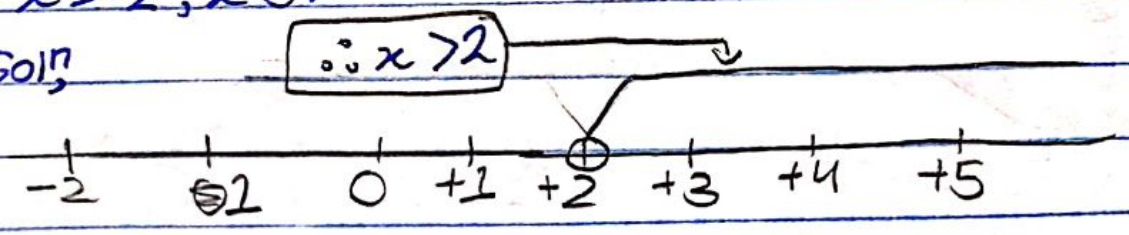
DATE
PAGE No.

Inequality
6x - 24(11)

1. Draw the graphs of the following inequalities:

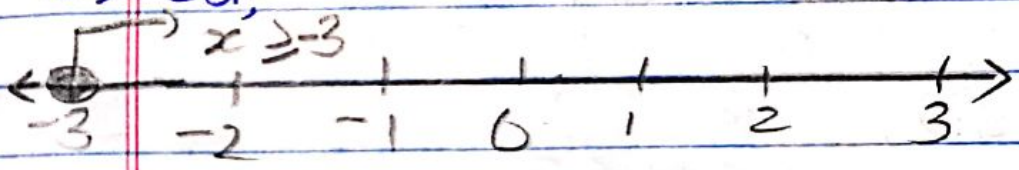
a) $x > 2, x \in N$

→ Soln,



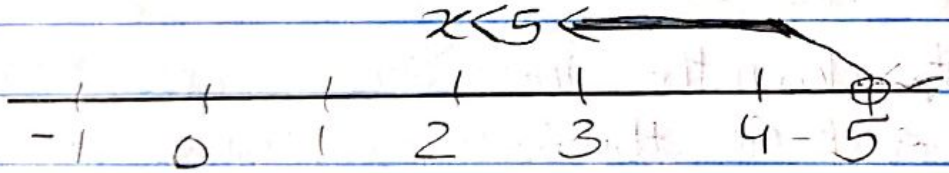
b) $x \geq -3, x \in Z$

→ Soln,



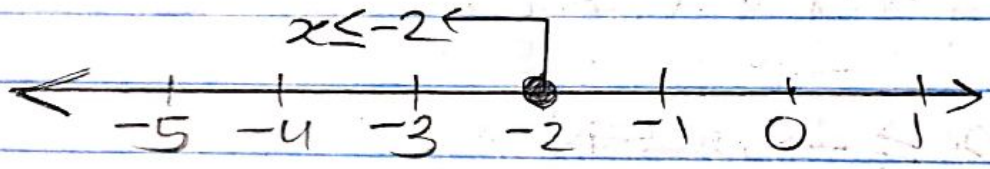
c) $x < 5, x \in R$.

→



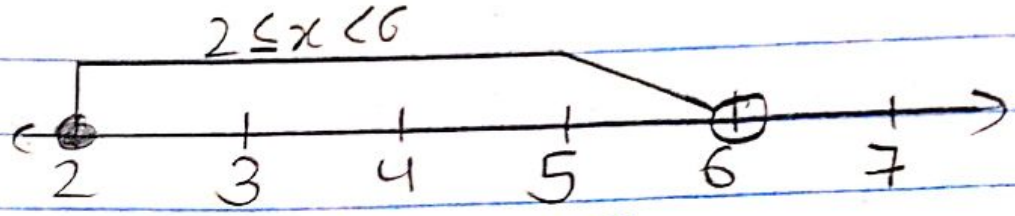
d) $3x \leq -6, x \in R \rightarrow \frac{3x}{3} \leq \frac{-6}{3} \rightarrow x \leq -2$

→



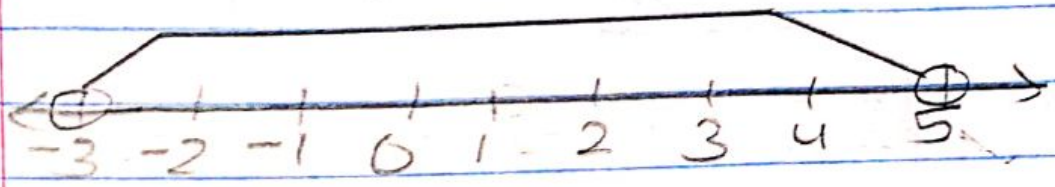
e) $2 \leq x < 6, x \in N$

→



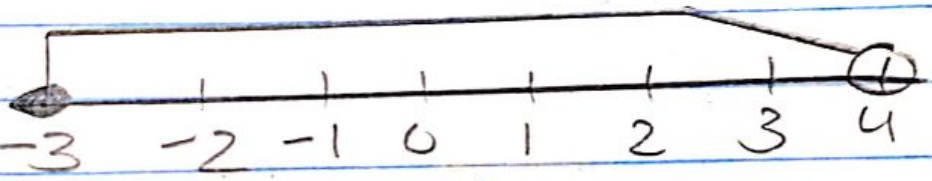
f) $-3 < x < 5, x \in Z$

→



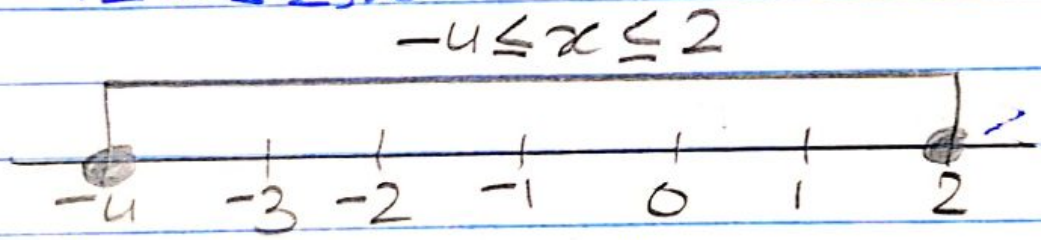
g) $-3 \leq x < 4, x \in R$

→



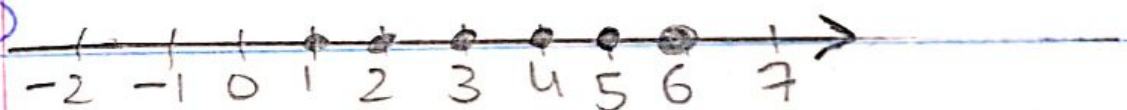
h) $-4 \leq x \leq 2, x \in R$

→



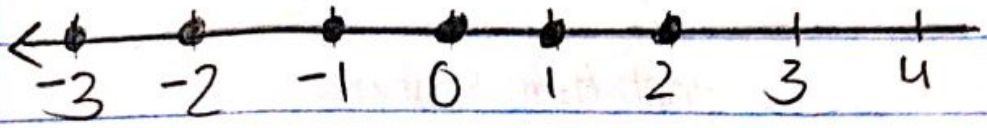
2. Write down the inequalities corresponding to each of the following graphs.

a)



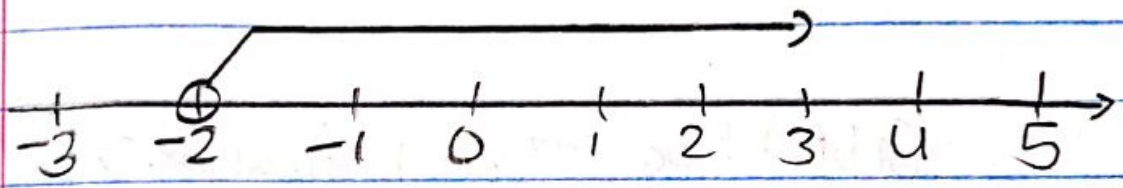
→ $x \geq 1, x \in N$

b)



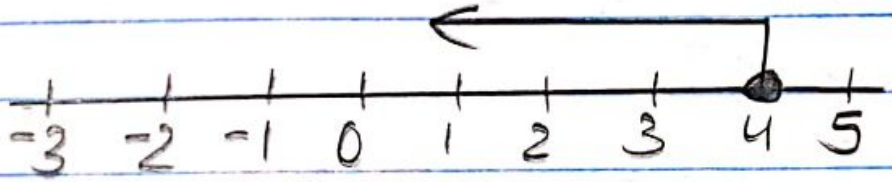
→ $x \leq 2$

c)



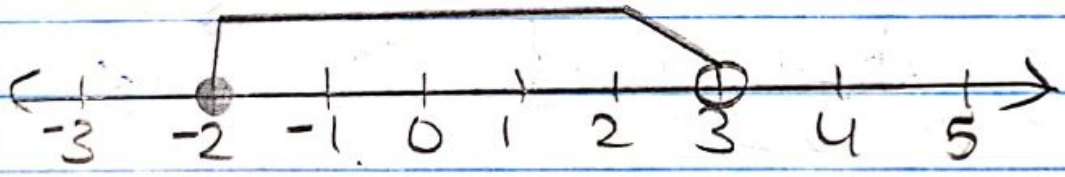
→ $x > -2$

d)



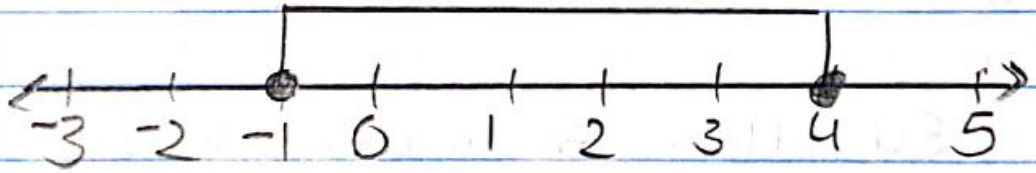
→ $x \leq 4$

e)



→ $-2 \leq x < 3$

f)



→ $-1 \leq x \leq 4$

3- Find the solution set of each of the following inequalities & graph their solution sets.

⇒

a) $x+2 \geq 5, x \in N$

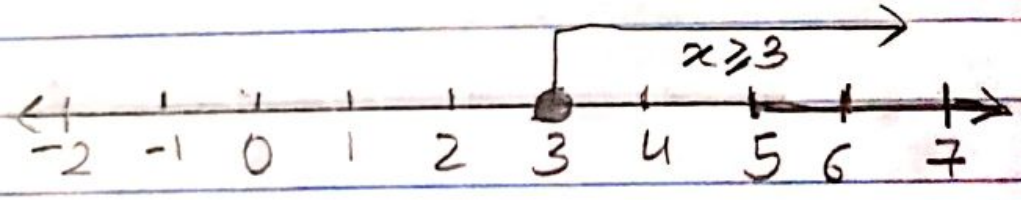
→ Soln,

Subtracting '2' on both sides. So,

$x+2-2 \geq 5-2$

or, $x \geq 3$

Soln set $= \{3, 4, 5, 6, 7, \ldots\}$



b) $x-5 < -1, x \in N$

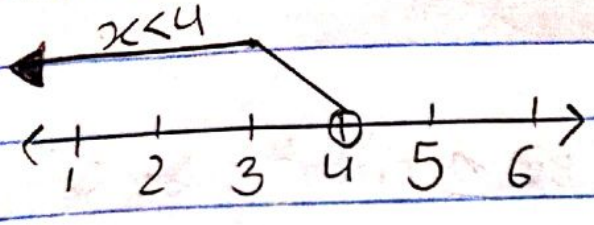
→ Soln,

Adding 5 in both sides. So,

$x-5+5 < -1+5$

or, $x < 4$

∴ Soln set = {3, 2, 1, ...}



c) $2x - 3 \geq -7, x \in Z$

→ Soln,

Adding 3 in both sides. So,

$$2x - 3 + 3 \geq -7 + 3$$

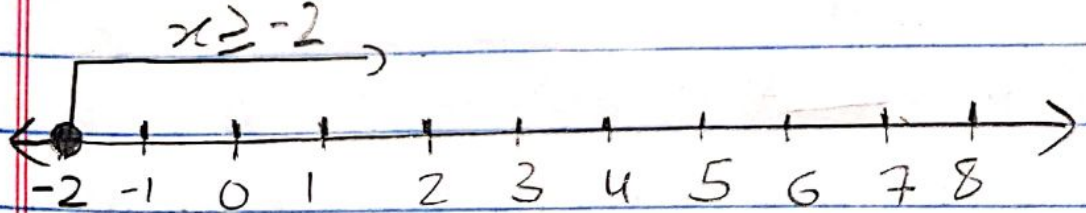
or, $2x \geq -4$

Dividing by 2 on both sides. So,

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

or, $x \geq -2$

∴ Soln set = {−2, −1, 0, 1, 2, 3, 4, ...}



d) $3x+2 \leq 8, x \in R$

→ Soln,

Subtracting by 2 on both sides. So,

$3x+2-2 \leq 8-2$

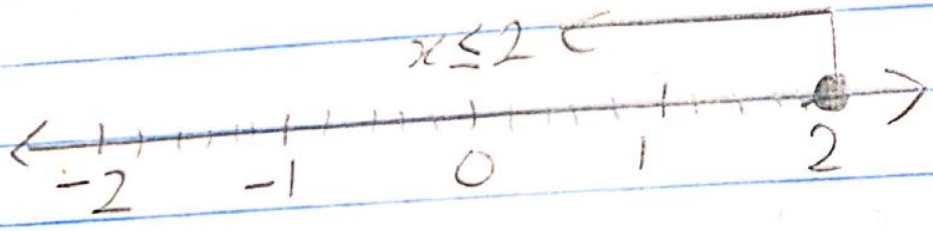
or, $3x \leq 6$

Dividing by 6 on both sides. So,

or, $\frac{3x}{3} \leq \frac{6}{3}$

or, $x \leq 2$

∴ Soln set $= \{+2, +1, 0, -1, -2\}$



⟶)

~~Subtractin~~

e) $\frac{5x}{4} < x-1, x \in Z$

→ Soln,

~~Divi~~ Multiplying both sides by 4. So,

$\frac{5x}{4} \times 4 < (x+1)4$

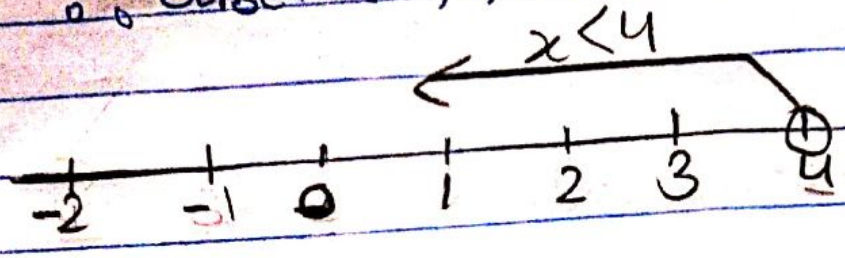
or, $5x < 4x+4$

or, $5x - 4x < 4$

Dividing both sides by 5. So, $x < 4$

$\frac{5x}{5} < \frac{4x+4}{5}$ →

∴ Solset = {3, 2, 1, 0, −1, ...}



b) $3x - 2 \geq 2x - 4, x \in Z$

→ Soln,

Adding 2 on both sides. So,

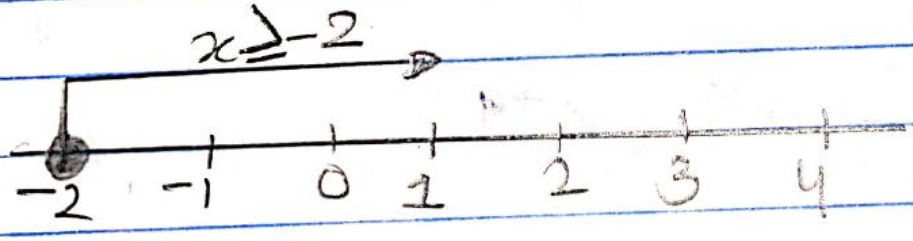
$3x - 2 + 2 \geq 2x - 4 + 2$

or, $3x \geq 2x - 2$

or, $3x - 2x \geq -2$

or, $x \geq -2$

∴ Soln set = {−2, −1, 0, 1, 2, 3, ...}



g) $2(x+3) \leq 3x+4, x \in N$

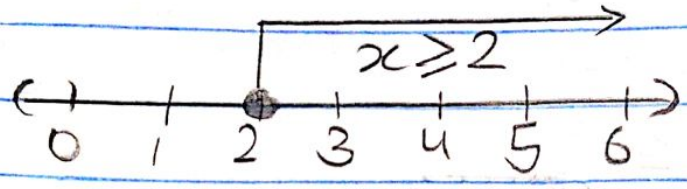
$\Rightarrow 2x+6 \leq 3x+4$

or, $6-4 \leq 3x-2x$

or, $2 \leq x$

or, $x \geq 2$

$\therefore$ Soln set $= \{2, 3, 4, 5, 6, \ldots\}$



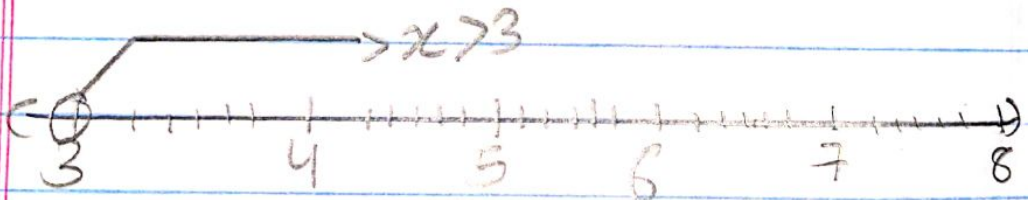
h) $\frac{x+1}{2} > 2, x \in R$

$x+1 > 2 \times 2$

or, $x > 4-1$

$\therefore x > 3.$

$\therefore$ Soln set $= \{4, 5, 6, 7, 8\}$



i) $1+2(x-2) \geq -3+4x, x \in R$

$3(x-2) \geq -3+4x$

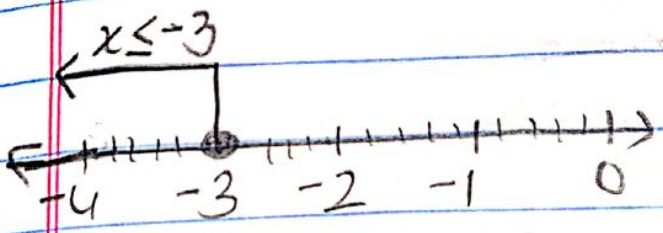
or, $3x-6 \geq -3+4x$

or, $-6+3 \geq 4x-3x$

or, $-3 \geq x$

or, $x \leq -3$

$\therefore$ Soln set $= \{-3, -4, -5, \ldots\}$



j) $\frac{x-1}{2} \geq 4-x, x \in R$

$\rightarrow x-1 \geq 2(4-x)$

or, $x-1 \geq 8-2x$

or, $x+2x \geq 8+1$

or, $3x \geq 9$

or, $x \geq \frac{9}{3}$

3,

$\therefore x \geq 3$ $\quad \therefore$ Soln set $= \{3, 4, 5, 6, 7, \ldots\}$

k) $\frac{2x-3}{3} \leq \frac{x-3}{2}$, $x \in R$

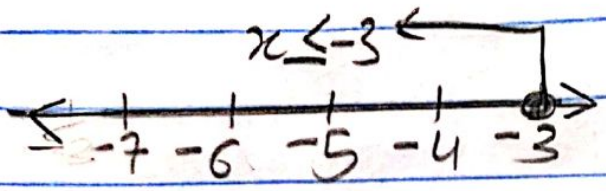
$\rightarrow 2(2x-3) \leq 3(x-3)$

or, $4x-6 \leq 3x-9$

or, $4x-3x \leq -9+6$

or, $x \leq -3$

$\therefore$ Soln set $= \{-3, -4, -5, -6, \cdots\}$



l) $\frac{x-1}{2} - \frac{x}{3} > \frac{x-1}{3}$, $x \in R$

$\rightarrow \frac{3x-3-2x}{6} > \frac{x-1}{3}$

or, $\frac{x-3}{6} > \frac{x-1}{3}$

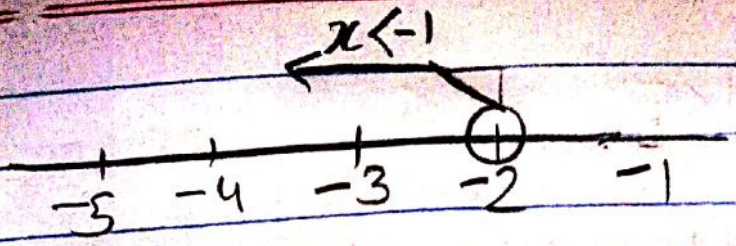
or, $3x-9 > 6x-6$

or, $-9+6 > 6x-3x$

or, $-3 > 3x$

or, $\frac{-3}{3} > x$ $\quad \therefore x < -1$

$\therefore$ Soln set $= \{-2, -3, -4, \cdots\}$



4. Solve the following inequalities and represent them graphically:

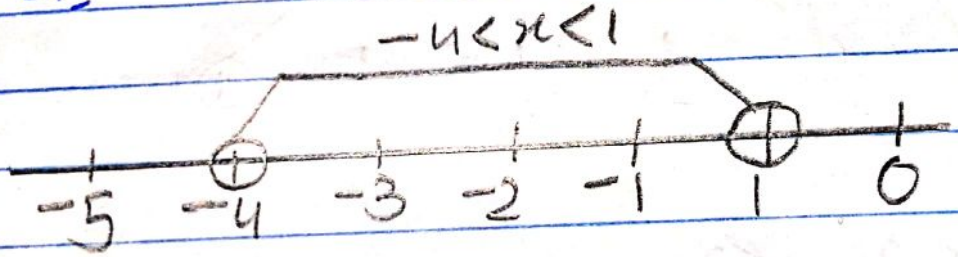
a) $-1 < x+3 < 4$

→ Soln,

Subtracting 3 on all sides. So,

$-1-3 < x+3-3 < 4-3$

or, $-4 < x < -1$



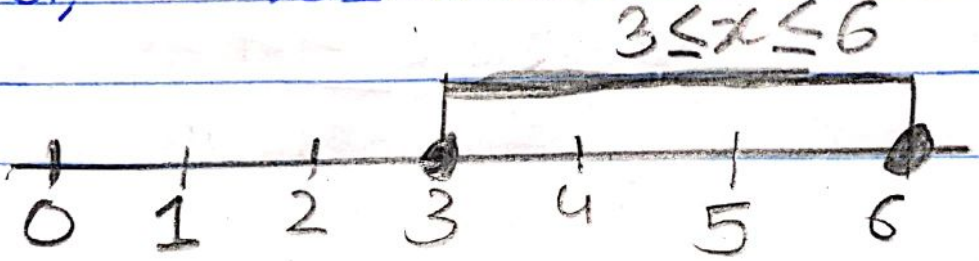
b) $-2 \leq x-5 \leq 1$

→ Soln,

Adding 5 on all sides. So,

$-2+5 \leq x-5+5 \leq 1+5$

or, $3 \leq x \leq 6$



c) $-3 < 2x+1 \leq 5$

→ Soln,

Subtracting 1 on all sides. So,

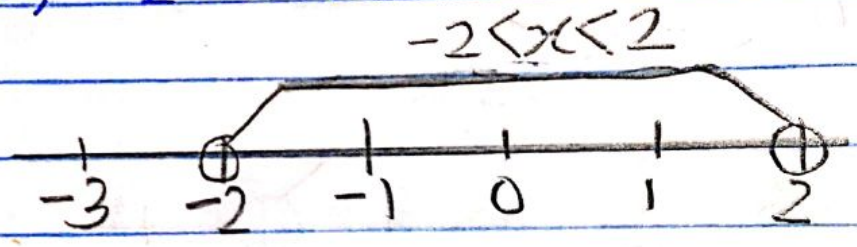
$-3-1 < 2x+1-1 \leq 5-1$

or, $-4 < 2x \leq 4$

Dividing 2 on all sides. So,

$\frac{-4}{2} < \frac{2x}{2} \leq \frac{4}{2}$

or, $-2 < x \leq 2$



d) $-3 \leq 2x-1 < 7$

→ Soln,

~~Subtracting~~ Adding 1 on all sides. So,

$-3+1 \leq 2x-1+1 < 7+1$

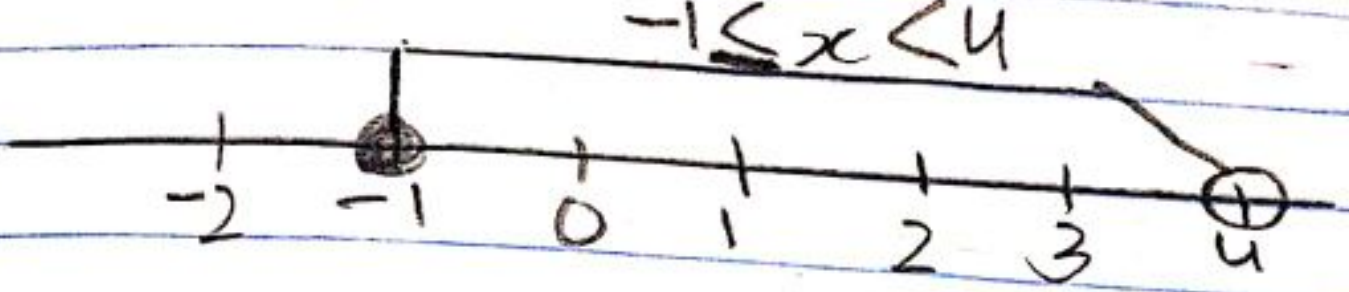
or, $-2 \leq 2x < 8$

~~diving~~ dividing 2 on all sides. So,

$\frac{-2}{2} \leq \frac{2x}{2} < \frac{8}{2}$

DATE
PAGE No.

or, $-1 \leq x < 4$



e) $-2 < 1 - x \leq 3$

→ Soln,

Subtracting 1 on all sides. So,

$-2-1 < x-x-1 \leq 3-1$

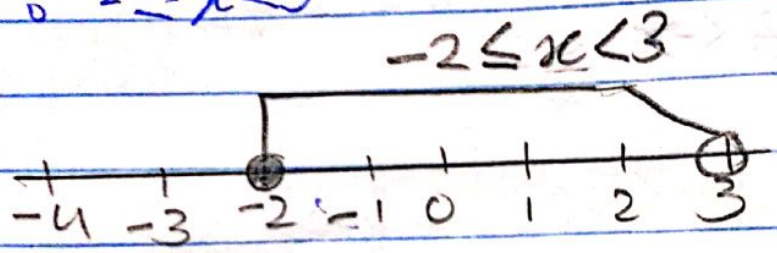
or, $-3 < -x \leq 2$

Dividing -1 on all sides.

$$\frac{+3}{+1} > \frac{+x}{+1} \geq \frac{2}{-1}$$

or, $3 > x \geq -2$

$\therefore -2 \leq x < 3$



8) $-1 \leq 2-3x \leq 8$

→ Soln

Subtracting 2 on all sides. So,

$-1-2 \leq 2-2-3x \leq 8-2$

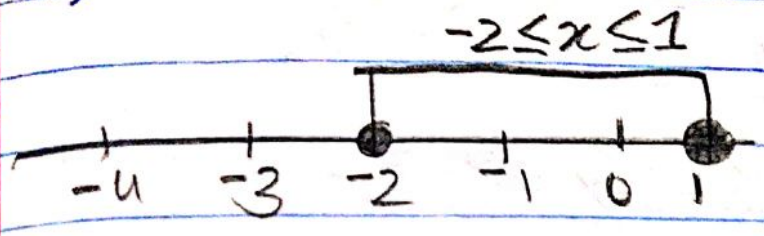
or, $-3 \leq -3x \leq 6$

Dividing -3 on all sides. So,

$$\frac{-3}{-3} 1 \leq \frac{-3x}{-3} \leq \frac{6}{-3} 1$$

or, $2 \geq x \geq -2$

or, $-2 \leq x \leq 1$



g) $\frac{3}{2} < x + \frac{5}{2} < \frac{9}{2}$

→ Soln,

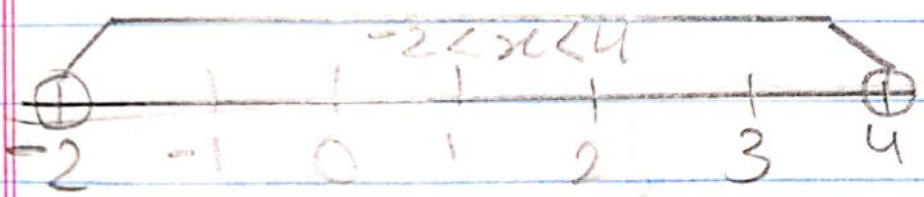
Multiplying 2 on all sides. So,

$\frac{3}{2} \times 2 < x + \frac{5}{2} \times 2 < \frac{9}{2} \times 2$

Subtracting 5 on all sides. So,

$3 - 5 < x + 5 - 5 < 9 - 5$

or, $-2 < x < 4$



h.) $-1 \leq \frac{3-x}{2} \leq 1$

→ Soln,

Multiplying 2 on all sides. So,

$$-1 \times 2 \leq \frac{3-x}{2} \times 2 \leq 1 \times 2$$

or, $-2 \leq 3-x \leq 2$

Subtracting 3 on all sides.

$$-2-3 \leq 3-x-3 \leq 2-3$$

or, $-5 \leq -x \leq -1$

Dividing -1 on all sides. So,

$$\frac{-5}{-1} \leq \frac{-x}{-1} \leq \frac{-1}{-1}$$

or, $5 \geq x \geq 1$

or, $1 \leq x \leq 5$

5 a) If $x \leq 2$, find the value of y in $y = 4x - 1$

→ Soln;

$$y = 4x - 1$$

When $x = 2$, $y = 4(2) - 1 = 8 - 1 = 7$

When $x = 1$, $y = 4 \times 1 - 1 = 4 - 1 = 3 < 7$

$x = 0$, $y = 4 \times 0 - 1 = 0 - 1 = -1 < 2$

When $x = 2$,

$$y = 4 \times 2 - 1 = 8 - 1 = 7$$

$\therefore y \leq 7$

b) If $x \geq -3$, find the value of y in $y = 3x + 2$.

→ Soln;

$$y = 3x + 2$$

When $x = -3$,

$$y = 3 \times (-3) + 2 = -9 + 2 = -7$$

$\therefore y \geq -7$

c) If $x < -2$, find the value of y in $y = 3 - 5x$.

→ Soln,

$$y = 3 - 5x$$

When $x = -2$,

$$y = 3 - 5(-2) = 3 + 10 = 13$$

$\therefore y < 13$

d) If $y > -2$, find the value of x in $3x + 5y + 4 = 0$

→ Soln,

$$3x + 5y + 4 = 0$$

When $y = -2$,

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

or, $3x + (-10) + 4 = 0$

or, $3x - 10 + 4 = 0$

or, $3x - 6 = 0$

or, $3x = 6$

or, $\frac{3x}{3} = \frac{6}{3}$ $\quad \therefore x < 2$

$\therefore x = \frac{6}{3} - 2$

6. a) If 3 times ~~bigger~~ a number is greater than 20, what must be the least whole number satisfying the statement.

→ Soln,

If x be the least number,

then,

$$3x > 20$$

or, $x > \frac{20}{3} = 6\frac{2}{3}$

∴ the least whole no. = 7.

b) If 12 is subtracted from 5 time a number, then the result is less than or equal to 3. Find the greatest whole number ~~sat~~ satisfying the mathematical statement.

→ Soln,

~~I~~ If x be the greatest no.,

then,

$5x - 12 \leq 3$

or, $5x \leq 3 + 12 = 15$

or, $x \leq \frac{15}{5}$, 3

$\therefore x \leq 3$

$\therefore$ the greatest whole no. $= 3$

c) Mahesh wants to purchase an exercise book costing Rs. 38 and some ball pens each costing Rs. 13. If he has Rs. 92, what maximum number of ball pens can purshased?

→ Soln,

Here,

If the no. of ball pens $= x$.

Cost of the ex. book $=$ Rs. 38

Cost of x ball pens $=$ Rs. $13x$.

Total cost $=$ Rs. $[13x + 38]$

Total cost cannot be greater than 92 Rs.

So,

$13x + 38 \leq 92$

or, $13x + 38 - 38 \leq 92 - 38$

or, $13x \leq 54$

or, $\frac{13x}{13} \leq \frac{54}{13}$

$\therefore x \leq 4$

4.15

$13 \overline{)54}$

-38

$\overline{52}$

$\therefore$ the maximum no of 4 ball pens can be purchased.

d. The cost of a chocolate is Rs. 8 and that of a biscuit is Rs. 12. Ramita has Rs. 72 and she bought 3 chocolates & some packets of biscuits. Find the maximum no. of biscuits that she can purchase.

→ Soln,

Cost of 1 chocolate = Rs. 8

Cost of 1 packet of biscuit = Rs. 12

Cost of 3 chocolates = Rs. 8×3 = Rs. 24

Cost of x biscuit = Rs. $12x$

Total cost = Rs.(12x + 24)

Total cost cannot be more than Rs. 72,

So,

$12x + 24 \leq 72$

or, $12x + 24 - 24 \leq 72 - 24$

or, $\frac{12x}{12} \leq \frac{48}{12}$

$\therefore x \leq 4$

∴ maximum no. of 4 packet of biscuits can be purchased.