

Assignment 1

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ICSE 2017 Board Paper Question 4(c):

Solve the following inequation and represent the solution set on a number line $-8\frac{1}{2} < -\frac{1}{2} - 4x \leq 7\frac{1}{2}$, $x \in I$.

Solution:

$$-8\frac{1}{2} < -\frac{1}{2} - 4x \leq 7\frac{1}{2}$$

$$\Rightarrow -\frac{17}{2} < -\frac{1}{2} - 4x \leq \frac{15}{2}$$

$$\Rightarrow -\frac{17}{2} + \frac{1}{2} < -4x \leq \frac{15}{2} + \frac{1}{2}$$

$$\Rightarrow -8 < -4x \leq 8$$

Now, dividing the inequality by -4, we get

$$2 > x \geq -2$$

(Since on dividing/multiplying an inequality by a negative number, the inequality gets reversed)

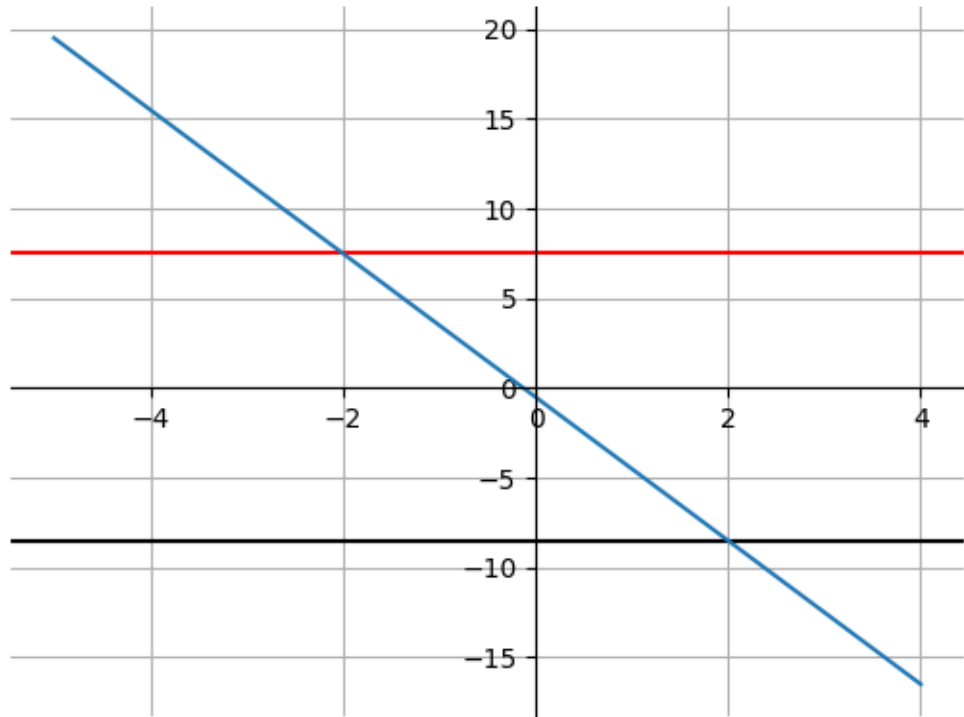
Hence, we have $-2 \leq x < 2$, and $x \in I$

Therefore, $x = -2, -1, 0, 1$. This is the required solution.

The solution can be represented on the real number line (as asked in the question):



The output of the python code used to verify the solution:



The graph above contains the lines $y = -\frac{1}{2} - 4x$, $y = -8\frac{1}{2}$, and $y = 7\frac{1}{2}$

We need to be concerned about the portion of the line $y = -\frac{1}{2} - 4x$ between the lines $y = -8\frac{1}{2}$, and $y = 7\frac{1}{2}$. The values of x within this portion of line is the required solution, i.e., it can be clearly seen that $y = -\frac{1}{2} - 4x$ intersects $y = -8\frac{1}{2}$ at $x = -2$ and intersects $y = 7\frac{1}{2}$ at $x = 2$. So the range of x would be from -2 to 2 (with $x = 2$ excluded).

Hence, the answer is verified.