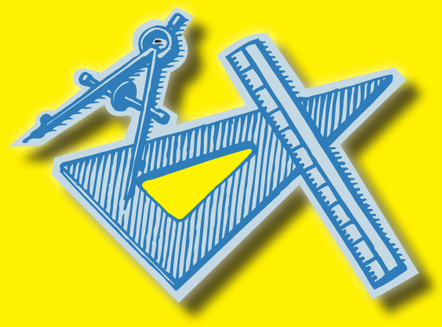
# LOGIC & DEDUCTIVE REASONING



A **COROLLARY** follows after a theorem and is a proposition which must be true because of that theorem.
Example: If 2 circles share a common tangent line at one point, then the centres and that point are collinear.

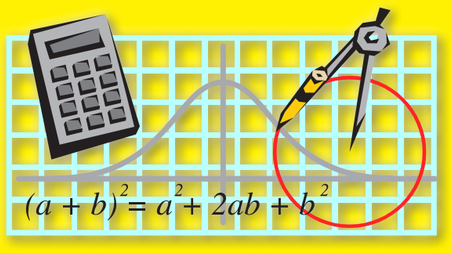
A **THEOREM** is a statement which has been proved to be true.
Example: The three angles in any triangle add to 180°.

An **AXIOM** is a statement which is assumed to be true and is used as a basis for developing a system.
Example: There is exactly one line through any two given points

**IMPLIES** indicates a logical relationship between two statements, such that if the first is true then the second must be true

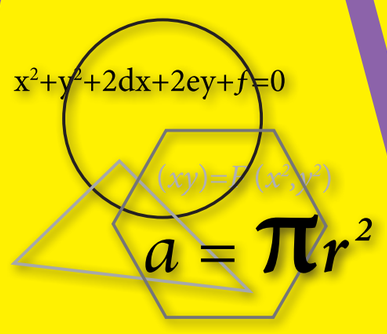
## Terminology and Examples of Logic & Deductive Reasoning

A **PROOF** is a sequence of statements (made up of axioms, assumptions and arguments) leading to the establishment of the truth of one final statement.




**IF AND ONLY IF:** Often shortened to "iff". The truth of either one of the connected statements implies the truth of the other i.e. they are both true or both false.

The **CONVERSE** of a theorem is formed by taking the conclusion as the starting point and having the starting point as the conclusion.




**A PROOF BY CONTRADICTION** involves making an assumption that a particular statement is not true. Then, by using valid arguments, it is shown that such an assumption leads to a contradiction. Such a contradiction proves that the statement must be true.

Two things are said to be **EQUIVALENT** if they have the same value but different forms.

Irish Mathematics Teachers' Association

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