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SOLVE

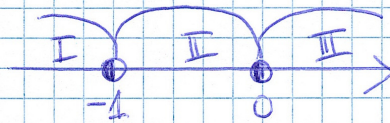$$|x| - |x+1| = 2x+4$$

the absolute value of x minus the absolute value of x plus 1 is equal to 2 times x plus 4

$$x=0 \qquad x+1=0$$
$$x=-1$$

To start with, we have to compare both expression which are located in the modulus bars to "0" to find out their location on the ox-axis

When we established that location we can draw the ox-axis and put that numbers on the ox-axis. The next step is creating the intervals and drawing circles at 0 and -1 they should be half-empty and half full (according to our likes).

Now, we are ready to consider the first interval where x belongs to the interval from minus infinity to -1 inclusive. We rewrite expession from the modulus bars. Then we choose any number from this interval $x \in (-\infty, -1]$ for example we choose -10. If we put -10 instead of x then x is negative and x+1 is negative too. We rewrite equation in the following way (x) and (x+1) are written with a changed sign. We solve an equation.

$$\text{I } \quad X \in (-\infty; -1]$$

$$x \ominus$$
$$x+1 \ominus$$

$$\ominus x - (\ominus(x+1)) = 2x+4$$
$$-x+x-1 = 2x+4$$
$$-2x = 5$$
$$x = -\frac{5}{2} \in (-\infty; -1]$$

x is equal to $-\frac{5}{2}$ it belongs to this interval.

In the second interval x belongs to the interval from -1 to 0. Is the same procedure like in the first interval. We have to establish signs of (x) and (x+1) In the first case we have got a minus, in the second it's a plus.

$$\text{II } \quad X \in (-1; 0]$$

$$x \ominus$$
$$x+1 \oplus$$

$$\ominus x - (\oplus(x+1)) = 2x+4$$
$$x = -\frac{5}{4} \quad ↯$$

x is equal to $-\frac{5}{4}$ It doesn't belong to this interval.

In the last interval x is greater than 0, so we choose any number greater then 0. Let's choose 10. If we put it instead of x we get x is positive and x+1 is positive too. The equation stays without changing signs.

$$\text{III } \quad X \in (0; +\infty)$$

$$x \oplus$$
$$x+1 \oplus$$

$$\oplus x - \oplus(x+1) = 2x+4$$
$$-2x = 5$$
$$x = -\frac{5}{2} \quad ↯$$

X is equal to $-\frac{5}{2}$. It doesn't belong this interval

The final answer: $x = -\frac{5}{2}$.