Solving by Squaring

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You might think that -4 and -1 are both solutions to this equation. Substituting in -4 gives:

$$\sqrt{-4+5} = -4+3$$

Which simplifies to:

$$\sqrt{1} = -1$$

This is true if you take into consideration the fact that square roots can be both positive and negative.

The second solution of -1 also works in a similar way. Subbing this value in gives:

$$\sqrt{-1+5} = -1+3$$

Which is equal to:

$$\sqrt{4} = 2$$

However, some may argue that -4 is not a solution because of logarithms. Taking any log of both sides of the equation gives:

$$\log{(x+5)^{\frac{1}{2}}} = \log{(x+3)}$$

The power-to-the-front rule simplifies the equation down to:

$$\frac{1}{2}\log{(x+5)} = \log{(x+3)}$$

Substituting -4 into the RHS gives this answer:

$$\log{(-4+3)} = \log{(-1)}$$

Logarithms with real number outputs are always positive therefore -4 is not a solution but -1 is.

Link to NRICH page.