

Iamblichus,
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*What the truly educated person should demand from the mathematician,
and how he should judge his theory, and from what criteria
its correctness should be acquired*
[7.10-13]

But since it is the function of the educated man to be able to judge to a good approximation what is right or wrong in the contributions of the speaker, and we believe the generally educated man is someone like that, then being educated is also being able to do the aforementioned. [25] So this is clear, that the correctly educated man must, in the case of mathematics too, demand from the mathematician correctness and his proper function, whether he rightly or wrongly creates his theory about them. [85.3] For just as we consider the universally educated man to be able to judge about everything, so to speak, though being one in number, similarly too about some delimited science there would be someone else who has same disposition about a portion as the one mentioned. [84.21-85.7]

Hence it is clear that there must be certain such criteria in the study of mathematics too, with reference to which the educated man will accept the manner of the proofs, independently of how the truth is, whether thus or otherwise. [11] I mean, for example, whether those who take up each individual theorem of the mathematicians must make determinations about it in accordance with itself, for example about these here triangles, or whether those who suppose the common theorems must also investigate the attributes of everything according to something common. [16] For many of the same things come about in many kinds that are different from each other, for example if someone were to make the demonstration insofar as it is a triangle or insofar as it is a rectilinear figure in common. [19] For if in a way the same things belong to things that differ in form, the demonstrations of them are not at all obliged to be any different. [85.21] But perhaps the ones in which the predicate happens to be the same are different by differing in form; for example, similarity in triangles is one thing, but in numbers is something else, and one must make particular demonstrations according to each one. [25] Thus one should investigate when to study what is in common according to a kind, and when to study particulars as individuals, for to make determinations about these matters contributes a great part towards mathematical education. [85.7-86.2]

Again, one must demand that the mathematician make his accounts in accordance with the underlying substance, and to make the manner of his demonstrations proper to that. [4] Thus just as we put up with plausible reasoning from an orator, so it is necessary to demand from the mathematician demonstrations that are necessary. [6] And one must not seek the same necessity everywhere, nor, similarly, the same precision in everything, but just as we divide the technical fields by their underlying materials, not seeking precision similarly in gold and tin and bronze, nor in cork and box and lotus,

in the same way this is so in the observational sciences. [12] For the underlying things will make an immediate difference when some are simpler and others more of a composite, or some are generally immovable and others movable, for example the things in numbers and in harmony, or those in geometry and astronomy; and the starting point of some is the intellect and of others is the mind, but of some other things there will also be certain small impulses coming from the sense, just as from the heavenly bodies. [19] For it is not possible to bring to bear the same or similar causes about such things; rather to the degree that the starting points differ, to that degree as well the demonstrations <need> to differ, for in each of them the manner is cognate. [86.2-22].

Again, there is a greater separation between them, in that those who are researching either do or do not have principles; so that here too one should not accept either the causes or the arguments to be similar. [26] And in these respects one must recognize what is the same and different, and what is the same by analogy; and one must recognize which sciences are in greater need and in which of them the perplexities are greater, for it is pretty much in these ways and in ways like these that there are variations in the demonstrations and arguments in each case. [87.5] This kind of observation could contribute not only to the judging but also to the question how research must be done, for having made a determination of the causes of each thing, one will create the arguments proper to it, which is not easy to do without being used to it. [9] For nature itself is able to guide us by itself to the principles, but is not self-sufficient in judging each thing without taking up a different understanding. [11] Again, we should ascertain whether the causes about which the mathematician must speak are numerous, and which of them are naturally first and second. [14] For the mathematically educated man is able both to scrutinize the causes that have been supplied and to observe their order. [86.23-87.16]

But this too should not be overlooked: that many of the more recent Pythagoreans assumed that mathematics has as its subject matter only the things that are the same and in the same way, and hypothesized only these principles; so in the same way they define as different both the sciences and the demonstrations about such things. [22]. But since we will demonstrate, not only in the speeches preceding this point but also in our later remarks, that there are many different substances that are unchangeable and exist in the same state, not only the ones in mathematics, and that the former are more senior and more honorable than the latter, and we will also demonstrate that these mathematical principles are not the only ones, but there are also others, and the latter are more senior and more powerful than the former, and that the mathematical principles are not the principles of all the things that exist but only of some -- so for these reasons the mathematical demonstration requires at this point a determination of which of its qualities can be demonstrated as remaining the same and in the same way, and from what kinds of principles it reasons, and about what kinds of problems it produces its demonstrations. [88.6] For the education which discriminates in these matters determines both the correctness and the end of mathematics, and it makes this discrimination as it should, and this includes the way one should conduct research well. [10] Hence let this too be determined by us in this way. [87.17-88.11]o