

# The Importance of Mathematics in the Recording and Interpretation of Accounting

Y. A. Babalola<sup>1</sup>, F. R. Abiola<sup>2</sup>

## Abstract

Everyone has heard that Mathematics and accounting go hand in hand, though not as intertwined as people may believe or sometimes that you should have a lot of math to take accounting. Unfortunately, for many people, just the mention of the word "math" can elicit childhood memories of struggling with long division and fractions or putting off that geometry homework, and later avoiding math in general as much as possible. This study examine how the result of a few bad experiences in elementary or secondary school affect accounting students, the unfortunate result of this is that some students are all too ready to be discouraged before even beginning an accounting class and learning what accounting is all about, and why it is so important in business.

**Keywords:** Important of Mathematics; Recording; Interpretation; Accounting

## 1. Introduction

The purpose of having a mathematical background is to increase an accountant's cognitive ability because accounting activities require the use mathematics or mathematical principles. The good news is that not a lot of math is needed to study accounting. A working knowledge of arithmetic and a small amount of basic algebra will allow a student to successfully complete any introductory accounting courses. The reason for this is that although accounting information consists of numerical data, the math tools used to record the numerical data are very simple, really just addition and subtraction <sup>[7]</sup>. The reason that you need to know a little more math than this is that doing accounting requires first analyzing transactions before recording them. It is the initial analysis of transactions to determine correct amounts to record that requires the basic math skills, only at very advanced professional levels would you need more math than this.

The subject of "accounting" consists of three key elements: accounting theory (underlying concepts), principles (rules) for how to apply the concepts, and the specific procedures that implement the rules <sup>[2][4]</sup>. The type of introductory class that you take will determine which of these elements receives the most emphasis. For example, bookkeeping classes emphasize procedures, particularly for recording and organizing financial data. Accounting principles classes or basic accounting classes usually provide a more balanced content that includes all three elements. These classes provide a less specialized, broader understanding and the opportunity for some study of financial statements and the use of accounting information. Introductory financial accounting concentrates more on theory, principles and the preparation and use of financial statements.

So why does introductory accounting seem challenging? There are two reasons, and they are not about math. First, you are simply learning a lot of ideas, rules, and procedures that are specific to accounting and that are new to you. Secondly, although accounting doesn't require much math, it does require thinking that is careful and logical. In this sense, accounting has some similarity to math and this is probably why taking

<sup>1</sup> Business Education Department; School of Vocational & Technical Education; Federal College of Education [Special], Oyo, Oyo State, Nigeria

<sup>2</sup> Business Education Department; School of Vocational & Technical Education; Federal College of Education [Special], Oyo, Oyo State, Nigeria

math classes helps with accounting classes. However this kind of careful thinking can definitely be learned with practice in accounting classes, without ever having to become some kind of expert math student <sup>[7]</sup>.

## 2. The Math You Need

Here is a summary table of the kind of math that will take you through a year of introductory accounting, a year of intermediate accounting and most other accounting courses as well<sup>[7]</sup>.

Item	Example
Whole number operations	Adding, subtracting, multiplying, and dividing numbers like 75, 230, 12, etc.
Decimals operations and rounding up numbers	Expressing amounts as decimals and adding, subtracting, multiplying, and dividing numbers like 75.3, 2.798, 12.61, .75, .05 etc. rounding amounts to a designated decimal amount.
Percentage operations and conversion	Expressing amounts as percentages and adding, subtracting, multiplying, and dividing numbers like 20%, 7%, .07%, 150%, etc.
Fraction operations	Expressing amounts as fractions and adding, subtracting, multiplying, and dividing numbers like 1/3, 15/100, 12/8, 1/10, etc.
Positive and negative numbers	Adding, subtracting, multiplying, and dividing numbers that are positive and negative.
Converting numbers expressed in one form to a different form	Converting any decimal, percentage, or fraction into another format, such as converting 30% into a decimal or fraction or converting 6/8 into a decimal or percentage.
Ratios and averages	Be able to express numerical relationships as ratios and averages.
Order of operations	For an expression that contains several operations, know the order to calculate the answer, [BODMAS] - such as for $[8/2 + 3/5]^2$ .
Basic algebra	Be able to create and/or solve a basic algebraic expression such $3x = y + z/8$ .
Exponents & Statistics	Understand the essential calculations with exponentials and statistical issues.

### To Major in Accounting

To major in accounting, very little changes because, you will need to successfully complete a business statistics class as well as being sure that you are comfortable with basic algebra. (Both basic statistics and basic algebra are pretty important as you continue on in business subjects.) Some schools may require more advanced topics such as linear programming or calculus for accounting majors. The courses are really just used as screening devices and to add status to a program. You just have to put up with them or find a different program.

### Test Yourself

The basic idea in accounting is that the total wealth of a company is called assets. There are two possible claims on assets, which are called liabilities and Capital. Liabilities and Capital together always equal the Assets. Express this concept as an equation using the letters A for assets, L for liabilities and C for Capital.

$A = L + C$  — this is "accounting equation" and is the fundamental concept behind accounting.

The total cost formula for a business is  $T = a + bx$ , where  $T$  is the total cost incurred over a range of output,  $a$  is the total fixed cost,  $b$  is the cost per unit produced, and  $x$  is the number of units produced. Solve the formula for  $x$ .

$(T - a)/b = x$  — Following the basic algebra procedure for isolating an element.

Mathematical formulas help accountants, management personnel and lenders to compare income, expenses, profits and debts to other companies in similar industries. The formulas usually result in ratios or percentages that can be used to compare companies with industry standards easily even though a large difference may exist between the actual income and expenses of each company<sup>[3]</sup>. Examples of some formulas used by accountants are Debt-to-equity ratio, Inventory turnover ratio, Operating margin, Earnings per Share (EPS), P/E ratio and Working capital. EPS may be calculated using only outstanding shares of stock or stated using all possible shares of stock, including options. EPS is stated on the face of a company's income state because of its importance to stockholders and lenders. There are also formulas that accountants use to calculate depreciation on assets depending on the type of asset being depreciated, such as straight-line and modified accelerated cost recovery system.

### **3. The Discovery of the Accounting Equation**

We now move back in time from 2014 to 1300. In Italy, a few insightful merchants are becoming aware of a simple but incredibly powerful concept – the relationship between their wealth and the claims on that wealth. Specifically, the merchants have concluded that the essential description of any financial entity is that the total wealth is equaled by no more than two possible kinds of claims “the creditors and the owner” on that wealth. The merchants come to express this discovery as: Assets = Liabilities + Owner's Equity<sup>[3][7]</sup>. The result of this understanding is that by 1300 the first double-entry accounting records are being used by a few merchants, in which at least two account entries are always required with each transaction in order to keep the equation in balance. Later, the accounting equation concept and rules for double-entry accounting are formalized in two books, first by *Benedetto Cotrugli* and then more famously by *Luca Pacioli*, a well-known mathematician and friend of *Leonardo da Vinci*<sup>[3][7]</sup>. Modern accounting, including all its potential complexity, operates within these basic concepts and principles.

#### **The Accounting Equation**

This equation is the foundation of double entry accounting<sup>[3][5]</sup>. The accounting equation displays that all assets are either financed by borrowing money or paying with the money of the company's shareholders. Thus, the accounting equation is: Assets = Liabilities + Shareholder Equity. The balance sheet is a complex display of this equation, showing that the total assets of a company are equal to the total of liabilities and shareholder equity. Any purchase or sale by an accounting equity has an equal effect on both sides of the equation, or offsetting effects on the same side of the equation. The accounting equation is also written as:

$$\text{Liabilities} = \text{Assets} - \text{Shareholder Equity} \text{ and } \text{Shareholder Equity} = \text{Assets} - \text{Liabilities.}$$

The assets, liabilities and equity (Capital) of a business are all financial measurements that relate to a particular point in time. The financial statement that is used to present this information is known as the **balance sheet**. The balance sheet is a statement of the assets, liabilities and Capital of a business as they exist at a particular point in time.

The relationship between the assets, the liabilities and the capital can be represented algebraically by what is commonly known as the **accounting equation**. If we use the letter **A** to represent the assets, the letter **L** to represent the liabilities and the letter **C** to represent the Capital then the accounting equation is:

$$C = A - L$$

This equation states that the Capital is the value of the assets minus the value of the liabilities. This equation is more commonly written as:

$$A = C + L$$

This equation states that the value of the assets is equal to the value of the liabilities plus the shareholder equity. This is just another way of saying the same thing. Because the shareholder equity is defined as the value of the assets minus the value of the liabilities then this equation is always true by definition.

The income and expenses of a business are financial measurements that relate to a specified period of time rather than a specific point in time. The financial statement that is used to present this information is known as the *income statement*. The income statement is a statement of the income and expenses of a business as they occur during a specific period.

If we use the letter **I** to represent the income over a specified period of time and the letter **E** to represent the expenses over that same period we can represent the relationship between the assets, the liabilities, the capital, the income and the expenses by using a modified form of the accounting equation as follows:

$$A = C + L + (I - E)$$

This equation states that the value of the assets is equal to the value of the liabilities plus the capital plus the excess of income over expenses. Another way of writing this equation is:

$$A + E = C + L + I$$

This equation states that the value of the assets plus the expenses is equal to the value of the liabilities plus the capital plus the income. This is just another way of saying the same thing. However it is helpful to express it in this way when we come to consider the practice of accounting. Each account in the ledger will be categorized into one of the five types of financial measurements described above (A, C, L, I or E.) Because the accounting equation

$$“A + E = C + L + I”$$

is always true the total of all the A and E account balances in the ledger must be equal to the total of all the L, P and I account balances if the ledger is to represent a logically correct picture of the finances of the business. If this is the case then we say that the accounts are *in balance* or that the ledger is *in balance*. For the ledger to remain in balance whenever an entry is posted to an account matching account entries must be posted at the same time to ensure that the total of the A and E account balances remain the same as the total of the L, P and I account balances. For this reason, accounting is often referred to as *double-entry bookkeeping* <sup>[3][5][6]</sup>.

A company keeps track of all of its transactions by recording them in accounts in the company's *general ledger*. Each account in the general ledger is designated as to its type: asset, liability, owner's equity, revenue, expense, gain, or loss account.

#### 4. Conclusion

There are three dimensions in which these situations occur: classification, valuation, and timing. Classification means recording a transaction in the correct account category and fully understanding the meaning of the account category. Valuation means attaching the correct value to a transaction or account balance, particularly for financial assets, which can be unpredictable and misunderstood. However, knowing the true wealth of a business depends entirely on accurate valuation. Timing refers to recording an item in the correct accounting period <sup>[1]</sup>. Accountants use math problems such as addition and subtraction problems every day to arrive at totals for various management reports, reconciliations and tax reports. Accountants balance or reconcile bank statements in much the same way that individuals do, by adding deposits and interest, and subtracting checks written and bank fees. When completing income tax returns, income and expense statements, and cost analysis, accountants use addition and subtraction to add sources of income and subtract expenses to arrive at totals. When balancing the general ledger they make adjustments by adding and subtracting the various credits and debits for the month. Accountants keep department and company budgets current by subtracting department expenses from the allotted budget amount. It is important to have basic math and algebra skills to complete these tasks and report accurate financial information.

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