

Activity 26. Read the article to collect all the definitions of mathematics given in the text. Classify them as either formal or informal.

Believing myself to be a non-mathematician, my dormant interest in maths has been awakened by the lively discussions going on around me every day, and the environment in which I am steeped has prompted me to ask the question “What is mathematics?” My search for the answer has unearthed some interesting ideas which I’d like to share.

In her blog on mathematics and ethics Lucy Rycroft-Smith says that mathematics is “the language of pattern, measurement and logical rules”. Now the idea of mathematics being a language resonates with me, evoking the memory of a statement that mathematicians the world over can communicate and understand each other through this “metalanguage par excellence”.

In a blog on the role of paradox in mathematics, Vinay Kathotia stated that “mathematics is the art of interpreting, quantifying, and working with error and uncertainty”. This gave me pause — I had never thought of maths as an art before. I have marvelled at the art produced by mathematics — for instance, the boundless beauty of fractals or the complexity of my son’s computer-designed creations — but to think of mathematics itself as an art, and especially as an art which deals with error and uncertainty was beyond my imagining. Hadn’t I always been taught that maths was certain, more like a science based on logic and facts, and that errors were wrong, resulting in red crosses all over my exercise book?

Moving on to a computer search the inevitable Wikipedia provided the less-than-helpful (although no doubt accurate) “Mathematics has no generally accepted definition”, before looking at a variety of suggested definitions ranging from Aristotle (“the science of quantity”), through abstract and philosophical definitions (“symbolic logic”; “carrying out mental constructions”; “the examination of the properties and interactions of idealized objects”), to humorous or even poetical definitions (“the art of giving the same name to different things” — there’s that word art again).

A more thorough online search however led me to these wonderful words by Dr Liaqat Khan, Professor in Mathematics at Quaid-i-Azam University, Islamabad: “Mathematics is concerned with using imagination, intuition and reasoning to find new ideas and to solve puzzling problems”. Whilst his use of the qualifier “concerned with” means this is not a definition per se, the overarching vision he expresses is inspiring and excitingly inclusive. If we accept this statement, then we are all born mathematicians; we are inherently mathematical beings whose defining human characteristics (as opposed to those we share with other animals) are those which also make us mathematical, and I can no longer claim to be a non-mathematician.

What is more, no-one should be viewed by others as a non-mathematician, especially by those whose aim is to teach mathematics. If mathematics is a language, an

art, a science, a philosophy, as well as innate, and if it embraces those very human traits of error and uncertainty, then learning mathematics should be delightful for all of the budding linguists, artists, scientists, philosophers and yes, even career mathematicians in each classroom. The challenge, of course, is finding ways of nurturing this delight — the imagination and intuition as well as the reasoning — within the constraints of a set curriculum.

(by Lynn Fortin, from Cambridge Mathematics, 2018)