

PHILOSOPHY AND FUN OF ALGEBRA

CHAPTER 6: THE FIRST HEBREW ALGEBRA

The first Hebrew algebra is called Mosaism, from the name of Moses the Liberator, who was its great Incarnation, or Singular Solution. It ought hardly to be called an algebra: it is the master-key of all algebras, the great central director for all who wish to learn how to get into right relations to the unknown, so that they can make algebras for themselves. Its great keynotes are these:—

When you do not know something, and wish to know it, state that you do not know it, and keep that fact well in front of you.

When you make a provisional hypothesis, state that it is so, and keep that fact well in front of you.

While you are trying out that provisional hypothesis, do not allow yourself to think, or other people to talk to you, about any other hypothesis.

Always remember that the use of algebra is to free people from bondage. For instance, in the case of number: Children do their numeration, their “carrying,” in tens, because primitive man had nothing to do sums with but his ten fingers.

Many children grow superstitious, and think that you cannot carry except in tens; or that it is wrong to carry in anything but tens. The use of algebra is to free them from bondage to all this superstitious nonsense, and help them to see that the numbers would come just as right if we carried in eights or twelves or twenties. It is a little difficult to do this at first, because we are not accustomed to it; but algebra helps to get over our stiffness and set habits and to do numeration on any basis that suits the matter we are dealing with. Of course, we have to be careful not to mix two numerations. If we are working a sum in tens, we must go on working in tens to the end of that sum. Never let yourself get fixed ideas that numbers (or anything else that you are working at) will not come right unless your sum is set or shaped in a particular way. Have a way in which you usually do a particular kind of sum, but do not let it haunt you.

You may some day become a teacher. If ever you are teaching a class how to set down a sum or an equation, say “This is my way,” or “This is the way which I think you will find most convenient,” or “This is the way in which the Government Inspector requires you to do the sums at present, and therefore you must learn it.” But do not take in vain the names of great unseen powers to back up either your own limitations, or your own authority, or the Inspector’s authority. Never say, or imply, “Arithmetic



requires you to do this; your sum will come wrong if you do it differently.” Remember that arithmetic requires nothing from you except absolute honesty and patient work. You get no blessing from the Unseen Powers of Number by slipshod statements used to make your own path easy.

Be very accurate and plodding during your hours of work, but take care not to go on too long at a time doing mere drudgery. At certain times give yourself a full stretch of body and mind by going to the boundless fairyland of your subject. Think how the great mathematicians can weigh the earth and measure the stars, and reveal the laws of the universe; and tell yourself that it is all one science, and that you are one of the servants of it, quite as much as ever Pythagoras or Newton were.

Never be satisfied with being up-to-date. Think, in your slack time, of how people before you did things. While you are at school my little book, *Logic of Arithmetic*, will help you to find out many things about your ancestors which may amuse and interest you; but, as soon as you leave school and choose your own reading, take care to read up the histories of the struggles and difficulties of the people who formerly dealt with your own subject (whatever that may be). If you find the whole of the data too complicated to deal with, and judge that it is necessary to eliminate one or more of them, in order to reduce your material within the compass of your own power to manage, do it as a provisional necessity. Take care to register the fact that you have done so, and to arrange your mind, from the first, on the understanding that the eliminated data will have to come back. Forget them during the working out of your experimental equation; but never give way to the feeling that they are got rid of and done with.

Be very careful not to disturb other people’s relationships to each other. For instance, if a teacher is explaining something to another pupil, never speak till she has done. Beware of the sentimental craving to be “in it.” Any studying-group profits by right working relations being set up between any two members; and ultimately each member profits. The whole group suffers from any distraction between any two. Therefore listen and learn what you can; but never disturb or distract. 1

Take care not to become a parasite; do not lazily appropriate the results of other people’s labour, but learn and labour truly to get your own living. Take care that everything you possess, whether physical, mental, or spiritual, shall be the result of your own toil as well as other people’s; and remember that you are bound to pay, in some shape or way, everyone who helps you. Do not make things easy for yourself by speaking or thinking of data as if they were different from what they are; and do not go off from facing data as they are, to amuse your imagination by wishing they were different from what they are. Such wishing is pure waste of nerve force, weakens your intellectual power, and gets you into habits of mental confusion.



When the time comes to stop grind-work, there is no better rest than amusing your imagination by thinking of non-existent possibilities; but do it on a free, generous scale. Give yourself a perfectly free rein in the company of the Infinite. During such exercise of the imagination, remember that you are in the company of the Infinite, and are not dealing with, or tinkering at, the problem on your paper.

Keep always at hand, clearly written out, a good standard selection of the most important formulæ—Arithmetical, Algebraic, Geometric, and Trigonometrical, and accustom yourself to test your results by referring to it. These are the main laws of mathematical self-guidance. Once upon a time “Moses” projected them on to the magic-lantern screen of legislation. In that form they are known as the Ten Commandments; or, to change the metaphors, we might call the Ten Commandments the outer skin of the mathematical body. A great many people seem to suppose that, though everyone ought to keep the Ten Commandments, it does not matter what happens to one’s mind. Just so, there are people who live unhealthy lives, and think they can make all right by putting cosmetics on their skin. But I hope you have learned in the hygiene class how stupid and futile all that is. The way to have a healthy skin is to grow it, by leading a hygienic life on a moderate allowance of pure wholesome food, and taking a proper amount of exercise in pure fresh air. People who do that with their minds grow the Ten Commandments naturally, just as Moses grew them. The world has been trying the other plan—bad food and air inside, and cosmetics outside—for at least 4000 years; and not much seems to have come of it yet. The Ten Commandments have not yet succeeded in getting themselves kept. Perhaps that is why some schoolmasters and mistresses think they would like to try the other plan now. Still, it is very good to have a normal model of what a healthy human being ought to look like outside. It is good to have a standard for reference. Therefore do not get too much immersed in the mere details of your own problems. Learn the Ten Commandments and a few other old standard formularies by heart, and repeat them every now and then. And say to yourself, “If I really am doing my algebra quite rightly, this (the standard formularies) is how I shall think and feel and wish. I shall wish to behave thus, not because anybody ordered me to do so, but from sheer liking and sense of the general fitness of things.”

