

LINEAR INEQUALITIES (Solution)

Ques 1 → Let the two consecutive even integers are x & $(x+2)$

ATQ $x > 5$ and $x+2 > 5$
 $\Rightarrow x > 5$ and $x > 3$
Consider $x > 5$ --- (i)

ATQ $x + (x+2) < 23$
 $\Rightarrow 2x < 21$
 $\Rightarrow x < 10.5$ --- (2)

From (1) & (2)

$$5 < x < 10.5$$

\therefore Required pairs are $(6, 8)$ $(8, 10)$ $(10, 12)$ Ans

Ques 2 → Let the shortest side be x cm

ATQ longest side = $3x$ cm
third side = $(3x-2)$ cm

$$\text{Perimeter} = \frac{x + 3x + 3x - 2}{\bullet} = \frac{7x - 2}{\bullet}$$

ATQ Perimeter ≥ 61

$$\Rightarrow \frac{7x - 2}{\bullet} \geq 61$$

$$\Rightarrow 7x \geq 63$$

$$\Rightarrow x \geq 9$$

\therefore Minimum length of shortest side = 9 cm Ans

Ques 3 → let the marks in 3rd test be x

$$\text{Average} = \frac{70+75+x}{3} = \frac{145+x}{3}$$

Given Average ≥ 60

$$\frac{145+x}{3} \geq 60$$

$$\Rightarrow 145+x \geq 180$$

$$\Rightarrow x \geq 35$$

∴ Minimum marks in 3rd test is more than equal to 35 Ans

Ques 4 → Given $30 < C < 35$

$$\Rightarrow 30 < \frac{5}{9}(F-32) < 35$$

$$\Rightarrow 270 < 5(F-32) < 315 \dots (\text{Multiply by } 9)$$

$$\Rightarrow 54 < F-32 < 63 \dots (\text{divide by } 5)$$

$$\Rightarrow 86 < F < 95 \dots (\text{Add } 32)$$

∴ Range of temp is between 86°F & 95°F Ans

Ques 5 →

$$\boxed{\begin{matrix} 640\text{ l} \\ 8\% \end{matrix}} + \boxed{\begin{matrix} x\text{ l} \\ 2\% \end{matrix}} = \boxed{\begin{matrix} \text{Mixture} \\ (640+x)\text{ l} \\ 4\% < \text{Acid} < 6\% \end{matrix}}$$

$$\text{Consider } \frac{8}{100} \times 640 + \frac{2}{100} \times x > \frac{4}{100} (640+x)$$

$$\Rightarrow 5120 + 2x > 2560 + 4x$$

$$\Rightarrow -2x > -2560$$

$$\Rightarrow x < 1280 \dots \text{--- (1)}$$

again

$$\frac{8}{100} \times 640 + \frac{2}{100} \times x < \frac{6}{100} (640 + x)$$

$$\Rightarrow 5120 + 2x < 3840 + 6x$$

$$\Rightarrow -4x < -1280$$

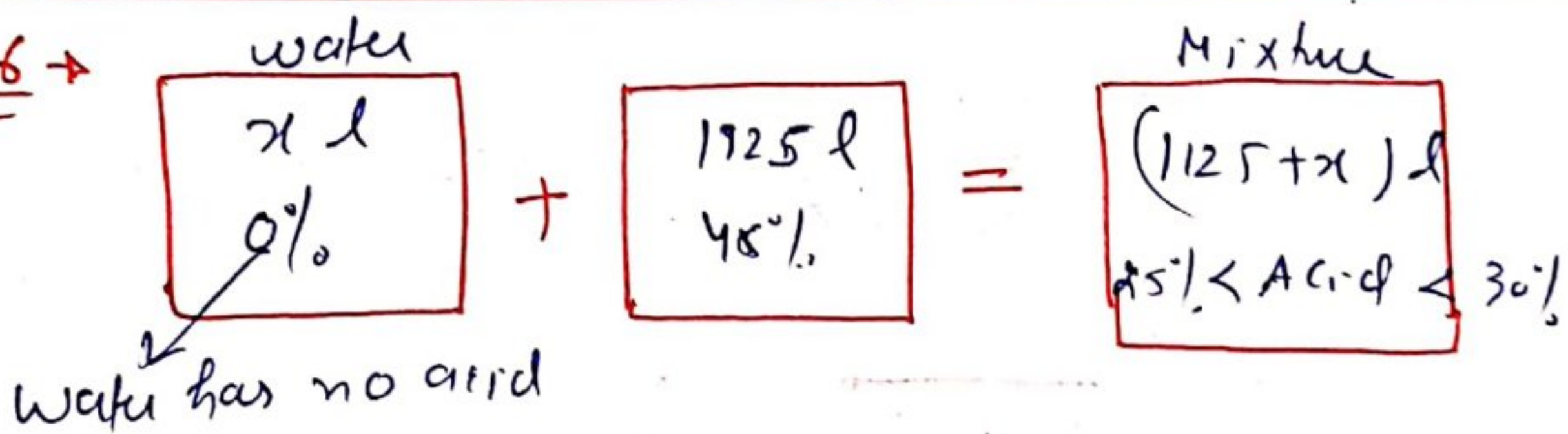
$$\Rightarrow x > 320 \dots (1)$$

from (1) & (2)

$$320 < x < 1280$$

\therefore 2% acid solution must be more than 320 litres and less than 1280 litres ANS

Ques 6 \rightarrow



we have $\frac{0}{100} \times x + 1125 \times \frac{45}{100} > \frac{25}{100} (1125 + x)$

$$\Rightarrow \frac{1125 \times 45}{25} > 1125 + x$$

$$\Rightarrow 2025 > 1125 + x$$

$$\Rightarrow 900 > x$$

$$(or) x < 900 \dots (1)$$

again $\frac{0}{100} \times x + \frac{45}{100} \times 1125 < \frac{30}{100} \times (1125 + x)$

$$\Rightarrow \frac{45 \times 1125}{30} < 1125 + x$$

$$\Rightarrow 1687.5 < 1125 + x$$

$$\Rightarrow x > 562.5 \dots (2)$$

from (1) & (2)

solution linear (ws. 2)

(4)

$$562.5 < x < 900$$

∴ water should be added in b/w 562.5 litres and 900 litres Ans

Qns. 7

we have

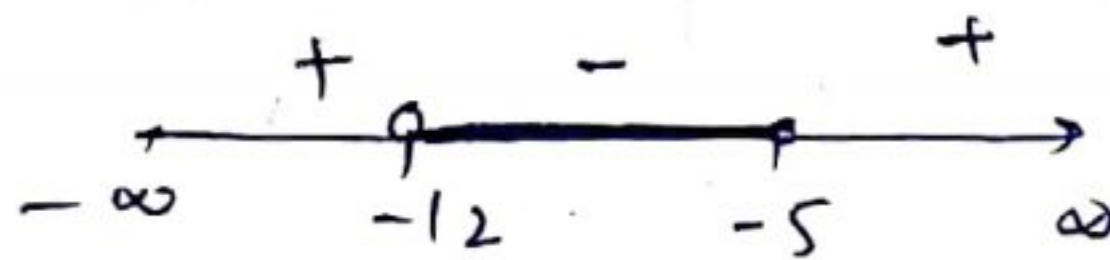
$$\frac{x-2}{x+5} > 2$$

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

$$\Rightarrow \frac{x-2-2x-10}{x+5} > 0$$

$$\Rightarrow \frac{-x-12}{x+5} > 0$$

$$\Rightarrow \frac{x+12}{x+5} < 0 \quad \dots \text{ (Sign change)}$$



$$\therefore x \in (-12, -5) \quad \underline{\text{Ans}}$$

Qns 8

$$\text{we have } \frac{4}{x+3} \leq 3 \leq \frac{6}{x+1}$$

$$\text{Consider } \frac{4}{x+3} \leq 3 \quad \text{and} \quad \frac{6}{x+1} \geq 3$$

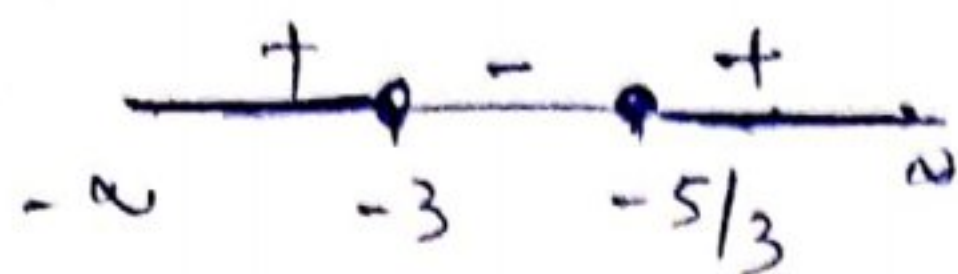
$$\Rightarrow \frac{4}{x+3} - 3 \leq 0 \quad \text{and} \quad \frac{6}{x+1} - 3 \geq 0$$

$$\Rightarrow \frac{4-3x-9}{x+3} \leq 0 \quad \text{and} \quad \frac{6-3x-3}{x+1} \geq 0$$

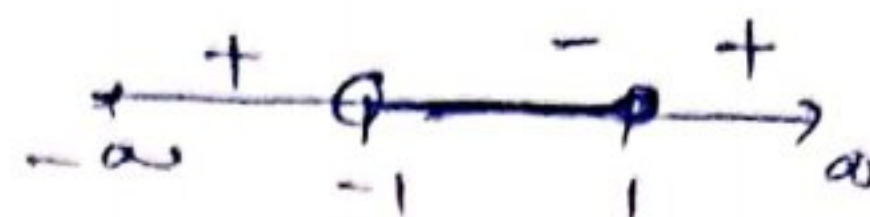
$$\Rightarrow \frac{-3x-5}{x+3} \leq 0 \quad \text{and} \quad \frac{3-3x}{x+1} \geq 0$$

$$\Rightarrow \frac{3x+5}{x+3} \geq 0 \quad \text{and} \quad \frac{x+1}{x+1} \leq 0 \quad \begin{array}{l} \text{divided by } (-3) \\ \text{sign change} \end{array}$$

(5)



and

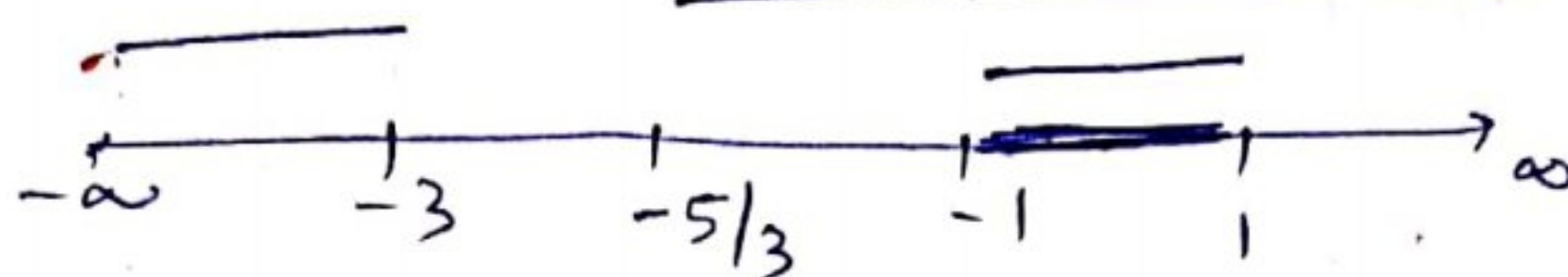


$$x \in (-\infty, -3) \cup [-5/3, \infty)$$

$$\text{and } x \in (-1, 1]$$

open since
(denominator) $x+3 \neq 0$
 $x \neq -3$

Now taking common / Intersection



$$\therefore \text{Common Solution is } (-1, 1] \text{ Ans}$$

→ Note: there is misprint in worksheet

Q4.9 →

Consider

$$2(2x+3) - 10 < 6(x-2)$$

$$\Rightarrow 4x + 6 - 10 < 6x - 12$$

$$\Rightarrow -2x < -8$$

$$\Rightarrow \boxed{x > 4} \dots (\text{divides by } -2)$$

Consider

$$\frac{2x-3}{4} + 6 \geq 2 + \frac{4x}{3}$$

$$\Rightarrow \frac{2x-3+24}{4} \geq \frac{6+4x}{3}$$

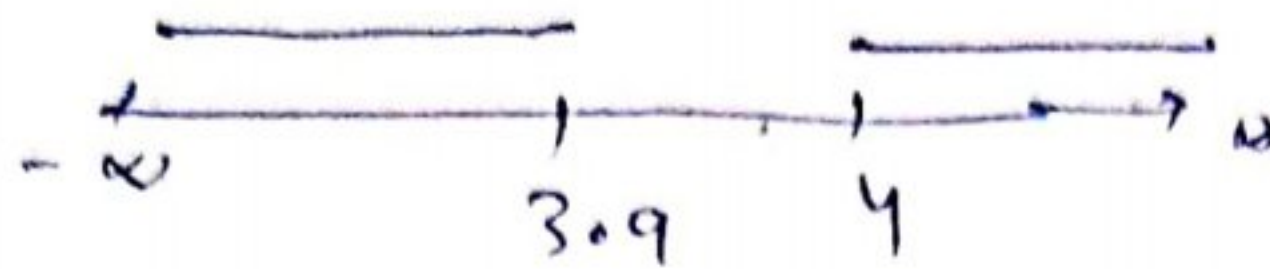
$$\Rightarrow \frac{2x+21}{4} \geq \frac{4x+6}{3}$$

$$\Rightarrow 6x+63 \geq 16x+24$$

$$\Rightarrow -10x \geq -39$$

$$\Rightarrow \boxed{x \leq 3.9} \dots (\text{divides by } -10)$$

taking common of two results



No Common Solution $\therefore \underline{\text{Ans}} = \phi$

Q. 10

$$\frac{5x+8}{4-x} < 2 \quad \text{and} \quad \frac{x-1}{x+3} > 2$$

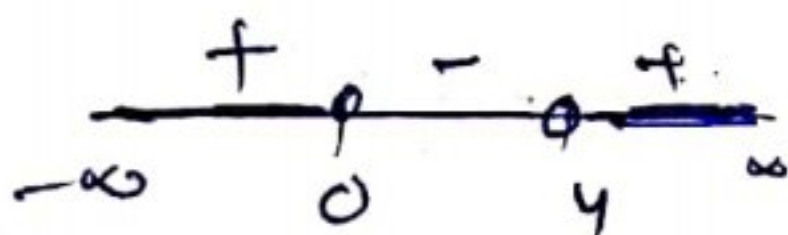
$$\Rightarrow \frac{5x+8}{4-x} - 2 < 0 \quad \text{and} \quad \frac{x-1}{x+3} - 2 > 0$$

$$\Rightarrow \frac{5x+8-8+2x}{4-x} < 0 \quad \text{and} \quad \frac{x-1-2x-6}{x+3} > 0$$

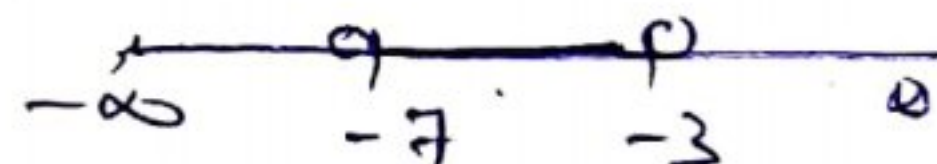
$$\Rightarrow \frac{7x}{4-x} < 0 \quad \text{and} \quad \frac{-x-7}{x+3} > 0$$

$$\Rightarrow \frac{7x}{x-4} > 0 \quad \text{and} \quad \frac{x+7}{x+3} < 0 \quad \text{Sign Change}$$

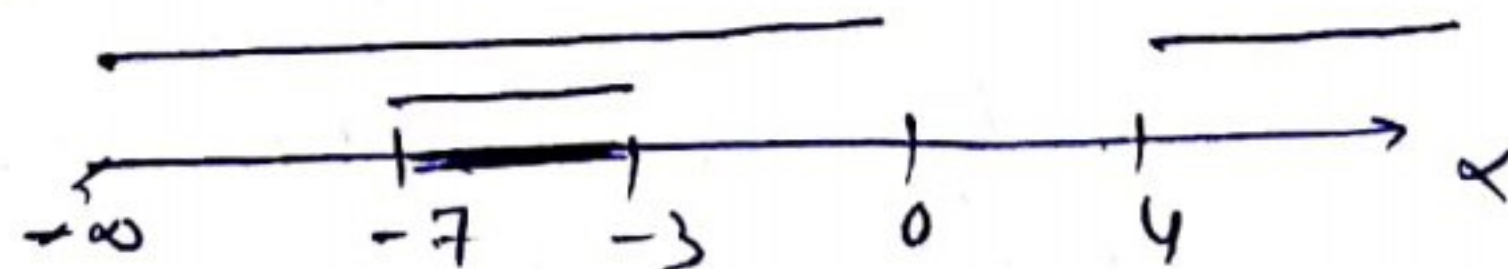
Sign change



and



taking Common



\therefore Common solution is $(-7, -3) \cup (4, \infty)$ Ans

Q. 11

$$5x-3 < 10$$

$$5x < 13$$

$$x < \frac{13}{5} \quad \text{or} \quad x < 2.6$$

(i) $x \in \{1, 2\}$

(ii) $x \in \{\dots, -3, -2, -1, 0, 1, 2\}$

(iii) $x \in (-\infty, 13/5)$