

INEQUALITIES

- $<$ "is less than"
- $>$ "is greater than"
- \leq "is less than OR equal to"
- \geq "is greater than or equal to"

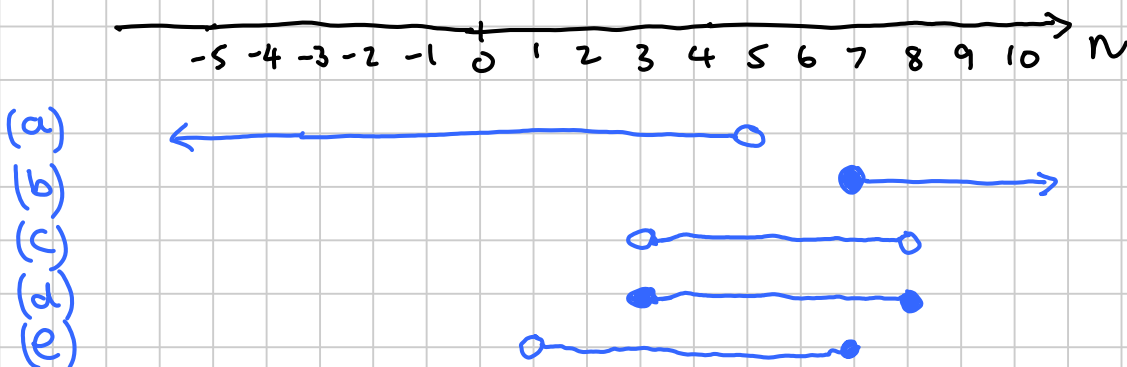
If the numbers have to be integers, we can list them.

① If n is a positive integer, list the possible values of n in each case:—

- (a) $n < 5$: $\{1, 2, 3, 4\}$
- (b) $n \geq 7$: $\{7, 8, 9, 10, 11, \dots\}$
- (c) $3 < n < 8$: $\{4, 5, 6, 7\}$
- (d) $3 \leq n \leq 8$: $\{3, 4, 5, 6, 7, 8\}$
- (e) $7 \geq n > 1$: $\{2, 3, 4, 5, 6, 7\}$
(this is the same as $1 < n \leq 7$)

If n can be any number, we cannot write a list. So we can show the inequalities using a number line

② If n can be any number, illustrate each of the inequalities in Q1 using a number line



Solving Inequalities

We can use the same method as we use for equations, except that

If we MULTIPLY or DIVIDE by a NEGATIVE number, we have to CHANGE THE DIRECTION of the inequality

Examples

$$\begin{aligned} \textcircled{1} \quad 3 - 2x &> 11 \\ (-3) \quad \quad \quad (-3) \\ -2x &> 8 \\ (\div -2) \quad \quad \quad (\div -2) \\ \underline{\underline{x < -4}} \end{aligned}$$

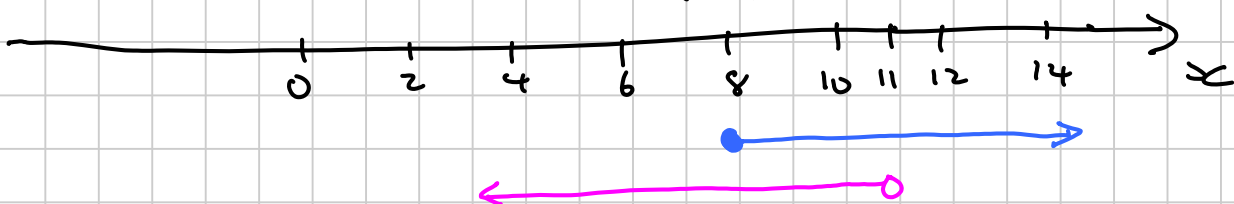
$$\textcircled{2} \quad x + 3 \leq 2x - 5 < 17$$

1st

$$\begin{aligned} x + 3 &\leq 2x - 5 \\ (+5) \quad \quad \quad (+5) \\ x + 8 &\leq 2x \\ (-x) \quad \quad \quad (-x) \\ \underline{8 \leq x} &\quad (\text{or } x \geq 8) \end{aligned}$$

2nd

$$\begin{aligned} 2x - 5 &< 17 \\ (+5) \quad \quad \quad (+5) \\ 2x &< 22 \\ x &< 11 \end{aligned}$$



Final answer :

$$\underline{\underline{8 \leq x < 11}}$$

the overlapping part