EXERCISE

Question 1.
If the replacement set is the set of natural numbers, solve.
(i) x – 5 < 0
Solution:-
x – 5 < 0
Adding 5, x – 5 + 5 < 0 + 5…
x < 5
Required answer = {1, 2, 3, 4}

(ii) x + 1 < 7
Solution:-
Subtracting 1x + 1 ≤ 7 ⇒ x + 1 – 1 ≤ 7 - 1
x ≤ 6
Required answer = {1, 2, 3, 4, 5, 6}

(iii) 3x – 4 > 6
Solution:-
3x – 4 > 6
Adding 4, 3x – 4 + 4 > 6 + 4
3x > 10
Dividing by, 3, $\frac{3x}{3} > \frac{10}{3}$ $x > \frac{10}{3}$ $x > 3\frac{1}{3}$
Required answer = {4, 5, 6,…}

(iv) 4x + 1 > 17
Solution:-
4x + 1 ≥ 17
Subtracting, 4x + 1 – 1 ≥ 17 - 1
4x ≥ 16
Dividing by 4, 4x/4 ≥ (16/4)x ≥ 4
Required answer = {4, 5, 6,…}

Question 2.
If the replacement set = {-6, -3, 0, 3, 6, 9}; find the truth set of the following:
(i) 2x – 1 > 9
Solution:-
2x – 1 > 9
Adding 1, 2x – 1 + 1 > 9 + 1
2x >10
Dividing by 2, x > 5
Required answer = {6, 9}

(ii) 3x + 7 < 1
Solution:-
3x + 7 ≤ 1

Subtracting 7, 3x + 7 – 7 ≤ 1 - 7
3x ≤ -6
x ≤ -2
Required Answer = {-6, -3}

Question 3.
Solve 7 > 3x -8; x ∈ N
Solution:-
7 > 3x - 8
Subtracting 3x, 7 - 3x > 3x - 3x - 8
Subtracting 7, 7 – 7 - 3x > 3x - 3x – 8 - 7
-3x > -15
Dividing by -3, x < 5
Required Answer = {1, 2, 3, 4}
Note: Division by negative number reverses the inequality

Question 4
-17 < 9y - 8; y ∈ Z
Solution:-
-17 < 9y - 8
Adding 8, - 17 + 8 < 9y – 8 + 8
- 9 < 9y
Dividing by 9
-1 < y
Required Answer = {0, 1, 2, 3, 4 …. }

Question 5.
Solve 9x – 7 ≤ 28 + 4x; x ∈ W
Solution:-
9x – 1 ≤ 28 + 4x
Subtracting 4x, 9x - 4x – 7 ≤ 28 + 4x - 4x
5x – 7 ≤ 28
Adding 7, 5x – 7 + 7 ≤ 28 + 7
5x ≤ 35
Dividing by 5, x≤7
Required answer = {0, 1, 2, 3, 4, 5, 6, 7}

Question 6.
Solve 2/3x + 8 < 12; x ∈ W
Solution:-
$\frac{2}{3}x + 8 < 12\ \frac{2}{3}x + 8 - 8 < 12 - 8\ \frac{2}{3}x < 4$
Multiplying by 3/2, (2/3) x × (3/2) < 4 × (3/2)
∴ Required answer = {0, 1, 2, 3, 4, 5}

Question 7.

Solve − 5(x + 4) > 30; x ∈ Z
Solution:-
-5(x + 4) > 30
Dividing by -5, ((−5(x+4))/−5) < (30/−5)
Note: Division by a negative number reverses the equality
x + 4 < -6
x + 4 – 4 < - 6 - 4
x < - 10
∴ Required Answer = {-11, -12, -13, …}

Question 8.
Solve the inequation 8 - 2x > x - 5; x ∈ N
Solution:-
8 – 2x ≥ x – 5; x ∈ N
8 + 5 ≥ 2x + x
13 ≥ 3x ⇒ 3x ≤ 13
$x \leq \frac{13}{3} = 4\frac{1}{3}$
x = 1, 2, 3, 4 (x ∈ N)
Solution set = {1, 2, 3, 4}

Question 9.
Solve the inequality 18 -3 (2x - 5) > 12; x ∈ W.
Solution:-
18 - 3(2x - 5) > 12; x ∈ W
18 - 6x + 15 > 12
33 – 12 > 6x
21 > 6x
6x < 21 ⇒ x < 21/6 + 7/2 =3½
But x ∈ W, x = 0, 1, 2, 3
∴ Solution set = {0, 1, 2, 3}

Question 10.
Solve: ((2x+1)/3) + 15 < 17; x ∈ W
Solution:-
((2x+1)/3) + 15 ≤ 17; x ∈ W ((2x+1)/3) ≤ 17 – 15 = 2
2x + 1 ≤ 6 ⇒ 2x ≤ 5
x ≤ 5/2 = 2½
∴ x = 0, 1, 2
∴ Solution set is = {0, 1, 2}

Question 11.
Solve:- 3 + x < 2, x ∈ N
Solution:
-3 + x < 2, x ∈ N
x < 2 - (-3)

$x < 2 + 3$
$x < 5$
$\therefore x = 1, 2, 3, 4$ $(\because x \in N)$
$\therefore$ Solution set = {1, 2, 3, 4}

Question 12.
Solve: $4x – 5 > 10 - x, x \in \{0, 1, 2, 3, 4, 5, 6, 7\}$
Solution:
$4x – 5 > 10 - x, x \in N$
$4x + x > 10 + 5$
$5x > 15$
$X > 15/5 = 3$
$\therefore x=4, 5, 6, 7$
Solution set = {4, 5, 6, 7}

Question 13.
Solve: $15 - 2(2x - 1) < 15, x \in Z$
Solution:
$15 - 4x + 2 < 15$
$17 - 4x < 15$
$-4x < 15 - 17$
$-4x < -2$
Dividing by -4, $(-4/-4)x > -2/-4 = ½$
$\therefore x = 1, 2, 3, 4, 5,$
$\therefore$ Solution set = {1, 2, 3, 4, 5,…}

Question 14.
Solve: $(2x + 3)/5 > (4x-1)/2, x \in W$
Solution:-
$(2x + 3)/5 > (4x - 1)/2, x \in W$
$2(2x + 3) > 5(4x - 1)$
$4x + 6 > 20x - 5$
$4x - 20x > - 5 - 6$
$-16x > -11$
Dividing by -16, $x< (-11/-16)$ $x < (11/16)$
$\therefore x = 0$
$\therefore$ Solution set = {0}

Solve and graph the solution set on a number line:
Question 15.
$x – 5 < - 2; x \in N$
Solution:-
$x – 5 < - 2$
Adding 5 to both sides, $x – 5 + 5 < - 2 + 5$
$x < 3$
$\therefore$ The required graph is