

## Aristotle, Prior Analytics, Book I, Chapter 23, Line 21

For all who effect an argument per impossibile infer syllogistically what is false, and prove the original conclusion hypothetically when something impossible results from the assumption of its contradictory; e.g. that the diagonal of the square is incommensurate with the side, because odd numbers are equal to evens if it is supposed to be commensurate. One infers syllogistically that odd numbers come out equal to evens, and one proves hypothetically the incommensurability of the diagonal, since a falsehood results through contradicting this. For this we found to be reasoning per impossibile, viz. proving something impossible by means of an hypothesis conceded at the beginning. Consequently, since the falsehood is established in reductions ad impossibile by an ostensive syllogism, and the original conclusion is proved hypothetically, and we have already stated that ostensive syllogisms are effected by means of these figures, it is evident that syllogisms per impossibile also will be made through these figures. Likewise all the other hypothetical syllogisms: for in every case the syllogism leads up to the proposition that is substituted for the original thesis; but the original thesis is reached by means of a concession or some other hypothesis. But if this is true, every demonstration and every syllogism must be formed by means of the three figures mentioned above. But when this has been shown it is clear that every syllogism is perfected by means of the first figure and is reducible to the universal syllogisms in this figure.

Read the passage above from Aristotle and answer the following questions:

[1] In this passage, Aristotle is describing a method of proof. He calls it an “argument per impossibile.” What do we call it today?

[2] Explain, in modern language, Aristotle’s example of “argument per impossibile.”

## A selection from Plato's *Theaetetus*

**Theaetetus** Theodorus was writing out for us something about roots, such as the roots of three or five, showing that they are incommensurable by the unit: he selected other examples up to seventeen-there he stopped. Now as there are innumerable roots, the notion occurred to us of attempting to include them all under one name or class.

**Socrates** And did you find such a class?

**Theaet.** I think that we did; but I should like to have your opinion.

**Soc.** Let me hear.

**Theaet.** We divided all numbers into two classes: those which are made up of equal factors multiplying into one another, which we compared to square figures and called square or equilateral numbers;-that was one class.

**Soc.** Very good.

**Theaet.** The intermediate numbers, such as three and five, and every other number which is made up of unequal factors, either of a greater multiplied by a less, or of a less multiplied by a greater, and when regarded as a figure, is contained in unequal sides;-all these we compared to oblong figures, and called them oblong numbers.

**Soc.** Capital; and what followed?

**Theaet.** The lines, or sides, which have for their squares the equilateral plane numbers, were called by us lengths or magnitudes; and the lines which are the roots of (or whose squares are equal to) the oblong numbers, were called powers or roots; the reason of this latter name being, that they are commensurable with the former *i.e., with the so-called lengths or magnitudes* not in linear measurement, but in the value of the superficial content of their squares; and the same about solids.

**Soc.** Excellent, my boys; I think that you fully justify the praises of Theodorus, and that he will not be found guilty of false witness.

Read the selection above and answer the following questions:

[1] In modern language what do we call the two classes of numbers discussed in this passage from Plato?

[2] Explain the relationship between this passage and the passage from Aristotle on the other side of the page.