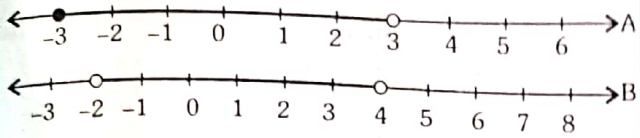
Linear inequation

6. The diagrams given below represent two inequations A and B on the real number lines.



(i) Write down A and B in set-builder form.

(ii) Represent $A \cap B$ and $A \cap B'$ on two different number lines.

7. Solve $\frac{x-2}{2x+4} < \frac{1}{3}$, $x \in R$. Hence, draw a diagram using number line for this inequation.

8. Solve the following inequation and represent the solution set on a number line:

$$\frac{11-2x}{5} \geq \frac{9-3x}{8}, x \in R.$$

9. Find the values of x which satisfy the inequation $-2 \leq \frac{1}{2} - \frac{2x}{3} \leq 1\frac{5}{6}$, $x \in N$.

Graph the solution set on the number line. [2001]

10. If $x \in R$ {real numbers}, find the range of values of x for which $-2 < 3(x+2) < 6$ and represent it on a number line.

11. Find the range of values of x which satisfy:

$2x - 5 \leq 5x + 4 < 11$, $x \in R$.

Graph the solution on the number line. [2002]

12. Solve the inequation: $-3 \leq 3 - 2x < 9$, $x \in R$. Represent the solution set on a number line. [2000]

13. If $x \in R$ {real numbers}, find the range of values of x for which $2x + 5 \leq x + 4 \leq 4x - 2$, and represent it on a number line.

14. List the elements of the solution set of the following inequation on the number line $-3 < x - 2 \leq 9 - 2x$, $x \in N$.

15. Solve the inequation and represent the solution set on the number line:

$$\frac{-2}{3} < \frac{-x}{3} + 1 \leq \frac{2}{3}; x \in R$$

16. Find the range of values of x which satisfy the inequality:

$$-\frac{1}{5} \leq \frac{3x}{10} + 1 < \frac{2}{5}; \quad x \in R$$

Graph the solution set on the number line.

17. Solve $2 \leq 2x - 3 \leq 5$, $x \in R$ and mark it on a number line. [2003]

18. Find the range of values of x which satisfy

$$-\frac{1}{3} \leq \frac{x}{2} - 1\frac{1}{3} < \frac{1}{6}, x \in R$$

Graph these values of x on the number line.

19. Solve the following inequation and represent the solution set on two different number lines:

$-20 < 2x - 24 \leq 16 - 3x$, when

(i) $x \in W$, and (ii) $x \in R$.

20. Solve the following inequation and graph the solution set on two different number lines:

$$2x - \frac{5}{2} < x + \frac{3}{2} \leq 3x + \frac{11}{2}$$

when (i) $x \in R$ and (ii) $x \in I$.

21. Given, $P = \{x : 5 < 2x - 1 \leq 11, x \in R\}$

$Q = \{x : -1 \leq 3 + 4x < 23, x \in I\}$

where R = real numbers and I = integers.

Represent P and Q on separate number lines. Write down the elements of $P \cap Q$.

22. Given that $x \in I$, solve the inequation and graph the solution on the number line:

$$3 \geq \frac{x-4}{2} + \frac{x}{3} \geq 2.$$ [2004]

23. Given that $x \in R$, solve the inequation and graph the solution on the number line:

$$-1 \leq 3 + 4x < 23$$ [2006]

24. Solve the following inequation and graph the solution on the number line:

$$-2\frac{2}{3} \leq x + \frac{1}{3} < \frac{1}{3}, x \in R$$ [2007]

25. Solve the given inequation and graph the solution on the number line:

$2y - 3 < y + 1 \leq 4y + 7$, $y \in R$ [2008]

26. Solve the inequation and represent the solution set on the number line:

$$-3 + x \leq \frac{8x}{3} + 2 \leq \frac{14}{3} + 2x, \text{ where } x \in I$$

[2009]

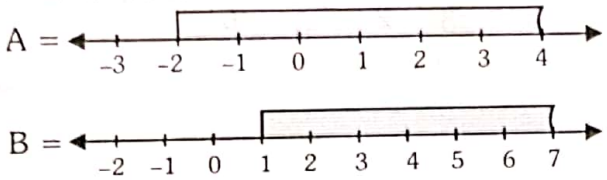
27. Solve the following inequation and represent the solution set on the number line:

$$-3 \leq -\frac{1}{2} - \frac{2x}{3} \leq \frac{5}{6}, x \in R$$ [2010]

28. Given that $A = \{x: = -1 < x \leq 5, x \in R\}$ and $B = \{x: -4 \leq x < 3, x \in R\}$. Represent the following on different number lines:

(i) $A \cap B$ (ii) $A' \cap B$

29. The diagram below represents two inequations A and B or real number lines.



(i) Write down A and B in set builder notation.

(ii) Represent A ∩ B and A ∩ B′ on two different number lines.

Multiple Choice Questions

Tick (✓) the correct answer:

1. If the replacement set is a set of whole numbers, the solution of inequation $3x + 4 < 16$ is

(i) {0, 1, 2, 3} (ii) {1, 2, 3}

(iii) {0} (iv) {1, 2, 3, 4}

2. If the replacement set is a set of positive integers, which of the following is the solution set of inequation $5 + x \leq 3x - 1$?

(i) {1, 2, 3, 4, 5} (ii) {1, 2, 3, 4, ...}

(iii) {3, 4, 5, ...} (iv) {0, 1, 2, 3, 4, ...}

3. Which of the following is not true?

(i) $7x > 5x \Rightarrow \frac{x}{7} < \frac{x}{5}$

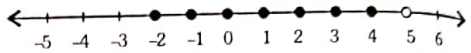
(ii) $m < -n \Rightarrow -m > n$

(iii) $-6y \leq 18 \Rightarrow y \leq -3$

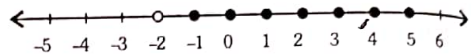
(iv) $2x \leq -7 \Rightarrow \frac{2x}{-4} \geq \frac{-7}{-4}$

4. Which of the following graphs represents the solution set of values of x satisfying inequations $7x + 3 \geq 3x - 5$ and $\frac{x}{4} - 5 \leq \frac{5}{4} - x$, where $x \in N$?

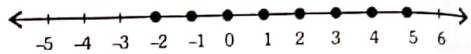
(i)



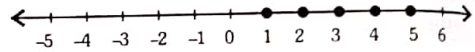
(ii)



(iii)



(iv)



5. Some positive integers are such that if 6 is subtracted from five times of any of them, the resulting number is always less than the four times of that integer. Which of the following is true for this information?

(i) The positive integers are 1, 2, 3, 4 and 5

(ii) All are less than 4

(iii) All are greater than 6

(iv) All are greater than 5

CHECK FOR UNDERSTANDING

1. Solve the inequation $\frac{x}{3} + 1 \geq \frac{x-4}{2}$, where $x \in W$ and is greater than 12.

2. If $y \in R$ (real numbers), find the range of values of y for which $-1 < 2y + 1 \leq 7$.

3. Given that $y \in \{-3, -4, -5, -6\}$ and $9 \leq 1 - 2y$. Find the values of y. Also represent its solution set on a number line.

4. Given that $5(x + 8) > 20 - 5x$. Find the smallest value of x when

(i) $x \in N$ (ii) $x \in W$ (iii) $x \in I$

5. Solve the following inequation and graph the solution set on the number line:

$$\frac{2x+1}{2} + \frac{x-1}{3} < x + \frac{1}{2}, x \in R$$

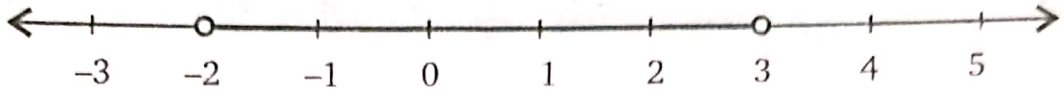
6. To obtain grade A in a mathematics, Neha needs at least 360 marks in four tests. On first three tests, she scored 91, 85 and 89 marks. Form an inequation for this and find what should her score be in the fourth test so that she can get grade A.

Ans

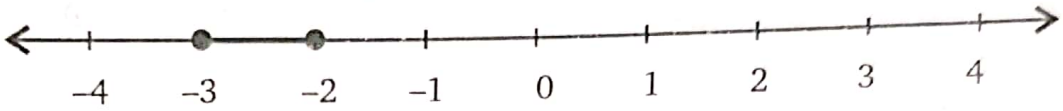
6. (i) $A = \{x : -3 \le x < 3, x \in R\}$

$B = \{x : -2 < x < 4, x \in R\}$

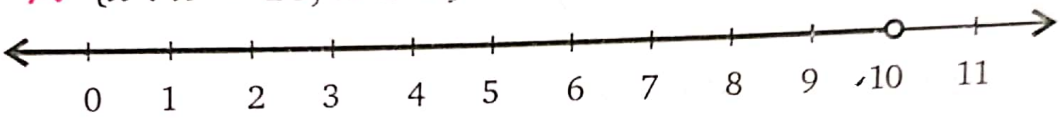
(ii) $A \cap B = \{x : -2 < x < 3, x \in R\}$



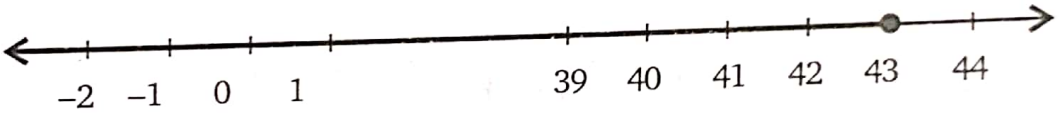
$A \cap B' = \{x : -3 \le x \le -2, x \in R$



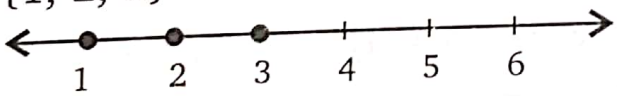
7. $\{x : x < 10, x \in R\}$



8. $\{x : x \le 43\}$

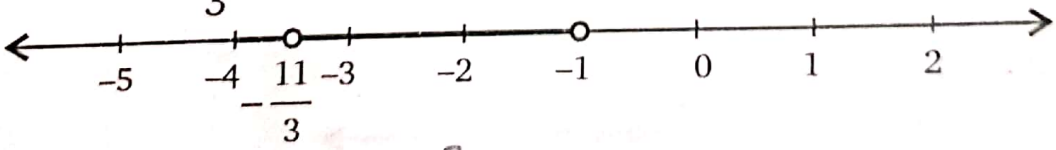


9. $\{1, 2, 3\}$



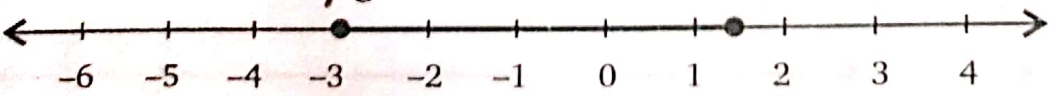
$-2\frac{2}{3}$ 0

10. $\{x : -\frac{11}{3} < x < -1, x \in R\}$

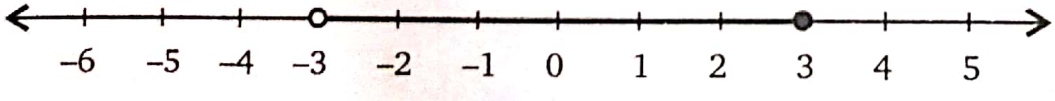


$1\frac{2}{5}$

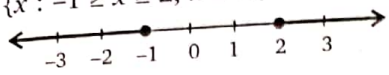
11. $\{x : -3 \le x < \frac{7}{5}, x \in R\}$



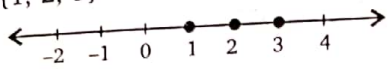
12. $\{x : -3 < x \le 3, x \in R\}$



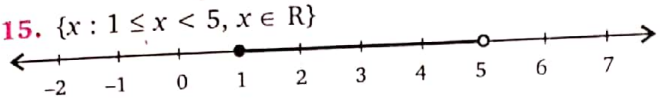
13. $\{x : -1 \geq x \geq 2, x \in R\}$



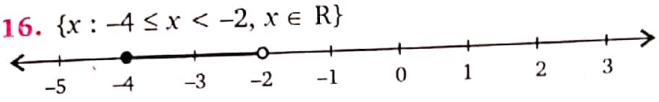
14. $\{1, 2, 3\}$



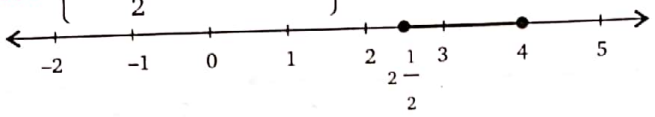
15. $\{x : 1 \leq x < 5, x \in R\}$



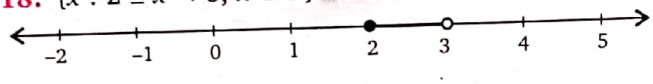
16. $\{x : -4 \leq x < -2, x \in R\}$



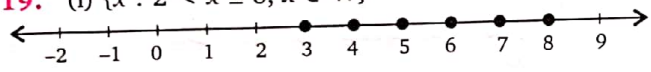
17. $\left\{x : 2\frac{1}{2} \leq x \leq 4, x \in R\right\}$



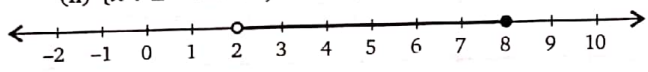
18. $\{x : 2 \leq x < 3, x \in R\}$



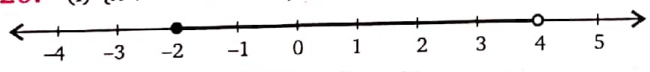
19. (i) $\{x : 2 < x \leq 8, x \in W\}$



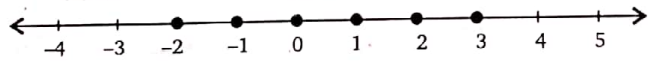
(ii) $\{x : 2 < x \leq 8, x \in R\}$



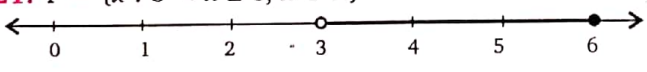
20. (i) $\{x : -2 \leq x < 4, x \in R\}$



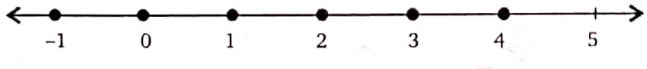
(ii) $\{x : -2 \leq x < 4, x \in I\}$



21. $P = \{x : 3 < x \leq 6, x \in R\}$

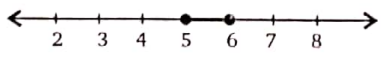


$Q = \{x : -1 \leq x < 5, x \in I\}$

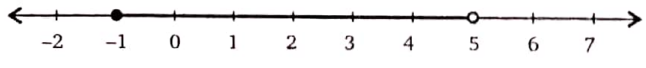


$P \cap Q = \{4\}$.

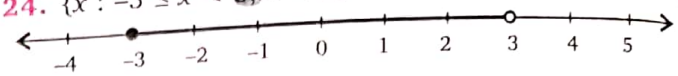
22. $\{5, 6\}$



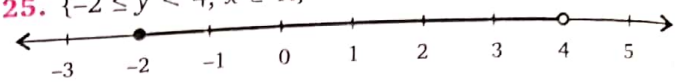
23. $\{x : -1 \leq x < 5, x \in R\}$



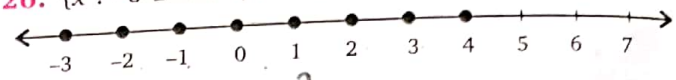
24. $\{x : -3 \leq x < 3, x \in R\}$



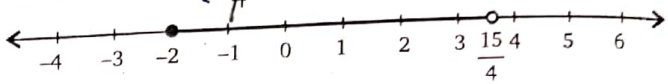
25. $\{-2 \leq y < 4, x \in R\}$



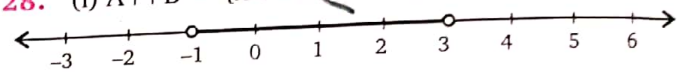
26. $\{x : -3 \leq x \leq 4, x \in I\}$



27. $\{x : -2 \leq x \leq \frac{15}{4}, x \in R\}$

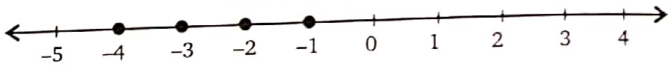


28. (i) $A \cap B = \{x : -1 \leq x < 3, x \in R\}$



(ii) $A' \cap B = \{x : -4 \leq x \leq -1, x \in R\}$

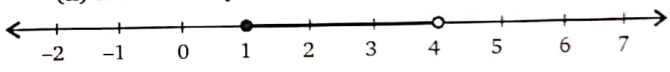
$= \{-1, -2, -3, -4\}$



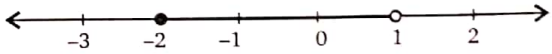
29. (i) $A = \{x : -2 \leq x < 4, x \in R\}$

$B = \{x : 1 \leq x < 7, x \in R\}$

(ii) $A \cap B = \{x : 1 \leq x < 4, x \in R\}$



$A \cap B' = \{x: -2 \leq x < 1\}$



Multiple Choice Questions

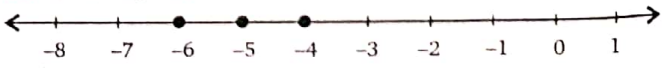
1. (i) **2.** (iii) **3.** (iii) **4.** (iv) **5.** (i)

Check For Understanding

1. {13, 14, 15, 16, 17, 18}

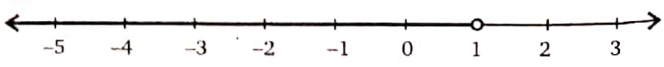
2. $\{x : -1 < y \leq 3, x \in R\}$

3. {–4, –5, –6}



4. (i) 1 (ii) 0 (iii) –1

5.



6. $x \geq 95$; 95