| < \alpha$, then
(A) inequality is satisfied by exactly two integral values of x
(B) inequality is satisfied by all values of $x \in (-4, -2)$
(C) Roots of the equation are opposite in sign
(D) $x^2 + \alpha x + \beta < 0 \ \forall \ x \in [-1, 0]$

7. Find the set of values of 'a' for which the roots of the quadratic equation

$(a - 5)x^2 + (\sqrt{4a - a^2})x + (a^2 - 2a - 3) = 0$ are of opposite sign.

8. If inequality $\frac{ax^2 + 3x + 4}{x^2 + 2x + 2} < 5$ is satisfied for all real values of x then find out greatest integral value of 'a'.

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 19

Total Marks : 23

Max. Time : 22 min.

Topics : Sets & Relation, Sequence & Series

Type of Questions		**M.M., Min.**
Single choice Objective (no negative marking) Q.1,2,3,4,5,6,	**(3 marks, 3 min.)**	**[18, 18]**
Multiple choice objective (no negative marking) Q.7	**(5 marks, 4 min.)**	**[5, 4]**

1. In a certain town 25% families own a phone and 15% own a car, 65% families own neither a phone nor a car. 2000 families own both a car and a phone. Consider the following statements in this regard :

1. 10% families own both a car and a phone.
2. 35% families own either a car or a phone.
3. 40,000 families live in the town.

Which of the above statements are correct ?

(A) 1 and 2 (B) 1 and 3 (C) 2 and 3 (D) 1, 2 and 3

2. $A \cap (B \cup A)' =$

(A) ϕ (B) A (C) B (D) $A \cap B$

3. In a school there are 20 teachers who teach mathematics or physics. Of these, 12 teach mathematics and 4 teach both physics and mathematics, the number of teachers who teach physics are-

(A) 12 (B) 16 (C) 8 (D) 4

4. Sum of all the odd numbers between 1 and 1000 which are divisible by 3 is

(A) 83667 (B) 167334 (C) 82667 (D) 166334

5. Let a_n be the n^{th} term of an A.P. If $\sum_{r=1}^{100} a_{2r} = \alpha$ & $\sum_{r=1}^{100} a_{2r-1} = \beta$, then the common difference of the A.P. is (A) $\alpha - \beta$ (B) $\beta - \alpha$ (C) $\frac{\alpha - \beta}{2}$ (D) none of these

6. The ratio of sums of n – terms of two arithmetic progressions is (3 n – 13) : (5 n + 21). The ratio of 24^{th} term of the two series is :

(A) 59 : 141 (B) 7 : 17 (C) 1 : 2 (D) none of these

7. The sum of the first three consecutive terms of an A.P. is 9 and the sum of their squares is 35. Then sum to n terms of the series is :

(A) n (n + 1) (B) n^2 (C) n (4 – n) (D) n (6 – n)

MATHEMATICS DPP
DAILY PRACTICE PROBLEMS

DPP No. 20

Total Marks : 23

Max. Time : 25 min.

Topic : Sequence & Series

Type of Questions		M.M., Min.
Comprehension (no negative marking) Q.1 to Q.3	(3 marks, 3 min.)	[9, 9]
Single choice Objective (no negative marking) Q.4,5	(3 marks, 3 min.)	[6, 6]
Subjective Questions (no negative marking) Q.6,7	(4 marks, 5 min.)	[8, 10]

COMPREHENSION (Q.No. 1 to 3)

Given a special squence a, b, c, d such that first three number are in A.P. while the last three are in G.P. If the first number is 18 and common ratio of G.P. is $\frac{1}{2}$, then answer the following questions.

1. The value of c + d is given by

(A) 9 (B) 10 (C) 11 (D) 12

2. If three A.M.s are inserted between b and c, then the third A.M. is

(A) $\frac{11}{2}$ (B) $\frac{13}{2}$ (C) $\frac{15}{2}$ (D) $\frac{17}{2}$

3. If four G.M.s are inserted between k_1c and k_2d, where $k_2 = 64k_1$, then the common ratio of G.P. so formed is

(A) 2 (B) $\frac{3}{2}$ (C) $\frac{2}{3}$ (D) $\frac{1}{3}$

4. If the sum of first three terms of a G.P. is to the sum of first six terms as 125 : 152, then the common ratio of the G.P. is

(A) $\frac{3}{5}$ (B) $\frac{5}{3}$ (C) $\frac{2}{5}$ (D) $\frac{5}{2}$

5. 61^{st} term of the H.P. $\frac{4}{3}, \frac{3}{2}, \frac{12}{7}$, ... is

(A) $-\frac{17}{4}$ (B) $\frac{34}{3}$ (C) $\frac{3}{34}$ (D) $-\frac{4}{17}$

6. All terms of the arithmetic progression are natural numbers. The sum of its nine consecutive terms, beginning with the first , is larger than 200 and smaller than 220 . Find the progression, if its second term is equal to 12.

7. Let x_1 & x_2 be the roots of the equation $x^2 - 3x + A = 0$ and let x_3 & x_4 be the roots of the equation $x^2 - 12x + B = 0$. It is known that the numbers x_1, x_2, x_3, x_4 (in the same order) form an increasing G.P. Find A and B.

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CLASS : XI (MATHS)

DPP

DAILY PRACTICE PROBLEM

Solutions

DPP-11 to 20

DPP 11 : **Fundamentals of Mathematics, Quadratic Equation, Complex Number**
DPP 12 : **Fundamentals of Mathematics, Quadratic Equation, Parabola**
DPP 13 : **Fundamentals of Mathematics, Quadratic Equation**
DPP 14 : **Quadratic Equation**
DPP 15 : **Quadratic Equation**
DPP 16 : **Quadratic Equation**
DPP 17 : **Fundamentals of Mathematics**
DPP 18 : **Fundamentals of Mathematics, Quadratic Equation**
DPP 19 : **Sets & Relation, Sequence & Series**
DPP 20 : **Sequence & Series**

DPP 11 TO 20 (ANSWER KEY)

DPP NO. - 11

1. (C) **2.** (A) **3.** (C) **4.** (C) **5.** (B) **6.** (A)

7. (C)

8. $x \in [2, \infty) \cup \{-2\}$

9. $x \in \{-1\} \cup (0, \infty)$

DPP NO. - 12

1. (A) **2.** (B) **3.** (C) **4.** (D) **5.** (D)

6. (D) **7.** (B) **8.** (B)(D)

9. (A) → (p), (B) → (r), (C) → (q), (D) → (q)

DPP NO. - 13

1. (D) **2.** (A) **3.** (A) **4.** (C)

5. x = 3, y = – 2, z = 5 ; x = – 3, y = 2, z = – 5

6. (i) $x \in (-\infty, -9) \cup (5, 8)$ (ii) $x \in (-\infty, \infty)$
(iii) $x \in (-2, -1) \cup (1, 2)$
(iv) $x \in (-\infty, 2) \cup (5, \infty)$

7. (a) 7 (b) 6

DPP NO. - 14

1. (D) **2.** (C) **3.** (D) **4.** (C) **5.** (A)

6. $x^3 - 8x^2 + 19x - 15 = 0$ **7.** $p \in \left[3, \frac{15}{4}\right]$

DPP NO. - 15

1. (D) **2.** (A) **3.** (D) **4.** (C)

5. (C) **6.** (B) **7.** $k \in \left(0, \frac{1}{3}\right)$

DPP NO. - 16

1. (C) **2.** (B) **3.** (C) **4.** (A) **5.** (A)

6. (C) **7.** (B) **8.** $a \in \left(-\infty, -\frac{1}{2}\right)$

DPP NO. - 17

1. $x \in (-2, 8)$ **2.** $x \in [-2, -1] \cup [3, 4]$

3. $x \in [-4, -2] \cup [2, 6]$ **4.** $x \in \left(-\infty, -\frac{1}{2}\right] \cup \left[\frac{7}{2}, \infty\right)$

5. $x \in (-\infty, -2) \cup (2, \infty)$ **6.** $(-2, -1] \cup [1, 2)$

7. $x \in [-3, -2) \cup (-1, \infty)$ **8.** $(-\infty, -2] \cup [6, \infty)$

9. $x < -\frac{7}{3}$ **10.** $x \in [-2, -1] \cup [1, 2]$

11. (C) **12.** (D) **13.** $\{-4, -1, -1-\sqrt{3}\}$

14. $\{-2, 2\}$ **15.** $x \in (3, 4)$

DPP NO. - 18

1. (A) **2.** (B) **3.** (B) **4.** (D)

5. (B) **6.** (A)(B)(C)(D) **7.** $a \in (3, 4]$

8. 2

DPP NO. - 19

1. (C) **2.** (A) **3.** (A) **4.** (A)

5. (D) **6.** (C) **7.** (B)(D)

DPP NO. - 20

1. (A) **2.** (C) **3.** (A) **4.** (A)

5. (D) **6.** 8, 12, 16, ... **7.** A = 2, B = 32

SOLUTIONS

DPP NO. - 11

1. If this has one solution then $\lambda \in (-3, 3)$

2. More than one solution $\lambda \in \{-3, 3\}$

3. If $\lambda = 6$, then no solution.

4. $4c^2 - 4ab > 0$ ...(1)
now $D = 4(a + b)^2 - 4(a^2 + b^2 + 2c^2)$
$= 4[2ab - 2c^2] = 8(ab - c^2) < 0$
roots one imaginary

5. $-3 + 5i + (-3 - 5i) = -p$
$p = 6$
and $(-3 + 5i)(-3 - 5i) = q$
$q = 34$

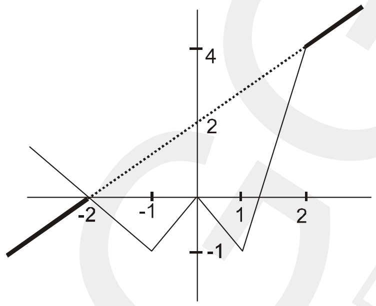
6. $ax^2 + bx + a^2 + b^2 - ab - bc - ca = 0$
$= 2ax^2 + 2bx + (a - b)^2 + (b - c)^2 + (c - 1)^2 = 0$
Let $f(x) = 2ax^2 + 2bx + (a - b)^2 + (b - c)^2 + (c - a)^2$
$f(0) = (a - b)^2 + (b - c)^2 + (c - a)^2 > 0$
and $D < 0$
$\therefore\ f(x) > 0$
$\forall\ x \in R$
$\therefore\ f(-1) > 0$
$2a - 2b + (a - b)^2 + (b - c)^2 + (c - a)^2 > 0$
$\Rightarrow 2(a - b) + (a - b)^2 + (b - c)^2 + (c - a)^2 > 0$

7. $ax^2 + 2cx + b = 0$ ...(1)
$ax^2 + 2bx + c = 0$ ...(2)
(1) – (2)

$x = \frac{1}{2}$

put in (1) $\Rightarrow a + 4c + 4b = 0$

8.



9. $\left|\frac{x+1}{x}\right| + |x + 1| = \frac{(x+1)^2}{x}$

$\frac{|x+1|}{|x|} + |x + 1| = \frac{(x+1)^2}{x} \quad x \neq 0$

Case-I : $x > 0$

$\frac{x+1}{x} + (x + 1) = \frac{(x+1)^2}{x}$

$\left(\frac{x+1}{x}\right).(1 + x) = \frac{(x+1)^2}{x}$

$\frac{(x+1)^2}{x} = \frac{(x+1)^2}{x}$

$1 = p$ true
I[st] is hold for $\forall\ n > 0$

Case-II : $-1 \le x < 0$

$\frac{(x+1)}{-x} + (x + 1) = \frac{(x+1)^2}{x}$

$(x + 1)\frac{(1-x)}{(-x)} = \frac{(x+1)^2}{x}$

$(x + 1)(x + 1) = x^2 + 1 + 2x$
$x^2 - 1 = x^2 + 2x + 1$
$2x + 2 = 0$
$x = -1$ is only solution

Case-III : $x < -1$

$\frac{-x-1}{-x} - x - 1 = \frac{(x+1)^2}{x}$

$\frac{x+1}{x} - (x + 1) = \frac{(x+1)^2}{x}$

$\frac{(x+1)(1-x)}{x} = \frac{(x+1)^2}{x}$

$1 - n = x + 1$
$2x = 0$
$x = 0$
But $n < -1$
so no solution isobtainal from case (I), (II), (III) we get $x \in \{-1\} \cup (0, \infty)$

DPP NO. - 12

1 to 3.

$\frac{-p}{4} = -3, -\frac{(p^2 - 8q)}{8} = 1$

$p = 12,\ 8q - p^2 = 8$
$8q - 144 = 8$

$q = \frac{152}{8}$

$q = 19$
$f(x) = 2x^2 + 12x + 19$
$D = 144 - 152 < 0$

4. $-4 < \frac{1}{x} - 2 < 4$

$-2 < \frac{1}{x} < 6$

$\frac{1+2x}{x} > 0 \quad \& \quad \frac{1-6x}{x} < 0 \quad \Rightarrow \quad \frac{6x-1}{x} > 0$

Sign scheme: + (−1/2) − (0) + & + (0) − (1/6) +

$x \in \left(-\infty, \frac{-1}{2}\right) \cup (0, \infty)$ ....(1) & $x \in (-\infty,$ $0) \cup \left(\frac{1}{6}, \infty\right)$ ....(2)

(i) $\cap$ (ii)
$x \in (-\infty, -1/2) \cup (1/6, \infty)$

5. $\frac{-D}{4a} = \frac{-(16-40)}{8} = 3$

6. $\therefore$ m > 0 and D < 0

$16 - 4m(3m + 1) < 0$

$4 - m(3m + 1) < 0$

$3m^2 + m - 4 > 0$

$(3m + 4)(m - 1) > 0$

$m \in \left(-\infty, \frac{-4}{3}\right) \cup (1, \infty)$

But m > 0

$\therefore$ $m \in (1, \infty)$

Least integral value = 2

7. $(a-6)x^2 - 2 = 2ax + 1 \Rightarrow (a-6)x^2 - 2ax\ x - 3 = 0$

D < 0

$4a^2 + 12(a-6) < 0$

$a^2 + 3a - 18 < 0$

$(a+6)(a-3) < 0$

$a \varepsilon (-6, 3)$

least Integer = –5

8. $\alpha^2 - 5\alpha + 4 = 0$ ...(1)

$\alpha^2 - 6\alpha + k = 0$ ...(2)

$-4 - \alpha + k = 0 \Rightarrow k = 4 + k$

from (1) $(k-4)^2 - 5(k-4) + 4 = 0$

$k^2 - 13k + 40 = 0$

k = 8, 5

9. $f(x) = x^2 + kx + 4$

(A) D > 0

$k^2 > 16$

$k \in (-\infty, -4) \cup (4, \infty)$

(B) D = 0

$k^2 = 16$

$k = \pm 4$

(C) D < 0

$k \in (-4, 4)$

(D) $f(x) > 0\ \forall\ x \in R$

D < 0

$k \in (-4, 4)$

DPP NO. - 13

1. v(3, –2), c = 10

$y = ax^2 + bx + c$

$\frac{-b}{2a} = 3, \frac{4ac - b^2}{4a} = -2$

on solving $b = -8, a = \frac{4}{3}$

so $y = \frac{4}{3}x^2 - 8x + 10$

2. $y = \frac{1}{3}[4x^2 - 24x + 30] = \frac{2}{3}[2x^2 - 12x + 15]$

$x = \frac{6 \pm \sqrt{36-30}}{2} = \frac{6 \pm \sqrt{6}}{2}$

3. $y > -\frac{2}{3}$

$\Rightarrow 2x^2 - 12x + 15 \geq -1$

$\Rightarrow x^2 - 6x + 8 \geq 0$

$\Rightarrow (x-4)(x-2) \geq 0$

$\Rightarrow x \in (-\infty, 2] \cup [4, \infty)$

4. i.e. $\alpha x^2 + 6x - 8 = 0$ ...(1)

& $-8x^2 + 6x + \alpha = 0$ ...(2)

have a common root.

solving (1) & (2) for common root

(1) – (2)

$(\alpha + 8)x^2 = (8 + \alpha) \Rightarrow x = \pm 1$

so from (1) $\alpha = 2, 14$

if both root are common

$\frac{\alpha}{-8} = 1 \Rightarrow \alpha = -8$

so $\alpha = \{2, 14, -8\}$

5. $x^2 + xy + xz = 18$

$\Rightarrow x^2 + x(y + z) = 18$ ......(1)

$y^2 + yz + yx + 12 = 0$

$\Rightarrow y^2 + y(z + x) = -12$ ......(2)

$z^2 + zx + zy = 30$

$\Rightarrow z^2 + z(x + y) = 30$

Adding equation (1), (2), (3)

$x^2 + y^2 + z^2 + 2xy + 2yz + 2zx = 36$

$(x + y + z)^2 = 36$

$x + y + z = \pm 6$

Case-1 : x + y + z = 6

from Equ. (1)

$x^2 + x(6 - x) - 18 = 0$

$x^2 + 6x - x^2 = 18$

x = 3 $\because$ x = 3, y = –2

from Equ. (2) $\Rightarrow$ 2 = 6 – 1 = 5

$y^2 + y(6 - y) = -12$

y = –2

Case-2 : x + y + z = –6

from Equ. (1)

$x^2 + x(-6 - x) = 18$

$x^2 - 6x - x^2 = 18$

x = –3 $\Rightarrow$ z = – – x – y

from Equ. (2) z = –6 + 3 – 2

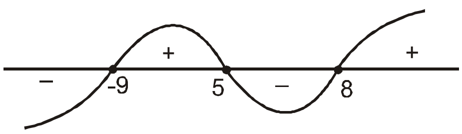
$y^2 + y(-6 - 9) = -12 = -5$

$y^2 - 6y - y^2 = -12$ $(x, y, z) \equiv (-3, 2, -5)$

y = 2

from Case-1 and Case-2, we get $(x, y, z) \equiv (3, -2, 5), (-3, 2, -5)$

6. (i)

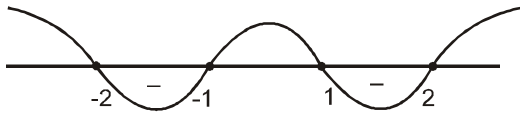


$x \in (-\infty, -9) \cup (5, \infty)$

(ii) $(x-2)^2 + 5 > 0$ so $x \in R$

(iii) $(x^2 - 4)(x^2 - 1) < 0$

$\Rightarrow (x-2)(x+2)(x-1)(x+1) < 0$



$x \in (-2, -1) \cup (1, 2)$

(iv) $\dfrac{3}{x-2} - 1 < 0 \Rightarrow \dfrac{5-x}{x-2} < 0$

$x \in (-\infty, 2) \cup (5, \infty)$

7. $f(x) = x^2 - 4ax + 5a^2 - 6a$

f(x) is positive for D < 0

$16a^2 - 4(5a^2 - 6a) < 0$

$-4a^2 + 24a < 0$

$4a^2 - 24a > 0$

$4a(a - 6) > 0$

$a > 6$ or $a < 0$

Smallest positive integer value is 7.

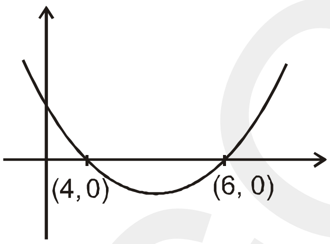
(b) $\alpha - \beta = \sqrt{(\alpha+\beta)^2 - 4\alpha\beta}$

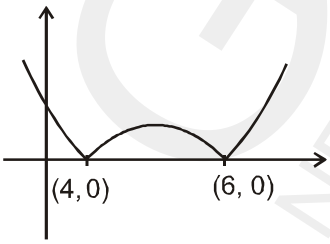
$= \sqrt{16a^2 - 4(5a^2 - 6a)} = \sqrt{-4a^2 + 24a}$

maxima at a = 3, $\alpha - \beta = \sqrt{-4 \times 3^2 + 24 \times 3} = 6$

DPP NO. - 14

1. $y = x^2 - 10x + 24$ now $y = |x^2 - 10x + 24|$





2. $3^{2(x^2-x-6)} - 2.3^{(x^2-x-6)} + 1 = 0$

$\Rightarrow 3^{(x^2-x-6)} = 1$

$\Rightarrow x^2 - x - 6 = 0$

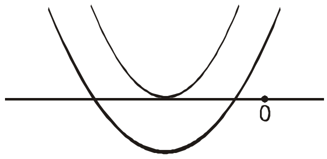
$\Rightarrow (x-3)(x+2) = 0$

$\Rightarrow x = -2, 3$

3. $x^2 + 2(a+1)x + 9a - 5 = 0$

for both roots to be –ve

desired graph is



$D \geq 0$

$\dfrac{-b}{2a} < 0$ $f(0) > 0$

$(a+1)^2 - 9a + 5 \geq 0$

$a^2 - 7a + 6 \geq 0$

$a \in (-\infty, 1] \cup [6, \infty)$

$\dfrac{-b}{2a} < 0$ given

$-(a+1) < 0$

$a + 1 > 0$

$a > -1$

$f(0) > 0$

$9a - 5 > 0$

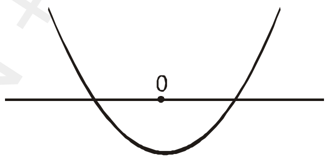
$a > \dfrac{5}{9}$ $\therefore$ $a \cup \left(\dfrac{5}{9}, 1\right] \cup [6, \infty)$

is the final solution

4. $3x^2 + 2(a^2 + 1)x + a^2 - 3a + 2 = 0$

for roots to be of opposite sign

derived graph is



$f(0) < 0$

$a^2 - 3a + 2 < 0 \Rightarrow (a-1)(a-2) < 0$

$a \in (1, 2)$

5. $x^2 - 2mx + m^2 - 1 = 0$

$f(x) = x^2 - 2mx + m^2 - 1$

roots lie in (–2, 4)

$f(-2) > 0$ & $f(4) > 0$

$D > 0$

$f(-2) = 4 + 4m + m^2 - 1 > 0$

$m^2 + 4m + 3 > 0$

$(m+1)(m+3) > 0$

$m > -1$ or $m < -3$ ...(1)

$f(4) > 0$

$f(4) = 16 - 8m + m^2 - 1 > 0$

$m^2 - 8m + 15 > 0$

$(m-3)(m-5) > 0$

$m < 3$ or $m > 5$ ...(2)

$D > 0$

$4m^2 - 4(m^2 - 1) > 0$

$4 > 0$

using (1), (2) & (3)

$m \in R$ ...(3)

so $m \in (-1, 3)$

6. $x^3 - 5x^2 + 6x - 3 = 0$

α, β, γ are root of equation

$\alpha + 1, \beta + 1, \gamma + 1$ are roots of newer equation

$x^3 - (\alpha + \beta + \gamma + 3)x^2 + [(\alpha + 1)(\beta + 1) + (\beta + 1)(\gamma + 1) + (\gamma + 1)(\alpha + 1]x - (\alpha + 1)(\beta + 1)(\gamma + 1)$

$\alpha + \beta + \gamma = 5,\ \alpha\beta + \beta\gamma + \gamma\alpha = 6$
$\alpha\beta\gamma = 3$
$x^3 - (8)x^2 + [\alpha\beta + \beta\gamma + \gamma\alpha + 2(\alpha + \beta + \gamma)]x$
$\quad - (\alpha\beta\gamma + \alpha\beta + \beta\gamma + \gamma\alpha + \alpha + \beta + \delta + 1)$
$= x^3 - 8x^2 + [6 + 10]x - [3 + 6 + 5 + 1] = 0$
$x^3 - 8x^2 + 16x - 15 = 0$

7. $(p - 3)x^2 - 2px + 5p = 0$
$f(x) = (p - 3)x^2 - 2px + 5p$
for real & positive
$D \ge 0$
$4p^2 - 20p(p - 3) \ge 0$
$4p^2 - 20p^2 + 60p > 0$
$-16p^2 + 60p \ge 0$
$4p(-4p + 15) \ge 0$
$4p(4p - 15) \le 0$

$0 \le p \le \frac{15}{4}$, $p \in \left(0, \frac{15}{4}\right]$ ...(1)

Case-I : if $p - 3 > 0$, $p > 3$

$f(0) > 0,\ 5p > 0 \qquad \frac{-b}{2a} > 0,\ \frac{p}{p-3} > 0$

$p > 3$ or $p < 0$
$p \in (3, \infty)$ ...(2)

Case-II : $p < 3$

$f(0) < 0$, $p < 0$, $\frac{-b}{2a} > 0 \qquad \frac{p}{p-3} > 0$

$p > 3$ or $p < 0$
$p(-\infty, 0)$ ...(3)

$p \in \left[3, \frac{15}{4}\right]$

DPP NO. - 15

1. $f(x) = x^2 + 2ax + b$

$\frac{-D}{4a} = \frac{-(4a^2 - 4b)}{4}$

$g(x) = cx^2 + 2dx + 1$

$\frac{-D}{4a} = \frac{-(4d^2 - 4c)}{4c}$

$\frac{4a^2 - 4b}{4} = -\left(\frac{4d^2 - 4c}{4c}\right) \Rightarrow a^2 - b = \frac{-d^2 + c}{c}$

$a^2c - bc = -d^2 + c$
$a^2c + d^2 = bc + c$

2. Sum of roots = $-b/2a$
since $|OA'| = |OB|$
$OA' = -OB$
hence sum of roots of $f(x) = 0$ & $g(x) = 0$ is zero.

3. $(g(x))^2 + mg(x) + 4 = 0$
$m^2 - 16 > 0$
$m \in (-\infty, -4) \cup (4, \infty)$
$|OA'| = |AA'| = 1$
$|OA'| = |OB| = 1 = |BB'|$
if $y = g(x)$ to have real roots $y > -1$
$m \in (5, \infty)$

4. $a\left(\frac{x}{1-x}\right)^2 + b\left(\frac{x}{1-x}\right) + c = 0$

$\Rightarrow \frac{x}{1-x} = \alpha$

$x = \alpha - \alpha x$

$x = \frac{\alpha}{1+\alpha}$

5. $x^3 - px^2 + qx - r = 0$
α, β, γ are root of equation
$\sum \alpha^2\beta = \alpha^2\beta + \alpha^2\gamma + \beta^2\alpha + \beta^2\gamma + \gamma^2\alpha + \gamma^2\beta$
$= (\alpha^2\beta + \alpha^2\gamma + \alpha\beta\gamma) + (\beta^2\alpha + \beta^2\gamma + \alpha\beta\gamma) + (\gamma^2\alpha + \gamma^2\beta + \alpha\beta\gamma)$
$- 3\alpha\beta\gamma$
$= \alpha(\alpha\beta + \beta\gamma + \alpha\gamma) + \beta(\beta\alpha + \beta\gamma + \alpha\gamma)$
$\quad + \gamma(\alpha\beta + \beta\gamma + \gamma\alpha) - 3\alpha\beta\gamma$
$= (\alpha\beta + \beta\gamma + \gamma\alpha)(\alpha + \beta + \gamma) - 3\alpha\beta\gamma$
$= qp - 3r$

6. α, β, γ are roots are roots of $x^3 - px^2 + qx - r = 0$
$\alpha + \beta + \gamma = p$, $\sum \alpha\beta = q$, $\alpha\beta\gamma = r$

$\left(\frac{1}{\alpha^2} + \frac{1}{\beta^2} + \frac{1}{\gamma^2}\right) = \frac{\alpha^2\beta^2 + \beta^2\gamma^2 + \gamma^2\alpha^2}{\alpha^2\beta^2\gamma^2}$

$= \frac{(\alpha\beta + \beta\gamma + \gamma\alpha)^2 - 2[\alpha\beta^2\gamma + \gamma\alpha^2\beta + \alpha\beta\gamma^2]}{\alpha^2\beta^2\gamma^2}$

$= \frac{q^2 - 2rp}{r^2}$

7. $(x - 3k)(x - k - 3) < 0$
$x \in [1, 3]$
for $x = 1$, $(1 - 3k)(1 - k - 3) < 0$
$(3k - 1)(k + 2) < 0$

$k \in \left(-2, \frac{1}{3}\right)$

for $x = 3$, $(3 - 3k)(-k) < 0$
$(k - 1)k < 0$
$k \in (0, 1)$

so $k \in \left(0, \frac{1}{3}\right)$

DPP NO. - 16

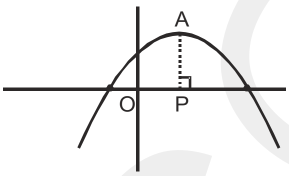
1. $|x^2 - 2x - 3| = m$
$x^2 - 2x - 3 - m = 0$
or $x^2 - 2x - 3 + m = 0$
if equation has 4 solutions
$4 + 4(3 + m) > 0$ & $4 - 4(m - 3) > 0$
$4 + m > 0$ & $-4m + 16 > 0$
$m > -4$ & $m < 4$
Since $|x^2 - 2x - 3| = m$
so m should be positive
hence $m \in (0, 4)$

2. For three solutions one of the equation should have equal roots
$|x^2 - 2x - 3| = m$
$x^2 - 2x - (m + 3)$ & $x^2 - 2x + (m - 3)$
$D_1 = 4 + 4(m + 3)$, $D_2 = 4 - 4(m - 3) = 0$
$D_1 \neq 0$ as $m > 0$ $m = 4$

3. Equation has two solutions
at $m = 0$ or $m \in (4, \infty)$
$n \in (4, \infty) \cup \{0\}$

4. $x^3 + x^2 - 333x - 1002 = 0$
$a + b + c = -1$, $ab + bc + ca = -333$
$abc = 1002$
$a^3 + b^3 + c^3 - 2(a + b + c)$
$= (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca) + 3abc - 2(a + b + c)$
$= (a + b + c)[(a + b + c)^2 - 3(ab + bc + ca)] + 3abc - 2(a + b + c)$
$= (-1)[1 - 3(-333)] + 3 \times 1002 - 2(-1)$
$= -1[1000] + 3006 + 2 = 2008$

5. $x^2 + \left(\frac{x}{x-1}\right)^2 = 8$
$x^2(x - 1)^2 + x^2 = 8(x - 1)^2$
$x^4 - 2x^3 + 2x^2 = 8x^2 - 16x + 8$
$x^4 - 2x^3 - 6x^2 + 16x - 8 = 0$
$x^3(x - 2) - 6x(x - 2) + 4(x - 2) = 0$
$(x - 2)[x^3 - 6x + 4] = 0$
$(x - 2)^2 (x^2 + 2x - 2) = 0$
number of roots = 3

6.


Equation of curve $y = ax^2 + bx + c$

$AP = \frac{-(b^2 - 4ac)}{4a} = 3 \Rightarrow \frac{-2b}{4a} = 3$

so $\frac{-b}{2a} = 3 \Rightarrow OP = 3$

7. $mx^2 - 9mx + (5m + 1) > 0 \quad \forall\ x \in R$
it is possible only if
$m > 0$ and $D = 81m^2 - 4m(5m + 1) < 0$
$\Rightarrow 61m^2 - 4m < 0$
$m(61m - 4) < 0$

$m \in \left(0, \frac{4}{61}\right)$

if $m = 0$ then expression is also positive so

$m \in \left[0, \frac{4}{61}\right)$

8. $f(x) = \frac{ax^2 + 2(a+1)x + 9a + 4}{x^2 - 8x + 32} < 0$

$= \frac{ax^2 + 2(a+1)x + 9a + 4}{(x-4)^2 + 16} < 0$

$ax^2 + 2(a + 1)x + 9a + 4 < 0$
$a < 0$, $4(a + 1)^2 - 4a(9a + 4) < 0$
$a^2 + 2a + 1 - 9a^2 - 4a < 0$
$8a^2 + 2a - 1 > 0$
$8a^2 + 4a - 2a - 1 > 0$
$4a(2a + 1) - 1(2a + 1) > 0$
$(2a + 1)(4a - 1) > 0$
$a < -1/2$ or $a > 1/4$
since $a < 0$

so $a \in \left(-\infty, -\frac{1}{2}\right)$

DPP NO. - 17

1. $|x - 3| < 5$
$\Rightarrow -5 < x - 3 < 5 \Rightarrow -2 < x < 8$
$\therefore x \in (-2, 8)$

2. $2 \le |x - 1| \le 3$
$\Rightarrow |x - 1| \ge 2$ and $|x - 1| \le 3$
$\Rightarrow -2 \le x - 1$ or $x - 1 \ge 2$ & $-3 \le x - 1 \le 3$
$\Rightarrow -1 \le x$ or $x \ge 3$ & $-2 \le x \le 4$
$\Rightarrow x \in (-\infty, -1] \cup [3, \infty)$ & $x \in [-2, 4]$
$\Rightarrow x \in [-2, -1] \cup [3, 4]$

3. $|x - 1| \le 5$ and $|x| \ge 2$
$\Rightarrow -5 \le x - 1 \le 5$ and $x \le -2$ or $x \ge 2$
$\Rightarrow -4 \le x \le 6$ and $x \le -2$ or $x \ge 2$
$\Rightarrow x \in (-4, 6] \cap x \in (-\infty, -2] \cup [2, \infty)$
$\Rightarrow x \in [-4, -2] \cup [2, 6]$

4. **Case-I :** $x < 1$
$-(x - 1) - (x - 2) \ge 4$
$\Rightarrow -x + 1 - x + 2 \ge 4$
$\Rightarrow -2x + 3 \ge 4$

$\Rightarrow -2x \ge 1$

$\Rightarrow x \le -\frac{1}{2}$ ......(1)

Case-II : $1 \le x < 2$
$x - 1 - (x - 2) \ge 4 \Rightarrow x - 1\ \ x + 2 \ge 4$
$1 \ge 4$ Not possible
$\therefore x \in \phi$

Case-III : $x \ge 2$
$x - 1 + x - 2 \ge 4$

$2x \ge 7 \Rightarrow x \ge \frac{7}{2}$ ......(2)

$\therefore (1) \cup (2) \quad x \in \left(-\infty, -\frac{1}{2}\right] \cup \left[\frac{7}{2}, \infty\right)$

5. $\frac{|x| + 1}{|x| - 2} \ge 0$, $x \in R$, $x \neq \pm 2$

$\Rightarrow \frac{1}{|x| - 2} \ge 0 \quad (\because |x| + 1 > 0) \Rightarrow |x| - 2 > 0$

$\Rightarrow |x| > 2 \Rightarrow x \in (-\infty, -2) \cup (2, \infty)$

6. $\frac{-1}{|x|-2} \ge 1 \quad \Rightarrow \quad \frac{-1}{|x|-2} - 1 \ge 0$

$\Rightarrow \frac{-1-|x|+2}{|x|-2} \ge 0 \quad \Rightarrow \quad \frac{1-|x|}{|x|-2} \ge 0$

$\Rightarrow \frac{|x|-1}{|x|-2} \le 0$

$\Rightarrow 1 \le |x| < 2$

$\Rightarrow |x| \ge 1 \quad \& \quad |x| < 2$

$\Rightarrow x \in (-\infty, -1] \cup [1, \infty) \cap x \in (-2, 2)$

$\Rightarrow x \in (-2, -1] \cup [1, 2)$

7. $\frac{|x+3|+x}{x+2} > 1$

$\Rightarrow \frac{|x+3|+x-x-2}{x+2} > 0 \quad \Rightarrow \quad \frac{|x+3|-2}{x+2} > 0$

Case-I : $x \le -3$ ......(1)

$\frac{-x-3-2}{x+2} > 0$

$\Rightarrow \frac{-x-5}{x+2} > 0$

$\Rightarrow \frac{x+5}{x+2} < 0$

$\Rightarrow -5 < x < -2$

$\Rightarrow x \in (-5, -2)$ ......(2)

(1) $\cap$ (2) $\Rightarrow x \in (-5, -3]$ ......(A)

Case-II : $x > -3$ ......(3)

$x > -3$

$\frac{x+3-2}{x+2} > 0$

$\frac{x+1}{x+2} > 0$

$x \in (-\infty, -2) \cup (-1, \infty)$ ......(4)

(3) $\cap$ (4) $\Rightarrow x \in (-3, -2] \cup (-1, \infty)$ ......(B)n

$\therefore$ (A) $\cup$ (B) $\Rightarrow x \in (-5, -2) \cup (-1, \infty)$

8. $||x-2|-1| \ge 3$

$\Rightarrow |x-2| - 1 \le -3$ or $|x-2| - 1 \ge 3$

$\Rightarrow |x-2| \le -2$ or $|x-2| \ge 4$

$\Rightarrow x \in \phi$ or $x - 2 \ge -4$ or $x - 2 \ge 4$

or $x \le -2$ or $x \ge 6$

$\therefore$ Ans. $(-\infty, -2] \cup [6, \infty)$

9. $|(x^2 + 2x + 2) + (3x + 7)| < |x^2 + 2x + 2| + |3x + 7|$

$\underbrace{(x^2+2x+2)}_{+ve\ \ D<0}(3x + 7) < 0$

$[\because |x + y| < |x| + |y| \Rightarrow xy < 0]$

$\Rightarrow 3x + 7 < 0 \quad \Rightarrow \quad x < -\frac{7}{3}$

10. $|x^2 - 1| + |x^2 - 4| \le 3$

Case-I : When $x^2 < 1$

$\Rightarrow x \in (-1, 1)$ ......(i)

$-(x^2 - 1) - (x^2 - 4) \le 3$

$\Rightarrow -2x^2 \le -2 \quad \Rightarrow \quad x^2 \ge 1$

$\Rightarrow x \in (-\infty, -1] \cup [1, \infty)$ ......(ii)

(i) $\cap$ (ii) $\Rightarrow x \in \phi$

Case-II : $1 \le x^2 \le 4$

$\Rightarrow 1 \le |x| \le 2 \quad \Rightarrow \quad |x| \ge 1 \ \& \ |x| \le 2$

$\Rightarrow x \in (-\infty, -1] \cup [1, \infty) \cap [-2, 2]$

$\Rightarrow x \in (-2, -1] \cup [1, 2]$ ......(iii)

$x^2 - 1 - x^2 + 4 \le 3$

$3 \le 3$ which is true.

$\therefore x \in [-2, -1] \cup [1, 2]$ ......(iv)

Case-III : $x^2 > 4$

$\Rightarrow |x| > 2 \Rightarrow x \in (-\infty, -2) \cup (2, \infty)$.......(v)

$x^2 - 1 + x^2 - 4 \le 3$

$\Rightarrow 2x^2 - 5 \le 3$

$\Rightarrow 2x^2 \le 8$

$\Rightarrow x^2 \le 4$

$\Rightarrow x \in [-2, 2]$ ......(vi)

(v) $\cap$ (vi) $\Rightarrow x \in \phi$

$\therefore$ Ans. $x \in [-2, -1] \cup [1, 2]$

11. $|x^2 + 3x| + x^2 - 2 \ge 0$

$\Rightarrow |x(x + 3)| + x^2 - 2 \ge 0$

Case-I $x < -3$ ....(i)

$\Rightarrow x(x + 3) + x^2 - 2 \le 0$

$\Rightarrow x^2 + 3x + x^2 - 2 \ge 0$

$\Rightarrow 2x^2 + 4x - x - 2 \ge 0$

$\Rightarrow 2x(x + 2) - 1(x + 2) \ge 0$

$\Rightarrow (2x - 1)(x + 2) \ge 0$

$\Rightarrow x \in (-\infty, -2]\ [1/2, \infty)$ ......(ii)

(i) $\cap$ (ii) $\Rightarrow x \in (-\infty, -3)$ ......(A)

Case-II : $-3 \le x < 0$ ......(iii)

$-x(x + 3) + x^2 - 2 \ge 0$

$\Rightarrow -x^2 - 3x + x^2 - 2 \le 0$

$\Rightarrow 3x + 2 \le 0$

$\Rightarrow x \le \frac{-2}{3}$ ......(iv)

(iii) $\cap$ (iv) $\Rightarrow x \in \left[-3, -\frac{2}{3}\right]$ ......(B)

Case-III : $x \ge 0$ ......(v)

$x^2 + 3x + x^2 - 2 \ge 0$

$\Rightarrow x \in (-\infty, -2] \cup \left[\frac{1}{2}, \infty\right)$ ......(C)

Ans. (A) $\cup$ (B) $\cup$ (C) $\Rightarrow x \in \left(-\infty, -\frac{2}{3}\right] \cup \left[\frac{1}{2}, \infty\right)$

12. $||x| - 1| < |1 - x|, x \in R$

+ve +ve

squaring both sides,

$\Rightarrow (|x| - 1)^2 < (1 - x)^2$

$\Rightarrow x^2 + 1 - 2|x| < 1 + x^2 - 2x$

$\Rightarrow |x| > x$

$\Rightarrow x < 0$

$\Rightarrow x \in (-\infty, 0)$

13. $|x^2 + 4x + 3| + 2x + 5 = 0$

$\Rightarrow |(x + 1)(x + 3)| + 2x + 5 = 0$

Case-I : $x < -3$

$+(x + 1)(x + 3) + 2x + 5 = 0$

$x^2 + 6x + 8 = 0$

$\Rightarrow$ $(x + 4)(x + 2) = 0$

$\Rightarrow$ $x = -2, -4$

$\because$ $x < -3$ $\Rightarrow$ $x = -4$

Case-II : $-3 \le x < -1$

$-(x + 1)(x + 3) + 2x + 5 = 0$

$-x^2 - 4x - 3 + 2x + 5 = 0$

$-x^2 - 2x + 2 = 0$

$x^2 + 2x - 2 = 0$

$\Rightarrow$ $x = \dfrac{-2 \pm \sqrt{4+8}}{2} = \dfrac{-2 \pm 2\sqrt{3}}{2} = -1 \pm \sqrt{3}$

$\because$ $-3 \le x < -1$

$\therefore$ $x = -1 - \sqrt{3}$

Case-III : $x \ge -1$

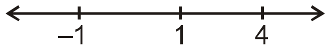
$$\left.\begin{aligned} & x^2 + 4x + 3 + 2x + 5 = 0 \\ \Rightarrow\ & x^2 + 6x + 8 = 0 \\ \Rightarrow\ & x = -2, -4 \end{aligned}\right\} \cap \Rightarrow x \in \phi$$

$\therefore$ Ans. $x \in \{-4, -1 - \sqrt{3}\}$

14. $|x^2 - 3x - 4| = 9 - |x^2 - 1|$

$\Rightarrow$ $|x^2 - 3x - 4| + |x^2 - 1| = 9$

$\Rightarrow$ $|(x - 4)(x + 1)| + |(x + 1)(x - 1)| = 9$



Case-I : $x < -1$

$x^2 - 3x - 4 + x^2 - 1 = 9$

$\Rightarrow$ $2x^2 - 3x - 5 = 9$

$\Rightarrow$ $2x^2 - 3x - 14 = 0$

$\Rightarrow$ $2x^2 - 7x + 4x - 14 = 0$

$\Rightarrow$ $x(2x - 7) + 2(2x - 7) = 0$

$\Rightarrow$ $x = -2, 7/2$

$\because$ $x < -1$ $\therefore x = -2$

Case-II : $-1 \le x < 1$

$-(x^2 - 3x - 4) - (x^2 - 1) = 9$

$\Rightarrow$ $-x^2 - 3x + 4 - x^2 + 1 = 9$

$\Rightarrow$ $-2x^2 + 3x + 5 = 9$

$\Rightarrow$ $-2x^2 + 3x - 4 = 0$

$\Rightarrow$ $2x^2 - 3x + 4 = 0$

$\Rightarrow$ $D < 0$ $\therefore$ it has no real roots.

$\therefore$ $x \in \phi$

$1 \le x < 4$

$-(x^2 - 3x - 4) + x^2 - 1 = 9$

$\Rightarrow$ $-x^2 + 3x + 4 + x^2 - 1 = 9$

$\Rightarrow$ $3x + 3 = 9$

$\Rightarrow$ $3x = 6$

$\Rightarrow$ $x = 2 \in [1, 4)$

$\therefore$ $x = 2$

Case-IV : $x \ge 4$

$x^2 - 3x - 4 + x^2 - 1 = 9$

$\Rightarrow$ $2x^2 - 3x \ \ 5 = 9$

$\Rightarrow$ $2x^2 - 3x - 5 = 9$

$\Rightarrow$ $2x^2 - 7x + 4x - 14 = 0$

$\Rightarrow$ $x(2x - 7) + 2(2x - 7) = 0$

$\Rightarrow$ $(x + 2)(2x - 7) = 0$

$\Rightarrow$ $x = -2, 7/2$

$\because$ $x \ge 4$

$\therefore$ $x \in \phi$

$\therefore$ $x \in \{-2, 2\}$

15. $|f(x) - g(x)| < |f(x)| + |g(x)|$

Square both sides.

$\Rightarrow$ $(f(x) - g(x))^2 < (|f(x)| + |g(x)|)$

$\Rightarrow$ $f^2(x) + g^2(x) - 2f(x) \,.\, g(x) < f^2(x) + g^2(x) + 2|f(x) \,.\, g(x)|$

$-2f(x) \,.\, g(x) < 2|f(x) \,.\, g(x)|$

$\Rightarrow$ $|f(x) \,.\, g(x)| > -f(x) \,.\, g(x)$

$\Rightarrow$ $f(x) \,.\, g(x) > 0$

$\Rightarrow$ $(x - 3)(4 - x) > 0$

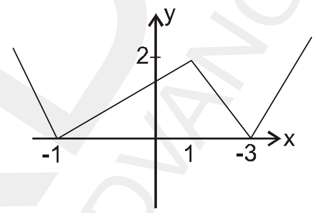
$\Rightarrow$ $(x - 3)(x - 4) < 0$

$\Rightarrow$ $x \in (3, 4)$

DPP NO. - 18

1. for two solution

$||x - 1| - 2| = \lambda$ graph of $f(x) = ||x - 1| - 2|$



$\lambda \in (2, \infty) \cup \{0\}$

2. For three solution

$\lambda = 2$

3. for four solution

$\lambda \in (0, 2)$

so integral values of $\lambda = 1$

4. α, β, γ are roots of equation

$x^3 - px^2 + qx - r = 0$

$\alpha + \beta + \gamma = p$

$\alpha\beta + \beta\gamma + \alpha\gamma = q$

$\alpha\beta\gamma = r$

$$\sum \frac{\alpha\beta}{\gamma} = \frac{\alpha\beta}{\gamma} + \frac{\beta\gamma}{\alpha} + \frac{\alpha\gamma}{\beta} = \frac{\alpha^2\beta^2 + \beta^2\gamma^2 + \alpha^2\gamma^2}{\alpha\beta\gamma} =$$

$$\frac{(\alpha\beta + \beta\gamma + \alpha\gamma)^2 - 2}{\alpha\beta\gamma} = \frac{q^2 - 2pr}{r}$$

5. **S_1 :** $ax^2 + bx + c = 0$ $(a \ne 0)$

if $a + b + c = 0$ then one root is 1

product of roots $= \dfrac{c}{a}$

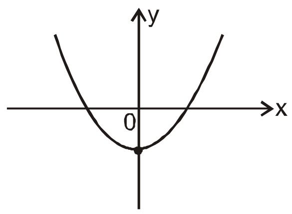
so another root $= \dfrac{c}{a}$

S_2 : $f(x) = ax^2 + bx + c$ $(a \ne 0)$

it has finite minimum value of graph is

upward parabola

roots are of opposite sign



so f(0) < 0

S_3 : α is repeated root of

$ax^2 + bx + c = 0$

so $ax^2 + bx + c = a(x - \alpha)^2$

S_n : $ax^2 + bx + c = 0 \quad (a \neq 0)$

Irrational roots occur in conjugate pair only if a, b, c are rational.

6. α, β are roots of $x^2 + \alpha x + \beta = 0$ is

$\alpha + \beta = -\alpha$ ...(1) and $<\beta = \beta$ ...(2)

from (1) & (2) $\alpha = 1, \beta = -2$

Now $||x + 2| - 1| < 1$

$\Rightarrow -1 < |x + 2| - 1 < 1$

$0 < |x + 2| < 2$

$\Rightarrow -2 < x + 2 < 2$ and $x \neq -2$

$x \in (-4, 0) - \{-2\}$

7. $(a - 5)x^2 + (\sqrt{4a - a^2})x + (a^2 - 2a - 3) = 0$

for defining equation $4a - a^2 \geq 0$

$a(a - 4) \leq 0$

$a \in [0, 4]$ ...(1)

roots are of opposite sign

so $\frac{a^2 - 2a - 3}{a - 5} < 0 \quad \Rightarrow \quad \frac{(a-3)(a+1)}{a-5} < 0$

– + – +
-1 3 5

$\Rightarrow \quad a \in (-\infty, -1) \cup (3, 5)$ ...(2)

from (1) & (2)

$a \in (3, 4]$

8. $\frac{ax^2 + 3x + 4}{x^2 + 2x + 2} - 5 < 0 \quad \Rightarrow \quad \frac{(a-5)x^2 - 7x - 6}{x^2 + 2x + 2} < 0$

but $x^2 + 2x + 2$ is always positive

so $(a - 5)x^2 - 7x - 6 < 0 \quad \forall \; x \in R$

so $a - 5 < 0 \Rightarrow a < 5$

and $D = 49 - 4(a - 5)(-6) < 0$

$49 + 24(a - 5) < 0$

$24a < 71$

$a < \frac{71}{24}$

so $a < \frac{71}{24}$

Max. Integral value of a = 2

DPP NO. - 19

1. n(P) = 25%, n(C) = 15%

$n(P^c \cap C^c) = 65\%$, $n(P \cap C) = 2000$

Since $n(P^c \cap C^c) = 65\%$

$\therefore n(P \cup C)^c = 65\% \quad \therefore n(P \cup C) = 35\%$ (2 is correct)

Now $n(P \cup C) = n(P) + n(C) - (P \cap C)$

$\therefore \quad 35 = 25 + 15 - n(P \cap C) \Rightarrow n(P \cap C) = 40 - 35$

= 5

Thus $n(P \cap C) = 5\%$

But $n(P \cap C) = 2000$

$\therefore$ 5% of total = 2000

$\therefore$ total number of families $= \frac{2000 \times 100}{5} = 40000$

$\therefore n(P \cup C) = 35\%$

Total number of families = 40, 000 (3 is correct)

and $n(P \cap C) = 5\%$

2. $A \cap (B \cup A)' = A \cap (B' \cap A') = (A \cap B') \cap (A \cap A') = (A \cap B') \cap \phi = \phi$.

3. Let number of people teaching mathematics, physics, both physics and mathematics, physics or mathematics are n (m), n(p), $n(p \cap m)$, $n(p \cup m)$ respectively.

$\therefore \quad n(m \cup p) = n(m) + n(p) - n(p \cap m)$

$20 = 12 + n(p) - 4$

$\therefore \quad n(p) = 12$

4. 3, 9,.........999

999 = 3 + (n – 1)6

$\frac{996}{6} = (n - 1) \Rightarrow 166$

n = 167

sum $= \frac{167}{2}(3 + 999)$

$\Rightarrow \frac{167}{2}(1002) \Rightarrow (167)(501)$

= 83667

5. $a_1 + a_2 + a_4 + \ldots\ldots + a_{200} = \alpha$

$a_1 + a_3 + a_5 + \ldots\ldots + a_{199} = \beta$

....

$100d = \alpha - \beta$

$d = \frac{\alpha - \beta}{100}$

6. $\frac{S_{n_1}}{S_{n_2}} = \frac{3n - 13}{5n + 21} \Rightarrow \frac{2a_1 + (n-1)d}{2a_2 + (n-1)d} = \frac{3n - 13}{5n + 21}$

$$\frac{a_1 + \left(\frac{n-1}{2}\right)d_1}{a_2 + \frac{(n-1)d_2}{2}} = \frac{3n - 17}{5n + 21}$$

Now $T_{24} = \frac{n-1}{2} = 23$

n = 47

$\frac{a_1 + 23d_1}{a_2 + 23d_2} = \frac{3.47 - 17}{5.47 + 21} = \frac{1}{2}$

7. a – d, a, a + d

$3a = 9 \Rightarrow a = 3$

$(a - d)^2 + a^2 + (a + d)^2 = 35$

$3a^2 + 2d^2 = 35$

$d^2 = 4$

d = 2, –2

$S_n = \frac{n}{2}[2 + (n - 1).2] \Rightarrow n^2$

$S_n = \frac{n}{2}[10 + (n - 1)(-2)]$

$= \frac{n}{2}[12 - 2n] = n(6 - n)$

DPP NO. - 20

1 to 3. a, b, c, d

18, p, $\frac{p}{2}$, $\frac{p}{4}$

$2p = \frac{p}{2} + 18 \Rightarrow p = 12$

18, 12, 6 , 3
a b c d
c + d = 9
12 A_1 A_2 A_3 6

$d = \frac{6-12}{4} \Rightarrow -\frac{3}{2}$

$A_3 = 6 - d = 6 + \frac{3}{2} = \frac{15}{2}$

k_1C A_1 A_2 A_3 A_4 k_2d $k_2 = 64k_1$

$r = \left(\frac{k_2 d}{k_1 c}\right)^{1/5}$

$r = (32)^{1/5} = 2$

4. $\frac{a(1-r^3)}{a(1-r^6)} = \frac{125}{152} \Rightarrow \frac{1}{1+r^3} = \frac{125}{152}$

$152 = 125 + 125r^3$

$r = \frac{3}{5}$

5. $\frac{3}{4}, \frac{2}{3}, \frac{7}{12}$ ............A.P.

$a = \frac{3}{4}$ $d = \frac{2}{3} - \frac{3}{4} = -\frac{1}{12}$

$T_{61} = a + 60d$

$= \frac{3}{4} + 60\left[-\frac{1}{12}\right] = -5 + \frac{3}{4} = -\frac{17}{4}$

T_{61} of an H.P. $= -\frac{4}{17}$

6. $200 < \frac{9}{2}(a_1 + a_9) < 220$

$\frac{400}{9} < a_1 + a_9 < \frac{400}{9}$

$\frac{400}{9} < a_1 + a_1 + 8d < \frac{440}{9}$

$\frac{200}{9} < a_1 + 4d < \frac{220}{9}$

$22 < a_1 + 4d < 24.4$
$a_1 + 4d = 23$ or 24
a + d = 12 or 12

3d = 12
d = 4
a = 8 8,12,16........

7. $x_1 + x_2 = 3$ $x_3 + x_4 = 12$
$x_1 x_2 = A$ $x_3.x_4 = B$
x_1 x_2 x_3 x_4 $\rightarrow$ G.P.
a ar ar^2 ar^3 $\rightarrow$ $|r| > 1$
a(1 + r) = 3
$ar^2 (1 + r) = 12$
----
r = 2, – 2 Hence r = 2
a = 1
$A = a.ar = a^2r = 2$
$B = a^2r^5 = 2^5 = 32$