**5.3 – RADICAL EQUATIONS**

**Restrictions on the variable:**

By definition, it is impossible to talk about the square root of a negative number.

For example, we can’t write: because it doesn’t make any sense for real numbers.

The square root of a negative number is a different type of number (imaginary number) which you haven’t learned about yet…

Remember: For even index, the radicand has to be positive or zero.

For odd radicals, there is no problem. All radicands are possible.

Examples:

a) is not a real number. And we won’t write it!

b) , and are real numbers.

Application: Determine the restrictions on the variable for the following radicals.

1. 4.   
   🡪 exists if and only if . 🡪 no restrictions for a cube root!
2. 5.   
   🡪
3. 🡪   
    (Be careful: quadratic inequality can only be solved with a graph or sign analysis!)  
    or

Your turn: Determine the restrictions on the variable for the following radicals.  
a) d)

b) e)

c) f)

**Solving Radical Equations:**

It comes in 3 different steps:

1. **RESTRICTIONS:** We determine the restrictions on the variable (which means for which values of *x* each expression involved in the equation makes sense). We make sure that no denominator will equal zero and that no radicand will be negative.
2. **ISOLATE THE RADICAL:** In order for it to disappear when we will square (or cube …) both sides of the equation.
3. **TEST POTENTIAL SOLUTIONS:** Because when we squared both sides, some solutions have potentially been added, and we need to cancel them.

Examples :

* Restrictions :
* Resolution :
* Tests :

Solution :

* Restrictions :
* Resolution :
* Tests :

Solution :

* Restrictions :
* Resolution :
* Tests :

Solution :

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