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## Mathematics In Its Relation To The Commercial World

By JANE E. GOODE, C. P. A.

Have you ever thought about the pressure of figures on the world in which we live? Cookbooks, timetables, mileage, football signals and bridge scores, calories, bank accounts or bills, taxes, insurance, values of one kind or another. Not only the commercial and financial world but all of civilized life as we know it is controlled by figures. With the very evident trend in our times toward some form of state control, do you realize how much the happiness and wellbeing of every individual depends on the correct interpretation of the many statistics released by governmental agencies? Most people think that all calculations can and are being made by machines. Nothing could be further from the truth. In the first place, machines are expensive and the average business house can afford only a cash register and an adding machine. Any business which has a large number of accounts receivable or payable usually has some sort of book-keeping machine. But unless there is an intelligent operator and one with some figure sense, there is plenty of grief and the accounting department can be at sixes and sevens despite the machines. Calculating machines have a very definite place in the business world but that place is limited and they can never take the place of the human brain which initiates the task to be done and then interprets the results which the machines produce.

Over and over we have heard the statement "Oh, I've no head for figures" until we have almost reached the stage where anyone who can add a simple sum correctly is regarded as a genius. The fiction is prevalent that anyone with literary tastes simply can't add or subtract. Girls coming into offices as stenographers or typists usually make it clear that they are not interested in having anything to do with accounting or bookkeeping departments.

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Her special interests include gardening, the A.S.W.A. and music. This article is taken from a talk given at a Los Angeles High School.

That feeling is due to a sort of, or rather lack of, social heritage. Down through the ages, the average man had little use for mathematics. Reading and writing came more or less easily because through these two mediums he could express his ideas and observations but he had never been taught mathematics as a language. For the effective use of any language, we need to have not only an adequate vocabulary but a knowledge of syntax. A baby

can get along for a while by the use of unconnected words. And in the language of measurement, we can get along after a fashion with a vocabulary consisting of addition, multiplication, division and subtraction. But to properly correlate all the advantages which science and industry have put within our grasp, it is absolutely necessary to know something about the grammar of the language of measurement.

The acquisition of any knowledge requires a certain amount of drudgery. I believe one of the main reasons why mathematics is such an unpopular subject and why our educational system in recent years has neglected to give it its proper value, is that it has been taught as a system of principles to be memorized and then exploited through the assignment of many problems. Students get bored and to the many who do not learn easily it provides the acceptable excuse "I've no head for figures". No attempt has been made to show its social history, how it has been used over and over to free mankind from superstition, the immense dependence of our civilization upon it. One writer calls mathematics the mirror of civilization.

The first mathematicians were the priests who calculated the advent of the seasons. History tells us that the early Egyptian temples were equipped with instruments to note the rise and fall of the Nile. But the great mass did not see any connection between prophecy and reality. Reading and writing were mysteries for centuries but the twentieth century made them common knowledge—at least in this country. Today the ordinary man knows something about scientific discoveries even though he doesn't know their mathematical bases. Side by

side with the development of modern art and modern industry has been the development of commerce and finance. And most persons have some knowledge of them just as their primitive ancestors observed the rise and fall of the river but all they know about the mathematical side is that commerce and industry are represented by figures so astronomical that they are not to be understood.

Just as our modern languages are a product of a long history of development, so is mathematics a story of evolution. The great trading cities of the Phoenicians and the caravans that plied the Arabian and Persian deserts had need for a system of measurement and counting. The secrets of the pyramid makers were the basis of geometry and as men began to think a little about the size of the earth and the sun and the moon, the language of trigonometry was born. The Arabic mathematicians developed the language of calculation which we still call by its arabic name of algebra and this new arithmetic was brought into Europe by the scholars from the great Moorish universities in Spain. The Hanseatic League sponsored many schools throughout Germany for the teaching of that arithmetic and a large percentage of the earliest printed books were devoted to the tastes and interests of the merchants of the middle ages. Ever since Martin Luther announced that every boy should be taught to calculate, I suppose youngsters have been protesting that such study is not compatible with their mental capacities and interests!

When the era of the great navigations began, it was necessary to have more accurate tables of star measurements for use in seafaring and arithmetic mothered a new device—logarithms. When mathematicians began to think about longitude and latitude we had the beginnings of the use of graphs. And all this busy new world gradually developed another language — the measurement of motion and called it the calculus. In our times, there are evidences that we will have to learn still newer languages of measurement. I mention these because I believe most people believe the subject should be confined to the scientific world and it is not necessary to learn such things for everyday purposes. They do not see that the world in which we are living demands these new languages.

They accept what science offers without question or analysis because they do not understand a proper measuring device. As a result, our technological development has outstripped our social development.

We hear a great deal about statistics these days. Our economic doctors stun us with reams and reams of figures. Our brokerage houses are filled with graphs charting the conduct of many securities from which they forecast the future movement of those securities. Many corporations feeling that their stockholders either can't or won't read balance sheets and profit and loss statements, attempt to show the operations of companies by means of charts. Much of this type of effort is constructive but only the person trained in mathematics knows where the factual matter is left behind and where the realm of guesswork begins and knows how to use both in the light of changing conditions.

I am tremendously impressed with the realism of modern youth and it seems to me that, properly presented, mathematics would be the only subject to gain their attention and hold their devotion. But boys and girls come into the commercial world and see only their jobs, rarely its relation to the whole department, or their department to the business as a whole. Perhaps that attitude is responsible for so much of the tug-of-war that is pulling our society apart. The study of mathematics should clearly show that the mind can be trained to hold the entire problem even though there are many underlying ideas.

We may deplore the inability to spell or the grammatical errors which are so common but at least these mistakes rarely interfere with a meaning. But employees can't make repeated errors in making change or keeping books or preparing statements and not have the boss feel that the firm would probably be better off without their services. The study of mathematics makes for accuracy.

Training in mathematics aids in producing two other essentials in modern life—clear and correct thinking and adherence to the rules. Schools have many methods for instilling various kinds of discipline but I don't know of any other subject that can train a student to think a problem through

to a logical conclusion. Proficiency in solving the old-fashioned trick problems has an enduring value as many a candidate for civil service examinations can testify.

The ability to compute mentally and rapidly is of prime importance. I know a very successful attorney who, when he came out of college, refused to go into his father's law office because he didn't want to be known as Mr. Jones' son. He decided to get a little business experience before beginning the practice of law and made a connection with a lumber firm. This young business man sold quite a lot of lumber to a Portugese contractor who could neither read nor write. One day this builder came into the office to settle his account. Recent purchases had been heavy and it took sometime to get the bill ready. The builder called attention to one or two errors and then paid up. The salesman was curious about the way in which the figures were checked because he knew the customer couldn't read and so he asked him. The Portugese replied that inasmuch as he couldn't read or write, he was dependent entirely on what his mind absorbed whereas the salesman had pencil and paper and an adding machine and, therefore, he of necessity had had to train himself to accuracy, a good memory and rapid calculation. This attorney told me he never forgot that lesson — that he with a college education and all the facilities of the business world at his command had been checked by an illiterate worker. And he began to practice computations in his head, verifying them on paper later. He said it was surprising how quickly his mind responded and, later on in life, the ability to think fast and retain information in his mind was of inestimable value in his court work.

Children lost valuable training when the schools dropped the daily drills in mental arithmetic. Such drills are of far more importance than the mere ability to calculate rapidly. They make for a keen, streamlined mind and a figure sense that will not only mean efficient office routine but a check and balance on much of the pernicious information that is so prevalent today.

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To be energetic and firm where principle demands it, and tolerant in all else, is not easy.

—Mark Hopkins

## Accounting With Variations

by NINA HUDSON ARNOLD, C. P. A.

Governmental postal accounting is the acme of simplicity and comprehensiveness. It might be interesting to those who have never had direct contact with Federal work to know how the records of a Third Class Post Office are kept.

The main headings are Surplus Fund and Fixed Credit. The Surplus Fund has to do with money orders. When a money order is written by the postmaster, it is posted in a book kept specially for itemized money orders, and also upon a separate sheet which is submitted at the end of each quarter to a central accounting office. At the end of each day, the details of the money orders and their respective fees are listed and the totals are put into the cash book. (This cash book is recapitulated every two weeks; the subtotal of money orders and fees are columnized. Therefore, in a quarter there are six of such subtotals, the grand total of which is carried to a quarterly account. This in turn is submitted to the central accounting office for that particular post office.) Since this grand total must equal the sum of the itemized totals previously mentioned, you can readily see that there are three checks upon the surplus fund.

Paid money orders are treated as cash in submitting the cash daily to the central accounting offices. Every money order drawn has its record in sequence in the general accounting office in Washington. Every application for a money order, which the individual draws, is filed by the postmaster and must be kept for at least three years.

The registry branch requires all cards which acknowledge the passing of regis-

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Mrs. Arnold is a member of the American Institute of Accountants, has received a life membership from the Connecticut C.P.A. Society, and is postmaster of Haddam, Conn. She has specialized in town reports, estate accounting and has done probate indexing for several towns, which covered over twenty volumes of probate records.