

Sometimes, Always or Never True?

This activity is designed to enable students to distinguish between equations and identities and will also highlight common misconceptions.

Students are presented with mathematical statements and are required to decide whether each statement is sometimes true, always true or never true.

Students usually start by substituting numbers into each statement leading to a conclusion. Students are then required to explain and justify their conclusion.

This activity is intended to lead towards definitions of an identity and an equation, highlighting the difference between the two, and introducing appropriate notation. Students could be asked to create their own identities and equations.

The statements to be presented include examples of expressions about complex numbers. The same activity can be used for a variety of expressions, identities and equations such as algebraic statements and trigonometric statements.

If all the coefficients in an equation are real then the equation has a real root.

If an equation has at least one coefficient of the form $a + bj$ where b is non-zero, then the equation has at least one complex root.

If an equation has all coefficients of the form $a + bj$ where a and b are non-zero, then the equation does not have a real root.

If an equation has a root $a + bj$ with a and b non-zero and it also has at least one coefficient of the form $c + dj$ with d non-zero, then $a - bj$ is not a root of the equation.

If an equation has all real coefficients and $a + bj$ is one of the roots of the equation, then $a - bj$ is another root.