13/8/24

Lesson-3 :- Equations * Topic

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Lesson 1 :-

1st three major I need to know to solve this problems on this topic.

* What type of Equation
* How to Compare x & y
* Find Answer.

* What type of Equation :-

(i) Quadratic equation :-

Type (1) → $x^2 + 11x + 28 = 0$ $\quad y^2 + 7y + 10 = 0$

28 → c → constant.

If there is a constant in a given equation the equation is Quadratic Equation.

Type (2) → $3x^2 + 13x + 12 = 0$ & $y - 15y + 14 = 0$.

ii) Quadratic equation based on Square root :-

$3x^2 - 8\sqrt{3}x + 45 = 0$ $\quad y^2 \mp \sqrt{12}y - 24 = 0$.

iii) Simultaneous Equation :-

If there is a equation with not like Quadratic equation

$2x + 5y = 6$ $\quad 3x + 11y = 8$.

iv) Synthetic division & long division

If a equation start with x^3 Solve the problem by using any one method Synthetic (or) long

$$\frac{4x^3 + 3x^2 + 2x + 1}{(x+2)}$$

v) Surds & Indies :-

$$\frac{9}{\sqrt{x}} + \frac{10}{\sqrt{x}} = \sqrt{2}$$

* How to Compare?

$x_1 = 4, 5$ $\quad x_2 = 5, 9$

$y_1 = 9, 8$ $\quad y_2 = 8$

$x = 5$

$y = 9, 1$

$y = 4, 5$

$x = 9, 2$

$x = 4, 5 \mid x = 5$

$y = 5, 9 \mid x = 9, 5$

$x = 4$

$y = 9$

$x_1 < y_1$ 9

$x_1 < y_2$ 8

$x_2 < y_2$ 9

$x_2 < y_2$ 8

$x_1 \quad 5 < 9$

$5 \leq 5$

$x = 9$

$y = 9 \quad 4 < 9$

$x = \frac{9}{7} \quad y = \frac{3}{7}$

$\frac{9}{7} > \frac{3}{7} \quad 63 < 21$

Pattern	Compare
x_1	y_1
x_1	y_2
x_2	y_1
x_2	y_2

* final Answer

a) $x>y$ b) $x<y$ c) $x \geq y$ d) $x \leq y$ e) $x = y$ (or) x y + relationship cannot exist

x y	x y	x y
$6>4$	$-7>7$	$-7<-3$
$6>3$	$-7>9$	$-7<-5$
$5>4$	$-7=-7$	$-7=-7$
$5>3$	$-7=-7$	$-7=-7$

A: a) $x>y$ c) $x \geq y$ A: d) $x \leq y$

$-7<7$

$8<10$

A:- b) $x<y$

$-3>-7$

$-7>-5$

$-4<-3$

$-4>-5$

e) x & y does not exist

Ex: x^2 & y^2 with constant

$x^2+11x+28=0$ $y^2+13y+40=0$

28: $7+4$, $7+4=11$ 40: 8 5, $8+5=13$

A: $x_1=-7$, $x_2=-4$ $y_1=-8$, $y_2=-5$

Compare - $-7>-8$, $-7<-5$, $-4 \geq -8$, $-4>-5$

x and y cannot exist.

$x^2-x-30=0$ $y^2+12x+36=0$

$x_1=-5$, $x_2=+6$ $y_1=-6$, $y_2=-6$

-30: 5 -6 36: 6 6

{ + → − ; − → + }

-5 $x_1>$ y_1-6

-5 $x_1>$ y_2-6

$+6$ $x_2>$ y_1-6

$+6$ $x_2>$ y_2-6

$x>y$

$x^2+3x-28=0$ $y^2-11y+280=0$ -7 4

$+7$ -4 | -7 -4

$x_1=-7$, $x_2=4$ | $y_1=7$, $y_2=4$

$-7=7$, $-7<4$, $4<7$, $4=4$ $x \leq y$

Type 2 :- Before x^2 y^2 Constant

$5x^2 + 3x - 14 = 0$ $2y^2 - 9y + 10 = 0$

Here multiplying here divided

$5 \times 14 = -70$

$5x - 14 = 10, -7$

$5x - 14$

5 10 7

$\frac{10}{5}$ $\frac{7}{5}$

-5 -4

$\frac{-5}{2}$ $\frac{-4}{2}$

- to positive (+)
(+) to negative (-)

$x_1 = \frac{7}{5}$ when compare $y_1 = +\frac{5}{2}$

$x_2 = -2$ $y_2 = 2$

14 < 25

x_1 y_1 / x_2 y_2

$\frac{7}{5}$ $x_1 < y_1$ $\frac{5}{2}$ b) $x < y$

$\frac{7}{5}$ $x_1 < y_2$ 2

-2 $x_2 < y_1$ $\frac{5}{2}$

-2 $x_2 < y_2$ 2

$8x^2 + 31x + 21 = 0$ $5y^2 + 11y - 36 = 0$

$8 \times 21 = 168$ $5 \times -36 = 180$

8 7 3 5 -9 4

$\frac{24}{8}$ $\frac{7}{8}$

$x_1 = 3$ $x = \frac{-7}{8}$

$y_1 = 4$ $y_2 = \frac{-9}{5}$

-3 $x_1 < y_1$ $-9/5$

-3 $x_1 > y_2$ -4

$\frac{-7}{8}$ $x_2 < y_1$ $-9/5$

$\frac{-7}{8}$ $x_2 > y_2$ -4

cannot be established

Rule: Number > 100
1) Square
2) cube
3) 1000
4) even
5) odd

$12x^2 + 11x - 56 = 0$ $4x^2 - 15y + 14 = 0$

$12x - 56 = -612$ $4 \times 14 = 56$

12 7 8 4 14

4 3 7 8 4 7 2

32 21 8 7

$\frac{+32}{12}$ $\frac{-21}{12}$ $\frac{+8}{4}$ $\frac{7}{4}$

$x_1 = \frac{-8}{3}$ $y_1 = +2$

$x_2 = \frac{7}{4}$ $y_2 = \frac{7}{4}$

$-\frac{8}{3}$ $x_1 < y_1$ 2

$-\frac{8}{3}$ $x_1 < y_2$ 7/4

$x_2 < y_1$ 2

7/4 $x_2 = y_2$ 7/4

$x \leq y$

4) $15x^2+68x+77=0$. $3y^2+29y+68=0$

15×77 : 3×68 : 34×2, 17×4

$35\ 11\ 7$: $3\ 17\ 4$

$x_1=-\frac{7}{5}$, $y_1=-4$

$x_2=-\frac{11}{3}$, $y_2=-\frac{17}{3}$

$-7/5\ x_1 > y_1\ -4$

$-7/5\ x_1 > y_2\ -17/3$

$-11/3\ x_2 > y_1\ -4$

$-11/3\ x_2 > y_2\ -17/3$

$x > y$

5) $14x^2-37x+24=0$ $28y^2-53y+24=0$

14×24 : $7\ 2\ 3\ 8$: $21\ 16$

28×24 : $7\ 4\ 8\ 3$: $56\ 12$

$x_1+\frac{3}{2}$, $x_2+\frac{8}{7}$

$y_1+\frac{4}{7}$, $y_2+\frac{3}{7}$

$3/2\ x_1 > y_1\ 3/4$

$3/2\ x_1 > y_2\ 8/7$

$8/7\ x_2 > y_1\ 3/4$

$8/7\ x_2 > y_2\ 8/7$

$4\times8=$

6) $6x^2+51x+105=0$. $2y^2+5y+78=0$.

6×105 : $6\ 5\ 21$: 2×78 : $4\ 13\ 6$

39×2 : 13×6

$x_1=-5$, $y_1=-6$

$x_1=-5$, $y_2=-\frac{13}{2}$

$x_2=-\frac{7}{2}$, $y_1=-6$

$x_2=-\frac{7}{2}$, $y_2=-\frac{13}{2}$

$x > y$

Lesson 4

Quadratic Equation with Square root

$\sqrt{3}=1.7$

$\sqrt{2}=1.4$

1. $x^2-8\sqrt{3}x+45=0$. $y-\sqrt{2}y-24=0$.

Two no. mul → 45

Two no. Add → $8\sqrt{3}$ Step ①

45 : $\sqrt{3}\ \sqrt{3}$

$x_1=+5\sqrt{3}$

$x_2=3\sqrt{3}$

Step ② $\sqrt{3}\times\sqrt{3}=3$

$3\times15=45$: $-5\ -3$

Step 3 : 45 : $-5\sqrt{3}\ -3\sqrt{3}$

-24 : $-\sqrt{2}\ \sqrt{2}$

$2\times-12=-24$: $+3\ -4$

-24 : $-4\sqrt{2}\ 3\sqrt{2}$

$y_1 = 4\sqrt{2}$ $5\sqrt{3}\, x_1 > y_1\ 4\sqrt{2}$ 4(1.4) 5.6

$y_2 = -3\sqrt{2}$ $5\sqrt{3}\, x_1 > y_2 - 3\sqrt{2}$

$3\sqrt{3}\, x_2 < y_1\ 4\sqrt{2}$

$3\sqrt{3}\, x_2 > y_2 - 3\sqrt{2}$

x does not relate to y.

(2) $x^2 - 7\sqrt{2}x + 24 = 0$ $y^2 - 5\sqrt{2}y + 12 = 0$

24 → $\sqrt{2}$ $\sqrt{2}$

$2 \times 12 = 24$ → $-3\ -4$

$-3\sqrt{2}$ $-4\sqrt{2}$

$x_1 = 3\sqrt{2}$

$x_2 = 4\sqrt{2}$

12 → $\sqrt{2}$ $\sqrt{2}$

$2 \times 6 = 12$ → $-3\ -2$

$-3\sqrt{2}$ $-2\sqrt{2}$

$y_1 = 3\sqrt{2}$

$y_2 = 2\sqrt{2}$

$3\sqrt{2}\, x_1 = y_1\ 3\sqrt{2}$

$3\sqrt{2}\, x_1 > y_2\ 2\sqrt{2}$

$4\sqrt{2}\, x_2 > y_1\ 3\sqrt{2}$

$4\sqrt{2}\, x_2 > y_2\ 2\sqrt{2}$

$x \geq y$

4×1.7 = 6.8

3×1.7 = 5.1

7×1.4 = 9.8

5×1.4 = 7

(3) $x^2 - 7\sqrt{3}x + 36 = 0$ $y^2 - 12\sqrt{2}y + 70 = 0$

36 → $-3\sqrt{3}$ $-4\sqrt{3}$

$3 \times 12 = 36$ → $-3\ -4$

$x_1 = +4\sqrt{3}$

$x_2 = 3\sqrt{3}$

70 → $\sqrt{2}$ $\sqrt{2}$

$2 \times 35 = 70$ → $-7\ -5$

$y_1 = +7\sqrt{2}$

$y_2 = 5\sqrt{2}$

6.8 < 9.8

$4\sqrt{3}\, x_1 < y_1\ 7\sqrt{2}$

$4\sqrt{3}\, x_1 < y_2\ 5\sqrt{2}$ 7

5.1 9.8

$3\sqrt{3}\, x_2 < y_1\ 7\sqrt{2}$

$3\sqrt{3}\, x_2 < y_2\ 5\sqrt{2}$

$x < y$

Lesson #5

Simultaneous Equation

$7x - 3y = 13$ (1) $5x + 4y = 40$ (2)

4 × (1) ⇒ $28x - 12y = 52$

3 × (2) ⇒ $15x + 12y = 120$

$43x = 172$

$x = 4$

$x = 172 \div 43$

$x = 4$ in (1)

$7(4) - 3y = 13$

$28 - 3y = 13$

$28 - 13 = 3y$

$15 = 3y$

$\frac{15}{3} = y$

$y = 5$

$x < y$

$2x + 5y = 6$ $5x + 11y = 9$

(1)×5 $10x + 25y = 30$

(2)×2 $10x + 22y = 18$

$3y = 12$

$y = 4$

$2(x) + 5(4) = 6$

$2x = 6 - 20$

$x = \frac{-14}{2}$

$x = -7$

6 − 20 = −14

$x < y$

Lesson #6

Surds & its uses

4 formula:

$a^m \times a^n = a^{m+n}$

$(a^m)^n = a^{mn}$

$a^m \times b^m = (ab)^m$

~~$(a^m)^n = a$~~

~~$(a \times b)$~~

$a^m \div b^n = a^{m-n}$

Ex

$x^2 = 25$ $\quad y = \sqrt{25}$

$x = \sqrt{25}$ $\quad y = 5$

(i) (ii) $x = \pm 5$

$\frac{9}{\sqrt{x}} + \frac{19}{\sqrt{x}} = \sqrt{x}$

$\frac{9+19}{\sqrt{x}} = \sqrt{x}$

$\frac{28}{\sqrt{x}} = \sqrt{x}$

$28 = (\sqrt{x})^2$

$x = 28$

$\frac{y^5}{1} - \frac{(14 \times 2)^{11/2}}{\sqrt{y}} = 0$

$\frac{y^5 \sqrt{y} - (14 \times 2)^{11/2}}{\sqrt{y}} = 0$

$y^5 \cdot y^{1/2} - (28)^{11/2} = 0$

$y^5 y^{1/2} - (28)^{11/2} = 0$ $\quad x = y$

$a^m a^n$

$5 \to 1/2$

$y = 28$

$y^{\frac{10+1}{2}} - (28)^{1/2}$

$\frac{12}{\sqrt{x}} - \frac{23}{\sqrt{x}} = 5\sqrt{x}$

$\frac{12-23}{\sqrt{x}} = 5\sqrt{x}$

$\frac{-11}{\sqrt{x}} = \sqrt{x}$

$-11 = x$

$\frac{\sqrt{y}}{12} - \frac{5\sqrt{y}}{60} = \frac{1}{\sqrt{y}}$

$\frac{-4\sqrt{y}}{12} = \frac{1}{\sqrt{y}}$

$-4(\sqrt{y})^2 = 12$ $\quad x < y$

$-4y = 12$

$y = \frac{12}{-4}$

$x = -11$ $\quad y = -3$

Ans 20

$(x^{7/5} \div 9) = 169 \div x^{3/5}$

$\frac{x^{7/5}}{9} = \frac{169}{x^{3/5}}$

$x^{7/5} \times x^{3/5} = 169 \times 9$

$x^{\frac{7}{5}+\frac{3}{5}} =$

$x^{\frac{10}{5}} = 169 \times 9$

$x^2 = 169 \times 9$

$x = \sqrt{169 \times 9}$

$x = \sqrt{169} \times \sqrt{9}$

$x = \pm 13 \times 3$

$x = \pm 39$

$y^{1/4} \times y^{1/4} \times 7 = 273 \div y^{1/2}$

$x^m \div x^n$

$\frac{1}{4} + \frac{1}{4} \quad \frac{x}{x^{1/2}}$

169×9

$y^{1/4}$

$(y)^{1/4} \times 7 = \frac{273}{y^{1/2}}$

$7 (y)^{1/2} \times y^{1/2}$

$y^{1/2} \times 7 = \frac{273}{y^{1/2}}$

$y^{1/2} \times y^{1/2} = \frac{273}{7}$

$\sqrt{y} \times \sqrt{y} = 39$

$y = 39$

13×3
39

39
7 | 273
21
6