AMERICAN JOURNAL OF EDUCATION AND LEARNING
ISSN: 2996-5128 (online) | ResearchBib (IF) = 9.918 IMPACT FACTOR
Volume-3| Issue-4| 2025 Published: |30-04-2025|

ONE STEP FROM COMPLEXITY TO SIMPLICITY

https://doi.org/10.5281/zenodo.15203432

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Abstract

Fractions and the calculations of it, is a daunting task to even some of the brightest minds in our society. We struggle to find a solution to them. However, as mathematicians, we continuously strive to solve these difficult problems and create simple solution. Traditional techniques often present fractions as abstract. This might lead to a disconnection between the theoretical understanding and the practical applications of it. This research contributes to the ever-evolving field of Mathematics education and the need that both teachers and learners need to adapt to better-aligned contemporary learning techniques and needs.

Key words

comparison, learning, interest in science, Cambridge curriculum, methods, classical method, simple method, periodic number, fraction. Recurring decimal

INTRODUCTION

Mathematics is concerned with the spatial forms of objects in the material world and the quantitative relationships between them. We continuously strive to understand this relationship, and we rely on scientific methods as the predominant tool of research. These research methods are also fundamental to the teaching of mathematics. In this article, we will explore a transition from a very complex method of calculating fractions to decimals, as well as from decimals to fractions, to a much simpler method and solution. This will illustrate how mathematical methodology can assist as a pathway to greater understanding of complex calculations. By using these methods, teachers can engage with students in a more classroom friendly way, and making it more easier for the learners to grasp the complex calculations involved in developing a genuine interest in decimal to fraction calculations, as well as from fractions to decimals.

Explanation of Key words:

Comparison. In mathematics, comparison refers to the process of determining the relationship between two or more mathematical objects, such as numbers, quantities, functions, or shapes, by evaluating their differences, sizes, or properties.

It involves comparing these objects to identify how they are similar, different, greater, or smaller relative to each other. In general, comparison helps to understand relative sizes, behaviours, or relationships in mathematical contexts.

Fraction: A fraction is a way to represent a part of a whole or a division of something into equal parts. It consists of two numbers:

1. Numerator (the top number): It represents how many parts we have.
2. Denominator (the bottom number): It shows how many equal parts the whole is divided into.

Recurring decimal: It is a decimal that repeats forever, for example $0.\dot{3} = 0.333333\ldots$,

Terminating decimal: A terminating decimal is a decimal that has a finite number of digits after the decimal point, for example 0.5 and 0.25.

DISCUSSION AND RESULTS

As stated earlier, this article will compare two different means of calculating fractions to decimals, and decimals to fractions. In our research, we continuously see learners struggle with the method given by various textbooks on how to get from a recurring decimal, for example $0.\dot{3}$ to the final answer of $\frac{1}{3}$. The text books in question fails to acknowledge that recurring decimals have all a fundamental starting point, and that recurring decimals have merely a different, yet simple way of writing it. Below is an example of how the current text books perform these calculations, and alongside it, is the much easier, less complex method.

According to the method given in the book	Method in a simpler way.
$0.\dot{3} = 0.333\ldots$ 0.333…=A 0.333…=A/*10 3.333…=10A 9A=3 A=$\frac{1}{3}$ $0.\dot{3} = \frac{1}{3}$	$0.\dot{a} = \frac{a}{9}$ $0.\dot{3} = \frac{3}{9} = \frac{1}{3}$
$0.2\dot{3} = 0.23333\ldots$ 0.2333…=B 0.2333…=B/*100	$0.a\dot{b} = \frac{\overline{ab} - \overline{a}}{90}$

23.3333…=100B (1) 0.2.333…=B/*10 2.3333…=10B (2) (1)-(2) 90B=21 B=$\frac{21}{90}=\frac{7}{30}$ $0.2\dot{3}=\frac{21}{90}=\frac{7}{30}$	$0.2\dot{3}=\frac{23-2}{90}=\frac{21}{90}=\frac{7}{30}$
$0.54\dot{2}=0.54222\ldots$ 0.54222…=A 0.54222…=A/*1000 542.222…=1000A (1) 0.54222…=A/*100 54.222…=100A (2) (1)-(2) 900A=488 A=$\frac{488}{900}=\frac{122}{225}$	$0.ab\dot{c}=\frac{\overline{abc}-\overline{ab}}{900}$ $0.54\dot{2}=\frac{542-54}{900}=\frac{488}{900}=\frac{122}{225}$
$0.6\dot{2}\dot{1}=0.6212121\ldots$ 0.62121…=B 0.62121…=B/*1000 621.211...=1000B (1) 0.62121…=B/*10 6.2121…=10B (2) (1)-(2) 990B=615 B=$\frac{615}{990}=\frac{41}{66}$ B=$\frac{41}{66}$	$0.a\dot{b}\dot{c}=\frac{\overline{abc}-\bar{a}}{990}$ $0.6\dot{2}\dot{1}=\frac{621-6}{990}=\frac{615}{990}=\frac{41}{66}$
$0.26\dot{4}\dot{5}=0.264545\ldots$ 0.264545…=A 0.264545…=A/*10000 2645.4545…=10000A (1) 0.264545…=A/*100 26.4545…=100A (2) (2)-(1) 9900A=2619 A=$\frac{2619}{9900}=\frac{291}{1100}$	$0.ab\dot{c}\dot{d}=\frac{\overline{abcd}-\overline{ab}}{9900}$ $0.26\dot{4}\dot{5}=\frac{2645-26}{9900}=\frac{2619}{9900}=\frac{291}{1100}$

I would ask you to pay more serious attention to the above table.

You might think that a formula has been introduced for each case, but it's actually quite simple, and the idea follows a general pattern.

$$1)0.\dot{a} = 0.\overline{aaa}\ldots = X$$
$$a.\overline{aaa}\ldots = 10X$$
$$9X = a$$
$$X = \frac{a}{9}$$
$$0.\dot{a} = \frac{a}{9}$$

$2)0.a\dot{b} = 0.abbb\ldots = X$

$$\overline{ab}.bb\ldots = 100X$$
$$a.bbbb = 10X$$

90X=$\overline{ab} - a$

$$X = \frac{\overline{ab} - a}{90}$$

For example, let's write a larger periodic number.

$$0.357\dot{6}\dot{8}\dot{2}\dot{4}$$

To convert this number into a simple decimal form, it is enough to write the number 9 in the denominator of the number written in the decimal position for numbers with dots, and 0 for numbers written without dots. In the picture, we subtract the number without dots from the number in the fractional part.

$$0.357\dot{6}\dot{8}\dot{2}\dot{4} = \frac{3576824 - 357}{9999000} = \frac{3576467}{9999000}$$

and thus, we were able to convert any complex periodic number into a simple fraction.

Now, if we go through this situation in a simple classical way, it will take a lot of time and will make the students bored.

This method does not work with the whole part of the number, but only with the fractional part, because the period is always in the fractional part.

$$4.\dot{2} = 4\frac{2}{9}$$

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$$3.5\dot{8} = 3\frac{58-5}{90} = 3\frac{53}{90}$$

Note that the work process has become much lighter and easier.

Now let me introduce all my ideas in general.

$0.\dot{a} = \frac{a}{9}$	$1)0.\dot{4} = \frac{4}{9}$ $2)0.\dot{7} = \frac{7}{9}$ $3)0.\dot{9} = 1$
$0.\dot{a}\dot{b} = \frac{\overline{ab}}{99}$	$1)0.\dot{2}\dot{3} = \frac{23}{99}$ $2)0.\dot{1}\dot{5} = \frac{15}{99}$ $3)0.\dot{4}\dot{6} = \frac{46}{99} = \frac{23}{33}$
$0.\dot{a}\dot{b}\dot{c} = \frac{\overline{abc}}{999}$	$0.\dot{1}\dot{2}\dot{3} = \frac{123}{999} = \frac{41}{333}$
$0.\dot{a}_1\dot{a}_2\dot{a}_3 \dots \dot{a}_n = \frac{a_1a_2a_3 \dots a_n}{999 \dots 9}$ 9 lar soni-$n$ta	$0.\dot{1}\dot{2}\dot{3}\dots\dot{k} = \frac{\overline{123 \dots k}}{999 \dots 9}$ 9lar soni- k ta
$0.a\dot{b} = \frac{\overline{ab}-a}{90}$	$2.4\dot{5} = 2\frac{45-4}{90} = 2\frac{41}{90}$
$0.ab\dot{c} = \frac{\overline{abc}-\overline{ab}}{900}$	$4.28\dot{7} = 4\frac{287-28}{900} = 4\frac{259}{900}$
$0.a\dot{b}\dot{c} = \frac{\overline{abc}-a}{990}$	$1.5\dot{7}\dot{8} = 1\frac{578-5}{990} = 1\frac{573}{990}$

CONCLUSION

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In today's fast-paced educational environment, students are increasingly looking for ways to quickly and effectively solve examples and problems, especially in subjects like science and mathematics. The key to engaging students in mathematics lies in presenting complex problems in a more approachable and understandable manner. By breaking down intricate problems into simpler, more manageable steps, teachers can help students not only grasp the concepts more easily but also foster a deeper interest in the subject. Adopting this simplified teaching method enhances the overall effectiveness of lessons and significantly improves the quality of students' mathematical knowledge, making learning both more efficient and enjoyable.

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