

**UNIVERSITY OF CAPE COAST**  
**INSTITUTE OF EDUCATION**

**USING CUISENAIRE ROD TO IMPROVE UPON ‘ADDITION AND SUBTRACTION OF  
FRACTIONS’ IN MATHEMATICS AT KAYERA/AWISEM M/A PRIMARY FIVE**

**BY**  
**BRIGHT BAAH KWAKYE**

(OFCE/239/2014)

**OF**

**OFFINSO COLLEGE OF EDUCATION**

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A PROJECT WORK SUBMITTED TO THE INSTITUTE OF EDUCATION OF THE FACULTY OF  
EDUCATION, UNIVERSITY OF CAPE COAST IN PARTIAL FULFILMENT OF THE  
REQUIREMENTS FOR THE AWARD OF DIPLOMA IN BASIC EDUCATION.

JULY, 2014

### CANDIDATE'S DECLARATION

I hereby declare that this project work is the result of my own original research and that no part of it has been presented for another diploma in this University or elsewhere

Candidate's

Name.....

Signature: .....

Date.....

### SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of the project work were supervised in accordance with the guidelines on supervision of project work laid down by the University of Cape Coast.

Supervisor's Name: .....

Signature: ..... Date: .....

## ABSTRACT

This research is conducted to employ measures to enhance pupils' understanding of 'addition and subtraction of fractions' so that their attitude towards the concept and Mathematics as a whole will change positively. Educational action research was used by the researcher. It addresses specific problems identified in the classroom. The aim of using the action research was to achieve positive changes in terms of pupils' attitude to enhance their educational outcomes. The purposive sampling method was used to sample the population based on those believed to have the problem with addition and subtraction of fraction. The research instruments used by the researcher to gather information about the problem were observation, questionnaire and test. Pupils' problems were identified through the use of the instruments. The problems include wrong teaching methods, lack of motivation and abstract teaching by the class room teacher which make the pupils to forget the concept within a short period.

The researcher, therefore, came out with a detailed lesson plan embedded with a lot of activities and a designed teaching and learning material to solve the pupils' problem of inability to understanding addition and subtraction of fractions.

Finally, the Cuisenaire rod used by the researcher to teach the topic makes the pupils understanding of the concept improved greatly and the development of positive attitude towards mathematics in general was also developed.

## **ACKNOWLEDGEMENT**

I wish to express my profound gratitude to the Almighty Father for His abundant protection, blessing, vision and strength during the writing of this project work.

My sincere thanks also goes to my supervisors, Miss.....and Mr.....of Offinso College of Education who helped to make this work successful. I also acknowledge the effort of all the teachers of Kayera/Awisem M/A primary school and colleague practicing teachers especially Afriyie, Emmanuel and Afrane Benedict. Finally, I extend special thanks to my parents Miss Mabel Manu and Mr. Stephen Oppong, my brothers especially Felix Osei Kwabena not forgetting Mr. and Mrs. Amo for their numerous support throughout my education till now.

## **DEDICATION**

This project work is dedicated to my most grateful family ever and everyone that has helped me through out my life as a school boy till now. It also goes to a mother of a friend of mine who just passed away, may her soul rest in perfect peace. May God bless you all.

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## **CHAPTER ONE**

### **INTRODUCTION**

This chapter of the researcher work introduces the whole research work which discusses the problem under investigation. The chapter consists of issues such as background to the study, statement of the problem, purpose of the study, the research questions, and significance of the study, limitations and delimitation and organization of the study.

#### **Background to the Study**

Mathematics as a course of study has many importance or significance to our educational system and considered as a jack of all trade because it cuts across all the educational system. In this modern world for instance, nothing is done without mathematical knowledge. Therefore, other fields like science, industry, technology, economics, etc, uses mathematical ideologies everyday in solving their problem. For example, counting of ballot papers, taking measurement, buying and selling which involves calculation of money, preparation of dishes also involves the application of mathematical concept.

It is therefore believed that no nation, society or individual can progress without the knowledge of Mathematics and Science. Mathematics therefore is seen as the bed-rock to other subjects of study and education as the driver to national development. For this reason it has become necessary that pupils take active participation in learning of every mathematical concept and have in-depth understanding of them.

On the other hand, Kayera, a town in the Offinso South Municipal of the Ashanti Region which is predominantly a farming community with few as traders, have a very shallow knowledge about the importance of education and for that matter, mathematics.

Even though the pupils engage in their parents' occupational activities which involve mathematical and scientific knowledge like the buying and selling and measuring distance for planting crops and how to care for them, they still lack most basic mathematical concepts.

During the researcher's final attachment course at Kayera/Awisem M/A basic five, the researcher realized that most pupils could not solve problems on the concept addition and subtraction of fractions. Upon critical investigation, the researcher realized that, the lesson was taught in abstract with the method that looked more teacher centered than pupil-centered which should have not been the case.

The researcher, therefore, knowing the importance of mathematics, have decided to carry out a project on this very concept, 'addition and subtraction of fractions' and also, to see how best the problem can be solved so as to improve pupils' understanding.

### **Statement of the Problem**

During the researcher's final year attachment course, enough observation showed that pupils at Kayera/Awisem M/A basic five could not understand the concept, addition and subtraction of fractions because the lesson was taught without using the relevant teaching and learning materials which made the concept not fully grasped by the majority of pupils.

The researcher, therefore, decided to research into the problem.

### **Purpose of the Study**

Every project work has its purpose depending on the topic of the research. The researcher in the course of trying to find lasting solutions to the problem, wanted to see by the end of the research work that, the pupil will be able to:

1. Identify the name of the colours of each Cuisenaire rod designed and the number or value it represents.
2. Add at least one fraction to another using the Cuisenaire rod designed
3. Subtract at least one fraction from another by using the Cuisenaire rod designed.
4. Develop a positive attitude towards the learning of mathematics in general.

### **Research Questions**

The researcher in the course of carrying out the study needed some directives in the form of questions to guide in arriving at a solution.

1. What steps would be appropriate to explain how the Cuisenaire rod is used?
2. How will the Cuisenaire rod be used to solve the problem of poor performances in finding solutions to problems involving addition and subtraction of fractions?
3. What methods would be best in helping pupils to develop positive attitudes towards the learning of mathematics?

### **Significance of the Study**

In this modern world, nothing is done without the concept of mathematical knowledge. Some of the fields where mathematical concepts are used are economics, banking, marketing, science and the likes.

The most important reasons for writing the project is to make pupils know the connections between parts and whole since most mathematical concepts are built or based on parts or portions of an object.

The researcher after considering all these factors realized that improving the concept will help pupils not only to understand this concept alone but also other methods in mathematics as well as improving their knowledge in other fields of study.

### **Limitations**

Often, when trying to find solution to a problem, one is bound to encounter some difficulties. The researcher in the course of undertaking the study encountered certain problems. First of all, the researcher noticed that pupils were not static in character. This then pose problem during observation and getting facts from their character which is very low. Truancy is one of the factors that affected the results of the study. It actually happened when some pupils absent themselves from school during the time of the intervention. Also, combining this study and the classroom work coupled with the numerous day to day activities posed a real problem to the researcher.

### **Delimitation**

The researcher decided to research into the pupils' inability to understand the concept addition and subtraction of fractions because it was the main problem identified at Offinso South Municipal Assembly Zone "A" primary five classes where the researcher carried out all the research activity.

Due to time factor, materials and the narrow nature of the action research, the researcher directed the study to improving pupils knowledge of addition and subtraction of fractions in mathematics at Kayera/Awisem M/A basic five with a selected number of pupils identified to have little or no knowledge of the concept.

### **Organization of the Study**

The whole research work is arranged into five chapters. Chapter one talked about the background to the study, statement of the problem, purpose of the study, research questions, and significance of the study. This is followed by the limitations and delimitations of the study and finally, the organization of the study report. Chapter two deals with literature review. This talk about what other writers have written about the topic under study. The next chapter is chapter three. It discusses the research design, the population and sample selection, sampling procedure, research instruments and the intervention processes.

The fourth chapter unfolds and discusses the results of the study. All findings from the research instruments are presented in this chapter.

The final chapter is chapter five. It deals with the summary of the research findings, conclusions to the study and recommendations made to the study.

## **CHAPTER TWO**

### **REVIEW OF RELATED LITERATURE**

Literature review is basically concern with drawing information or ideas from other people's work or theories about the topic under study and how the present study intends to solve or improve upon the existing theories and information. For that matter, Steven Shade (1993) said that, the functions of the literature review is to discuss relevant research carried out on the topic and also to prevent duplication of ideas and theories.

Fractions, according to Robert Asafo-Adjei (2002) Teaching Basic Mathematics for Colleges of Education 'are represented by two numbers separated by a division bar'. That is, the numbers or quantities short of a given value to become whole. The book talked about three main angles at which fractions can be looked at. They are considering fractions as part of a whole and secondly, fractions as part of a group. The third is fractions as ratio of comparing two quantities. The book further uses the practical and real examples of materials like folding paper into equal parts and use of number line and Cuisenaire rod to help children develop the concept



of fractions in depth from the beginning in order to solve the basic problems in fractions and mathematics as a whole. Again Asafo-Adjei (2002) reported that when introducing fractions to children, it is very important to name your whole. The whole should not necessarily be a one unit object but rather be (a) one unit (b) a group (c) part of a group.

Another book written by John Bush ridge and David Womack (1991) said that when we divide an object or a collection of objects into any number of parts, then each part is called a fraction of the whole. (Fraction means something broken off). They said that in order to give these fractions names, we need to make the division into equal parts. They further gave situations where children will meet fractions which include fractions of objects, fractions of collection of objects and fractions of measured quantities.

Claire Mooney et al (2001) stated that comparing fractions is quite straight forward if the denominators are the same and the concept of fractions is taught well from the beginning to the children. They stated an example which is  $\frac{5}{7}$  which is bigger than  $\frac{3}{7}$ . These they said is clear since the denominators for the two fractions are the same, hence, addition and subtraction will not be difficult. But if the denominators are different, they said can be confusing or harder to understand. For this matter, equivalent fractions must be found for the two to have the same denominator for easy computing. The book further said that if all these are known to the pupils, then it is important to let children not to add or subtract the denominators which are the same numbers when adding and subtracting fractions. That is the denominators represent just the number of parts that the unit has been partitioned into.

According to D. Paling, (1982), fraction is one of the problem areas where children in primary and secondary schools spend many hours on. So, he said all these problems are due to the fact

that the idea of understanding fractions and the notations used to represent them are not well understood by the children. He further emphasized two most important ideas children need.

These are

- a. The idea of fractions and the notations used
- b. The idea of equivalence.

Folding and cutting activities, use of strips of paper, drawing and colour activities are some of the activities recommended for solving the ideas and notations of fractions for easy understanding.

To Pamela Liebeck (1984), fractions are well identified areas of difficulty for many pupils and even for some adults.

The two main obstacles to the understanding of fractions recommended by Pamela are

- a. Fractions cannot be taught as separate identities
- b. The understanding is the complicated notation by which fractions are symbolized.

To overcome all these, she said teaching of fractions should always in the early stages refer to the whole to which any fraction applies and we should avoid using the notations for fractions until children's concept on fractions are well formed. She further used equal sharing, fractions and shapes, fractions and length and fractions and weight as models of teaching addition and subtraction of fractions for better understanding.

J. L. Martin et al (1994) also talked about a simple game called 'shade in game' for helping the pupils to understand the concept of addition and subtraction of fractions. To play the game, fold four pieces of paper into sixteen equal parts on each piece. Then a simple die marked with

different values of fractions would be provided. The score that appear after throwing the die indicates what area of the paper to shade.

According to them, playing this game and keeping record of what the pupils throw and comparing them with the rest of the unshaded portion would help them develop the concept of addition and subtraction of fractions. The book also talked about the use of the folding of pupils' worksheet into equal parts and shading portions of it for developing the concept of fractions in the pupils.

Another Writer called Dr. Adedotun O. Kalejaiye (1985) says that, addition and subtraction of two fractions should be taught in a graduated sequence of difficulty with the following main stages

- a. Common fractions with the same denominators, for example  $\frac{3}{5} + \frac{1}{5}$ ,  $\frac{3}{5} + \frac{1}{5}$
- b. Mixed fractions with different denominators,  $\frac{2}{3} + \frac{2}{4}$  or  $\frac{2}{4} + \frac{3}{3}$
- c. Mixed numbers having fractions with the same denominators,  $1\frac{1}{8}$  and  $2\frac{2}{8}$
- d. Mixed numbers with their fractions having different denominators,  $3\frac{1}{3}$  and  $1\frac{3}{5}$

The book said that if addition and subtraction of fractions are taught through this sequence, pupils would get better understanding of it. Division of circles into equal parts for teaching the concept is also recommended by the book. C. E. L. Farmer et al also says that, addition and subtraction of fractions can be solved by using the spaces in a graph sheet. Dr. D. K. Abbiw-Jackson et al (1974), to them, addition and subtraction of fractions can be solved by using cut outs and diagrams. They also used the number line as one of the materials.

Teaching and learning materials, according to J. N. K. Fianu in his book Education Studies in Basic Education, is an aid to learning rather than to teaching. The book added that, teaching and learning materials help the pupils to distinguish what they see, hence encouraging them to learn how to interact with them. The importance of the teaching and learning material, the book stated include:

- Making abstract ideas look concrete
- Making pupils to have first hand information about objects and bringing things that are far beyond the learners' environment nearer.

Robert Asafo-Adjei (1990) discusses how concepts are formed. The book explains that, primary concepts are built from sensory experiences of hearing, seeing, smelling, tasting and feeling. Further studies show that teaching and learning materials have qualities that help the child to develop primary concepts.

According to Ghana Education Service hand book, lesson note preparation and teaching and learning materials are relevant items that need to be prepared by the teacher to enhance teaching and learning. From this, it is clear that the addition and subtraction of fractions can be solved by using different teaching and learning materials as done by the various Writers. The researcher, therefore, decided to use the Cuisenaire rod coupled with a detailed explanation so as to address the gap. The researcher developed a simple Mnemonics (WRIPYDB<sup>3</sup>O) for all the colours representing the numbers which will help the pupils to remember the colours and their values easily.

The teaching and learning materials were also developed from the local materials which becomes easy for every student to get on their own and hence making practicing on their own

in their homes during their leisure thereby improving upon their learning capabilities in fractions and mathematics as a whole. The teaching method which is pupil-centered with enough activities would also help the students to have in-depth meaning of the whole concept.

In all, fractions, according to Robert Asafo Adjei, are number ideas that are not whole numbers. He therefore, recommended paper folding, use of Cuisenaire rod and number line for helping pupils to understand the concept of fractions.

D. Paling, in his book, also suggested two most important ideas that children need to know which would help them to understand the concepts in fractions. They are the idea of fractions and notation used and the idea of equivalence.

Pamela Liebeck in her book, 'How Children Learn Mathematics' identified two main obstacles to understanding fractions. These are: fractions cannot be thought of as separate independent identity and understanding the complicated notations by which fractions are symbolized. J. L. Martins et al in their book recommended a simple game called the Shade in game for teaching the concept while C. E. L Farmer and others used graph sheets as the teaching and learning material for teaching addition and subtraction of fractions.

Cramer,Post and delMas (2002) the word 'one-half' refers to one part of an object that has been divided into two equal parts.The easiest way to put into a symbol is to write the numerals 1 and 2 and separate them by a stroke (/).This gives  $\frac{1}{2}$ .The symbol thus gives the basic ideas,one out of two equal parts.

Even though much has been done on the topic, there is still a need for more research into the same topic. This is because; there are other relevant books which the researcher did not review

and even the teaching and learning materials used by the researcher can be modified in other ways for teaching the same topic which would have brought better understanding.

### **CHAPTER THREE**

#### **METHODOLOGY**

The chapter comprises discussion on research design, population and sample selection and the research instruments used for data collection. It also deals with the intervention processes used to combat the problem.

##### **Research Design**

The action research design was used for the study. This is because; it aims at solving existing problems with immediate solutions through the application of scientific method. Action research by its nature can be used by teachers in solving problems in the classroom very easily without wasting time or resources.

### **Population and Sample Selection**

The research was carried out on the pupils of Kayera/Awisem M/A Basic five with a total population of forty-five pupils comprising twenty-four boys and twenty-one girls. Twenty out of this number were selected together with gender equity and those believed not to have understood the concept.

The purposive sampling technique was used to select the sample size. This was done by selecting all the pupils who can not add and subtract simple fractions.

The purposive method was used since it gives studies based on samples required, less time wastage and more importantly, it produces quick results.

### **Research Instruments**

Research instrument is a tool that a researcher uses to collect data and other information for the study.

The researcher used observation for collecting data. Pupils in the sample group were observed carefully at a particular time in order to accumulate vital information on the problem identified. This instrument was used because there was first hand information without relying on reports of people which may not be true at times.

The instrument was used to study the learning behaviour of pupils in other subjects.

Along side the observation the researcher used the oral interview and test. The researcher conducted face-to-face interview with the pupils to find out more about the problem.

The reason for using other instruments was that, interview for instance can be adjusted to meet many situations and give opportunity to observe behaviour that may not be available when other methods are used.

At the end of the observation and the use of other instruments, the following were identified as the root causes of the problem:

- Inappropriate use of teaching and learning materials and poor teaching techniques used by the teacher.
- Weak knowledge of operations involving fractions in general
- Inadequate knowledge in addition and subtraction of figures by the pupils.

## **Interventions**

### **Pre-intervention**

Here, pre-test was conducted by the researcher to determine the strength and weakness of the pupils' understanding of the concept addition and subtraction of fractions. This was to find out the extent of



pupils' problem in order to know exactly where to begin the intervention and the extent to teach the topic.

Pupils' works were marked and the results show that pupils' really have problems in finding solutions to problems involving fractions.

### **Intervention**

The researcher after marking the pre-test exercises realised that the problem truly exists. A decision was therefore, taken by the researcher to construct the Cuisenaire rod as the teaching and learning material and use it to re-teach the topic 'addition and subtraction of fractions' in order to help improve pupils' understanding, hence changing pupils' perception about the subject mathematics as a difficult one.

A simple Cuisenaire rod was constructed by the researcher. These are rods with specific colours and length which represent specific value of numbers. Each rod has a colour which represent a specific number or value. The various Cuisenaire rods were then displayed for the pupils to feel and observe.

The researcher then guided the pupils to identify the colours, the length of each rod and the value or the number each Cuisenaire rod represents. The Cuisenaire rods which have the values from one to ten and their colours are as shown below.

Rod colours

|             |   |    |
|-------------|---|----|
| W           | 1 |    |
| RED         | 2 |    |
| LIGHT GREEN | 3 |    |
| PURPLE      | 4 |    |
| YELLOW      | 5 | 15 |
| DARK GREEN  |   |    |
| BLACK       | 7 |    |
| BROWN       |   |    |

The researcher then took time to guide pupils to identify the various Cuisenaire rods one after the other by their colours, lengths and values. The researcher continued by developing a mnemonic to help the pupils to remember the colours. The mnemonic is 'WRIPYDB<sup>3</sup>O' which represent the colours of all the ten rods.

To use the Cuisenaire rod, we choose any rod or set of rods to be our whole depending on the fractions given in the question. If the fractions have the same denominators or the same number, it can be solved as straight forward addition. That is the value of the denominator of the fraction must be chosen as the rod with that value. For example, in the fraction  $\frac{2}{5} + \frac{1}{5}$ , the denominator of the two fractions will be chosen which is yellow rod representing five and the numerators which are two and one will be added and compared with the original rod chosen. It is similar to subtraction of fractions with the same denominator but only that part will be taken away in the subtraction.

But for the fractions with unlike denominators, choose a whole which can be the lowest common multiple of the two denominators. For example,  $\frac{2}{3} + \frac{1}{4}$ , choose the whole that can be the lowest common multiple of three and four. The whole here therefore, will be twelve since three and four can partition it. Then you solve by comparing. This is the same for the subtraction and for proper fractions, change them into improper fractions and solve or add the whole numbers separately and the fractions also separately.

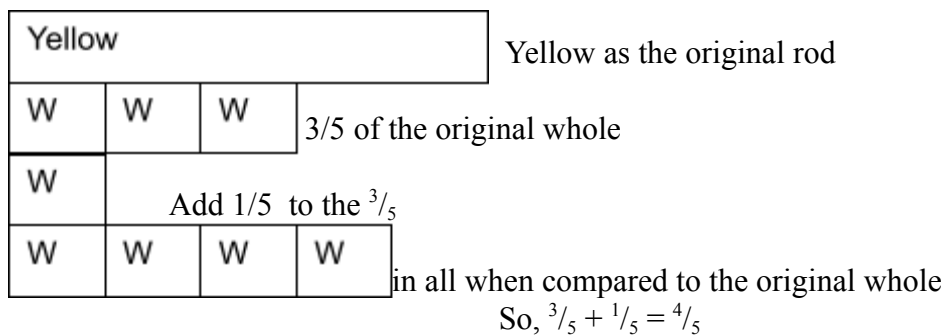
### Activity one

Solving addition of fractions having the same denominators or name using Cuisenaire rod For

example,  $\frac{3}{5} + \frac{1}{5} =$

#### Procedure

Choose a rod to be your whole but since we have the same denominators for the two fractions, we must choose yellow as our whole and white rod each as one-fifth. Then take the numerator of the first fraction, that is light green rod (3) and add the numerator of the second fraction, which is white (1) to it. It will give us purple (4) which will be compared to the original whole rod as  $\frac{4}{5}$  which gives us the result as shown below.

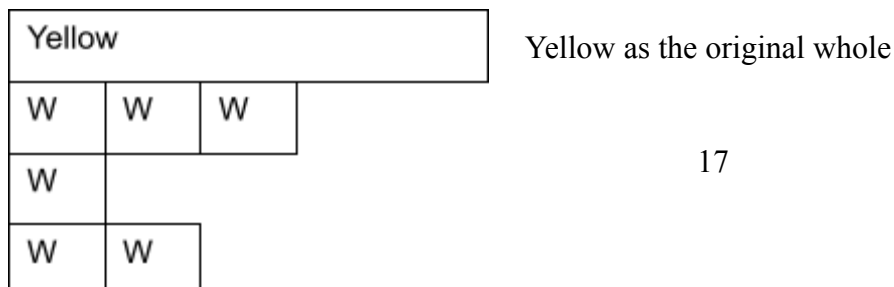


### Activity two

Solving subtraction of fractions having the same denominators or name using the Cuisenaire rod

Example,  $\frac{3}{5} - \frac{1}{5} =$

The same procedure is used for solving subtraction of fractions with the same denominators or the same name. That is, choose yellow as the original rod then take three fifth from it and subtract one-fifth from it. Compare the result with the original rod and hence the answer.



$\frac{3}{5}$  of the original whole

Subtract  $\frac{1}{5}$  from the  $\frac{3}{5}$

$\frac{2}{5}$  of the original whole

Therefore,  $\frac{3}{5} - \frac{1}{5} = \frac{2}{5}$

### Activity three

Solving addition of fractions with different denominators but one being a multiple of the other.

Example,  $\frac{5}{8} + \frac{1}{4} =$

Here, we can see that eight (8) is a multiple of four (4). So we must choose a rod that can be splitted into eight parts. The brown rod will therefore be chosen as the original. Take white rod to represent one-eighth. Then take the first numerator which is five-eighth part from the original rod. For the second fraction, take red rod to represent one-fourth of each rod. Then add the one-fourth to the five-eighth part of the white rod. Then change the red rod to white rod and add together and then compare it with the original rod which will give the answer as shown below.

|       |   |                                     |   |   |                           |                           |                                      |
|-------|---|-------------------------------------|---|---|---------------------------|---------------------------|--------------------------------------|
| Brown |   |                                     |   |   |                           | Brown as the original rod |                                      |
| W     | W | W                                   | W | W | 5/8 of the original whole |                           |                                      |
| P     |   | P                                   |   | P |                           | P                         | Divide the original rod into 4 parts |
| R     |   | One-fourth of the partitioned whole |   |   |                           |                           |                                      |
|       |   |                                     |   |   |                           |                           | In all, 7/8 of the original whole    |

### Activity four

Solving addition and subtraction of fractions with unlike denominators

Example,  $\frac{2}{4} + \frac{1}{3} =$

Here, the fractions are not multiples of the other, so we must choose a whole which can split into four and at the same time into three equal parts. This made us to choose a rod with length equal to the lowest common multiple of three and four which is twelve. Therefore, black and yellow rod may be chosen as a whole. Apart from these rods, other rods like brown and purple, blue and green, orange and red rods can all be used.

After this, find the colour of the rod which divides twelve into four and three equal parts respectively. Purple would divide three times and light green would divide four times equally. Now take two light green from the whole to represent  $\frac{2}{4}$  and one purple to represent  $\frac{1}{3}$ . Add the two rods and change them for white rods then compare with the original rod to give the result as shown below.

|            |   |          |   |          |   |          |        |   |   |
|------------|---|----------|---|----------|---|----------|--------|---|---|
| Yellow     |   |          |   | Black    |   |          |        |   |   |
| L. Green   |   | L. Green |   | L. Green |   | L. Green |        |   |   |
| Dark Green |   |          |   |          |   |          |        |   |   |
|            |   |          |   | Purple   |   |          | Purple |   |   |
| Purple     |   |          |   |          |   |          |        |   |   |
| W          | W | W        | W | W        | W | W        | W      | W | W |

The same procedure is used for solving the subtraction too but the only difference is that the second fraction will be taken away from the first fraction and compared the result to the original rod.

### Post-intervention

The researcher after the implementation of the intervention with the teaching and learning material conducted another test to examine the success of the intervention. It was observed that majority of those who did not perform well in the lesson earlier became conversant and happy about the topic.

## CHAPTER FOUR

### DATA PRESENTATION AND ANALYSIS

This chapter focuses on the data collection, representation and analysis of the findings. That is, it will unfold and discuss the results of the findings of the whole study. The interview and the test methods were used in gathering information from Kayera/Awisem M/A basic five.

The statistical tool used was frequency distribution table and percentage for representing data collected from the interview conducted.

#### Data presentation

The researcher is so curious about the causes of the pupils' attitude towards addition and subtraction of fractions therefore conducted a simple interview as shown below.

Table one

Pupils' attitude towards addition and subtraction of fraction

| Responses                                      | Frequency | Percentage (%) |
|------------------------------------------------|-----------|----------------|
| The topic is difficult to understand           | 8         | 40             |
| The topic is easy to understand                | 2         | 10             |
| Interesting but not well taught by the teacher | 3         | 15             |
| No motivation to enhance better understanding  | 7         | 35             |
| Total                                          | 20        | 100            |

From the table above, eight (8) pupils representing forty (40 %) percent of the total population of the class said the topic is difficult to understand. Two (2) pupils representing ten percent (10 %) said the

topic is easy to understand and three (3) pupils representing fifteen percent (15 %) said it was interesting but not well taught by the class teacher hence the difficulty in understanding.

The remaining seven pupils representing thirty-five percent (35 %) said there was no motivation to enhance better understanding.

A critical look at the table and its analysis revealed that, about ninety percent (90%) of the sample selected do not understand the topic which is due to poor teaching methods and procedures used by the classroom teacher during the lesson delivery.

Based on this interview and its findings, the researcher further used the test to examine the degree of the pupils' understanding in the topic. The test was in two folds. That is pre-test and post-test which were conducted before and after the intervention designed respectively.

Table two

Pre-test results

| Marks | Frequency | Percentage (%) |
|-------|-----------|----------------|
| 0     | -         | -              |
| 1     | 7         | 35             |
| 2     | 6         | 30             |
| 3     | 4         | 20             |
| 4     | 1         | 5              |
| 5     | 1         | 5              |
| 6     | 1         | 5              |
| Total | 20        | 100            |



Observing the table for pre-test, it could be seen that no body had zero (0). Moreover, seven (7) pupils representing thirty-five percent (35 %) obtained one mark. And six (6), representing thirty (30) percent had two (2) marks. Four (4) pupils representing twenty percent (20%) scored three (3) marks. Finally, one (1) pupil representing five percent (5) had four (4), five (5) and six (6) marks each. A look at the table shows that, out of twenty (20) pupils selected, only two had pass marks which is from five and above representing ten percent. The rest eighteen (18) pupils representing ninety percent (90 %) failed. This therefore, revealed that, pupils do not understand the concept at all.

Table three

Post-test results

| Marks | Frequency | Percentage (%) |
|-------|-----------|----------------|
| 4     | 1         | 5              |
| 5     | 1         | 5              |
| 6     | 2         | 10             |
| 7     | 3         | 15             |
| 8     | 4         | 20             |
| 9     | 4         | 20             |
| 10    | 5         | 25             |
| Total | 20        | 100            |

From the table for the post-test conducted above, it clearly shown that nobody scored marks below four out of the total of ten marks. The least mark therefore, was four marks which was scored by a single pupil representing five (5) percent. More so, one pupil representing five (5) percent also scored five marks and two pupils representing ten (10) percent scored six (6) marks. Three pupils from the population selected, had seven marks. They represent fifteen (15) percent and four (4) pupils representing twenty (20) percent scored eight (8) and nine (9) marks respectively. The remaining sample target of five (5) pupils representing twenty-five (25) percent scored the full mark.

A look at the table therefore, reveals that, after the intervention, pupils' performance rise up significantly thereby, showing ninety-five (95) percent pass; that is those who obtained marks from five (5) and above.

Pupils performance in the post-test revealed that, there was a great change and improvement over the earlier performance in the pupils selected due to the used improvised designed teaching and learning material and good lesson preparation and delivery strategies adopted by the researcher which motivated the pupils.

The aims and objectives of the research which were stated earlier were therefore, achieved. It could also be deduced that, the intervention design helped answered the research questions stated once it solved the pupils' problem of inability to understand the concept 'addition and subtraction of fractions'. Pupils now understand the concept in depth and can apply the knowledge acquired to solve other problems in mathematics and their everyday problems that come their way in calculation.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSION AND RECOMMENDATIONS**

This is the last chapter of the whole project work. It will therefore, discuss briefly, the main issues explained in the first four chapters. Then conclusions and recommendations will be made by the researcher.

#### **Summary**

The research was conducted at Kayera/Awisem M/A Primary Basic five. The researcher observed one day that the classroom teacher taught the lesson addition and subtraction of fractions which looked more teacher- centered and then made pupils not to understand the whole concept.

The researcher then conducted interview and test to the pupils to see the extent of their understanding. It was found out that the classroom teacher taught the lesson with set of rules and procedures with any motivation and teaching learning materials which made the pupils to forget the process within a very short time.

A planned lesson making use of concrete materials precisely Cuisenaire rods was then used to re-teach the lesson as the intervention material which ignored the use of the usual least common multiples approach adopted by the classroom teacher.

After the intervention the research gave another test in form of post-intervention, observation and interview in addition to see the level of the pupils' performance again. The results revealed that, the use of the Cuisenaire rod as the teaching learning material and enough activities with motivation, made the pupils to improve upon their performance greatly. Majority of the pupils at this time scored marks above seven (7) out of the total of (10) marks. This then showed that, pupils' level of understanding and participation in the lesson improved tremendously thereby solving the problem identified by the researcher.

## **Conclusion**

To conclude it all, the researcher after comparing the findings to the related literature reviewed realized that, the explanation given to the fractions as the number ideas that are not whole numbers is in line with how the researcher sees it.

The researcher upon this used the Cuisenaire rod which was recommended by other writers like Robert Asafo Adjei for the sake of the weak pupils identified with the problem. But the method the researcher used was quite different from what was said in the literature reviewed in that the researcher's method involved more activities, explanations and development of simple mnemonics for easy remembrance of the colours and their values by the pupils. The pain took by the researcher to help pupils prepare the Cuisenaire rod from the local materials also enabled them have enough practice on their own during their leisure times in their various homes. This will then solve the problem of inability of the pupils to understand the concept addition and subtraction of fractions in mathematics.

## **Recommendation**

As a result of the use of the Cuisenaire rod, motivational strategies, friendly cordial relationship and the method used by the researcher, pupils fear and misconceptions about mathematics has reduced drastically which made pupils to have interest in the lesson and positive attitudes towards mathematics. But the researcher recommended the use of improved teaching learning material to ready made ones because the ready made ones are very scarce to get. Moreover teaching the concept without relevant teaching learning material is like pouring water in a bottomless basket which makes the concept difficult to understand. Pupils should also be taught how to prepare some simple teaching learning materials themselves because it was noticed that, pupils play with the materials prepared by themselves than the one prepared and used to teach.

On the whole, the project work had a positive effect on the pupils' attitude towards the learning of mathematics and should be applied to achieve positive results.

Despite the success chalked in the project work, the researcher recommends formation of mathematics clubs and study groups or partners in the school as it was observed that pupils interact freely with their friends than the teachers in the classroom. For this will enable them share their problems and seek for help when needed.

Also, pupils must be educated on the importance of mathematics and education as a whole. This is because some pupils do not pay the necessary attention when lesson delivery is going on especially in

mathematics. They only think about mathematics as a difficult subject thereby not doing any attempt to know it. This enormous idea must be removed from their minds through talks.

Finally, in-service courses and workshops for the teachers at school should also be done in order to keep their minds abreast with time.

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## **Appendix A**

Interview guide for pupils on their attitude towards addition and subtraction of fractions.

1. Addition and subtraction of fractions is difficult to understand.
2. Addition and subtraction of fractions is easy to understand.
3. Addition and subtraction is interesting but not well taught by the teacher.
4. There is no motivation to enhance better understanding of the topic.

## Appendix B

Sample of pre-test and post-test questions given to the pupils to examine the extent of their problem.

1.  $\frac{2}{5} + \frac{1}{5}$

2.  $\frac{2}{5} - \frac{1}{5}$

3.  $\frac{5}{8} + \frac{1}{4}$

4.  $\frac{5}{6} - \frac{2}{3}$

5.  $\frac{1}{4} + \frac{3}{8}$

6.  $\frac{2}{4} + \frac{1}{3}$

7.  $\frac{3}{4} - \frac{1}{3}$

8.  $\frac{5}{8} - \frac{1}{4}$

9.  $\frac{3}{6} - \frac{1}{3}$

10.  $\frac{3}{6} + \frac{1}{6}$



# Appendix C

Name: 002

Class Five

Date: 25/03/2008

PRE - TEST

①

$$\textcircled{1} \frac{2}{5} + \frac{1}{5} = \frac{2+1}{5} = \frac{3}{5} \checkmark$$

$$\frac{2}{10}$$

②

$$\textcircled{2} \frac{2}{5} - \frac{1}{5} = \frac{2-1}{5-5} = \frac{1}{0} \times$$

$$\textcircled{3} \frac{5}{8} + \frac{1}{5} = \frac{5 \times 3}{8 \times 4} + \frac{1 \times 3}{4 \times 4} = \frac{5}{8} + \frac{5+2}{8+3} = \frac{10+2}{8} = \frac{30}{8} \checkmark$$

$$\textcircled{4} \frac{5}{6} - \frac{2}{4} = \frac{5 \times 1}{6 \times 4} = \frac{3 \times 2}{2 \times 3} = \frac{4}{6} = \frac{4}{6} = \frac{5-5}{6} = \frac{1}{6} \times$$

$$\textcircled{5} \frac{1}{4} + \frac{3}{8} = \frac{1 \times 2}{4 \times 2} + \frac{3 \times 1}{8 \times 1} = \frac{6}{8} + \frac{3}{8} = \frac{3+4}{8} = \frac{10}{8} \times$$

$$\textcircled{6} \frac{2}{4} + \frac{1}{3} = \frac{2}{10} + \frac{6}{0} = \frac{1}{0} \checkmark$$

$$\textcircled{7} \frac{3}{4} - \frac{1}{3} = \frac{6}{10} - \frac{1}{4} = \frac{30}{4} \times$$

$$\textcircled{8} \frac{5}{8} - \frac{1}{4} = \frac{1}{2} \checkmark \quad \textcircled{9} \frac{3}{8} - \frac{1}{3} = \frac{10}{6} \times$$

SUBJECT : MATHEMATICS

CLASS : FIVE

DATE : 25/03/2008

PRE-TEST

$$\textcircled{1} \frac{3}{5} + \frac{1}{5} = \frac{3+1}{5+5} = \frac{4}{10} \quad \times$$

$$\textcircled{2} \frac{2}{5} - \frac{1}{5} = \frac{2 \div 1}{5 - 5} = \frac{1}{0} \quad \times$$

$$\textcircled{3} \frac{5}{8} + \frac{1}{4} = \frac{5 \times 1}{8+4} = \frac{6}{12} = \frac{1}{2} \quad \times$$

$$\frac{1}{10}$$

$$\textcircled{4} \frac{5}{6} - \frac{2}{3} = \frac{5-2}{6+3} = \frac{3}{9} = \frac{1}{3} \quad \times$$

$$\textcircled{5} \frac{1}{4} + \frac{3}{8} = \frac{1 \times 2}{4+2} + \frac{3 \times 1}{8+1} = \frac{2}{6} + \frac{3}{9} = \frac{5}{15} \quad \times$$

$$\textcircled{6} \frac{2}{4} + \frac{1}{3} = \frac{2+1}{4+3} = \frac{3}{12} \quad \times$$

$$\textcircled{7} \frac{3}{4} - \frac{1}{3} = \frac{2+1}{4+2} = \frac{3}{6} \quad \times$$

$$\textcircled{8} \frac{5}{8} - \frac{1}{4} = \frac{4+2}{4+4} = \frac{6+3}{8+4} = \frac{9}{12} \quad \times$$

$$\textcircled{9} \frac{3}{6} - \frac{1}{3} = \frac{3 \times 3}{3+3} = \frac{6 \times 3}{6 \times 2} = \frac{9}{8} \quad \times$$

$$\textcircled{10} \frac{3}{6} + \frac{1}{6} = \frac{3+1}{6+6} = \frac{4}{12} = \frac{2}{6} \quad \checkmark$$

# Appendix D

SUBJECT: MATHEMATICS

CLASS: Five

DATE: 25/03/2008

POST-TEST

1.  $\frac{3}{5} + \frac{1}{5} = \frac{3+1}{5} = \frac{4}{5}$  ✓

2.  $\frac{2}{5} - \frac{1}{5} = \frac{2-1}{5} = \frac{1}{5}$  ✓

3.  $\frac{5}{8} + \frac{1}{4} = \frac{5 \times 1}{8 \times 1} + \frac{1 \times 2}{4 \times 2} = \frac{5+2}{8+8} = \frac{5+2}{8} = \frac{7}{8}$  ✓

4.  $\frac{5}{6} - \frac{2}{3} = \frac{5 \times 1}{6 \times 1} - \frac{2 \times 2}{3 \times 2} = \frac{5-4}{6-6} = \frac{5-4}{6} = \frac{1}{6}$  ✓

5.  $\frac{1}{4} + \frac{3}{8} = \frac{1 \times 2}{4 \times 2} + \frac{3 \times 1}{8 \times 1} = \frac{2+3}{8+8} = \frac{2+3}{8} = \frac{5}{8}$  ✓

6.  $\frac{2}{4} + \frac{1}{3} = \frac{2 \times 3}{4 \times 3} + \frac{1 \times 4}{3 \times 4} = \frac{6+4}{12+12} = \frac{6+4}{12} = \frac{10}{12} = \frac{5}{6}$  ✓

7.  $\frac{3}{4} - \frac{1}{3} = \frac{3 \times 3}{4 \times 3} - \frac{1 \times 4}{3 \times 4} = \frac{9-4}{12-12} = \frac{9-4}{12} = \frac{5}{12}$  ✓

8.  $\frac{5}{8} - \frac{1}{4} = \frac{5 \times 1}{8 \times 1} - \frac{1 \times 2}{4 \times 2} = \frac{5-2}{8-8} = \frac{5-2}{8} = \frac{3}{8}$  ✓

9. -

10.  $\frac{3}{6} - \frac{1}{3} = \frac{3 \times 1}{6 \times 1} - \frac{1 \times 2}{3 \times 2} = \frac{3-2}{6-6} = \frac{3-2}{6} = \frac{1}{6}$  ✓

11.  $\frac{3}{6} + \frac{1}{6} = \frac{3+1}{6+6} = \frac{4}{6} = \frac{2}{3}$  ✓

$\frac{10}{10}$   
V. Good



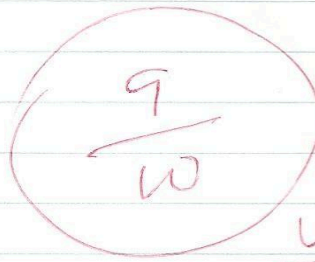
NAME: 002

SUBJECT: MATHEMATICS

CLASS : FIVE

DATE : 25/03/2008

Post - TEST



V. Good

$$① \frac{2}{5} + \frac{1}{5} = \frac{3+1}{5} = \frac{4}{5}$$

$$② \frac{2}{5} - \frac{1}{5} = \frac{2-1}{5} = \frac{1}{5}$$

$$⑩ \frac{3}{6} + \frac{1}{6} = \frac{3+1}{6} = \frac{4}{6} = \frac{2}{3} + \frac{1}{4} = \frac{5 \times 1}{4}$$

$$③ \frac{5}{8} + \frac{1}{4} = \frac{5 \times 1}{8 \times 1} + \frac{1 \times 2}{4 \times 2} = \frac{5}{8} + \frac{2}{8} = \frac{5+2}{8} = \frac{7}{8}$$

$$⑩ \frac{3}{6} + \frac{1}{8} = \frac{3+1}{6} = \frac{4}{6} = \frac{2}{3}$$

$$④ \frac{5}{6} - \frac{2}{3} = \frac{5 \times 1}{6 \times 1} - \frac{2 \times 2}{3 \times 2} = \frac{5}{6} - \frac{4}{6} = \frac{5-4}{6} = \frac{1}{6}$$

$$⑤ \frac{1}{4} + \frac{3}{8} = \frac{1 \times 2}{4 \times 2} + \frac{3 \times 1}{8 \times 1} = \frac{2}{8} + \frac{3}{8} = \frac{2+3}{8} = \frac{5}{8}$$

$$⑥ \frac{2}{4} + \frac{1}{3} = \frac{2 \times 3}{4 \times 3} + \frac{1 \times 4}{3 \times 4} = \frac{6}{12} + \frac{4}{12} = \frac{10}{12}$$

$$⑦ \frac{3}{4} - \frac{1}{3} = \frac{3 \times 3}{4 \times 3} - \frac{1 \times 4}{3 \times 4} = \frac{9}{12} - \frac{4}{12} = \frac{9-4}{12} = \frac{5}{12}$$

$$⑧ \frac{5}{8} - \frac{1}{4} = \frac{5 \times 1}{8 \times 1} - \frac{1 \times 2}{4 \times 2} = \frac{5}{8} - \frac{2}{8} = \frac{5-2}{8} = \frac{3}{8}$$

$$⑨ \frac{3}{6} - \frac{1}{3} = \frac{3 \times 1}{6 \times 1} - \frac{1 \times 2}{3 \times 2} = \frac{3}{6} - \frac{2}{6} = \frac{3-2}{6} = \frac{1}{6}$$

## Appendix D

### Lesson note used for the intervention

No. on Roll: 45

School: Kayera/Awisem M/A Primary

Reference: Hand book on lesson note Preparation and Teaching

Subject: Mathematics

## Learning materials

Class: Five (5)

Robert Asafo-Adjei (1991) Teaching Basic Mathematics for

Training Colleges Page 72

Mathematics Syllabus for Primary Schools five.

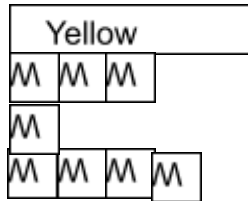
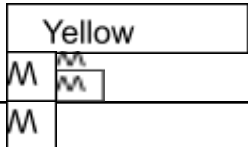
| Duration        | Sub-topic                                                       | Activities/R.P.K                                                             | / T. L.A       | Points | Observation/Remarks |
|-----------------|-----------------------------------------------------------------|------------------------------------------------------------------------------|----------------|--------|---------------------|
| May<br><br>2014 | Concepts of addition and subtraction of fractions.<br><br>TOPIC | At the end of the lesson, pupils will be able to explain what fractions are. | Cuisenaire rod |        |                     |

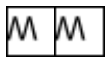
|                          |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                             |
|--------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------|
| <p>ATION</p> <p>utes</p> |  | <p>e values or number each</p> <p>elves, how many will each</p> <p>ent.</p> <p>get?</p> <p>vo fractions.</p> <p>ted answer: each will take 2.</p> <p>ct one fraction from</p> <p>3 pupils take the orange, how</p> <p>r.</p> <p>will each get if they add it</p> <p>er?</p> <p>ted answer: 6 oranges.</p> <p>many pupils can pick the rest</p> <p>king two each?</p> <p>C</p> <p>share food and things</p> <p>g themselves in the home</p> <p>e school.</p> <p>also know addition and</p> <p>VITY I</p> <p>ction of numbers up to</p> <p>er helps pupils to explain the</p> <p>s.</p> <p>fractions. Help them to know</p> |  | <p>ation</p> <p>5</p> <p>5</p> <p>7</p> <p>8</p> <p>8</p> <p>8</p> <p>3</p> |
|--------------------------|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----------------------------------------------------------------------------|

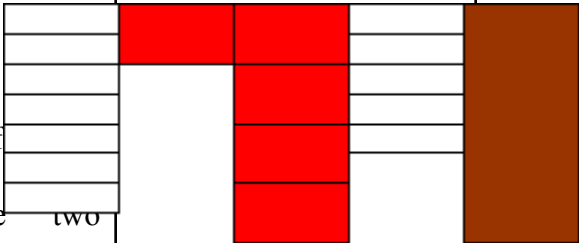
|  |  |  |                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
|--|--|--|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |  |  | <p>me given to the top number</p> <p>the down number of a given</p> <p>n.</p> | <p>ons are number ideas</p> <p>are not whole numbers.</p> <p>ple, <math>\frac{1}{2}</math>, <math>\frac{2}{3}</math>, <math>\frac{4}{8}</math>, <math>\frac{5}{8}</math> etc.</p> <p>very fraction, there are two</p> <p>ers concerned. The top</p> <p>er is called numerator</p> <p>the down one is called</p> <p>inator. The top one</p> <p>ents the portion taken</p> <p>and the down one</p> <p>ses the number of portions</p> <p>ole is divided into.</p> |  |
|--|--|--|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

|  |  |  |                                                                                                                                                                                                                                                                                                                                       |                                                                                                             |  |
|--|--|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|--|
|  |  |  | <p>VITY II</p> <p>y the Cuisenaire rods on the specific colours and lengths<br/> or pupils to interact with. represent specific number</p> <p>pupils to identify the colour,<br/> and the value of each rod. Let<br/> compare the rod with each<br/> and to see how they can</p> <p>...</p> <p>ue to teach them how to</p> <p>ls.</p> | <p>Cuisenaire rods simply are rods</p> <p>specific colours and lengths</p> <p>represent specific number</p> |  |
|  |  |  | <p>VITY III</p> <p>er writes addition of fraction</p> <p>g the same denominators on</p>                                                                                                                                                                                                                                               |                          |  |



|  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                 |  |
|--|--|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|--|
|  |  |  | <p>alkboard. Eg: <math>\frac{2}{5} + \frac{1}{5}</math> and</p> <p>pupils to find the results. To</p> <p>fractions of the same</p> <p>inator, choose a rod which is</p> <p>to the value of the</p> <p>inator. So the rod to choose</p> <p>is yellow. Then take the</p> <p>ator of the first fraction which</p> <p>at green rod (3) and add the</p> <p>ator of the second fraction,</p> <p>white (1) to it. Compare the</p> <p>with the original one.</p> <p>VITY IV</p> <p>er writes subtraction of</p> <p>ns having the same</p> |  $\frac{3}{5} = \frac{3+1}{5} = \frac{4}{5}$ |  |
|  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                            |  |

|  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                |  |
|--|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |  | <p>inators on the chalkboard.</p> <p>le,</p> <p><math>\frac{1}{5}</math> and guide pupils to find the</p> <p>subtract one fraction from</p> <p>r, choose the rod that is equal</p> <p>denominator. So yellow is</p> <p>, then take three parts and</p> <p>ne part out of it. Compare the</p> <p>with the original rod to give <math>\frac{3-1}{5} = \frac{2}{5}</math></p> <p>swer.</p> <p>VITY V</p> <p>er writes addition of fractions</p> <p>different denominator but one</p> | <br><br> |  |
|--|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

|  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                     |  |
|--|--|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|
|  |  |  | <p>a multiple of the other on the</p> <p>Example <math>\frac{5}{8} + \frac{1}{4}</math></p> <p>guide the pupils to find</p> <p>Her, since the two</p> <p>inators are of the same</p> <p>les, the rod which is best for</p> <p>is brown. Take the first</p> <p>ator that is five parts from the</p> <p>ake two rods to represent <math>\frac{1}{4}</math></p> <p>it again. Add them and</p> <p>re with the original rod to</p> <p>the answer.</p> <p>VITY VI</p> <p>er writes addition of fractions</p> <p>unlike denominators on the</p> |  |  |
|--|--|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--|

|  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |  |
|--|--|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
|  |  |  | <p>board for pupils to find the</p> <p>. Example</p> <p>4.</p> <p>we choose a rod which can</p> <p>into four and three at the same</p> <p>o black and yellow are chosen</p> <p>a whole of twelve. Find the</p> <p>of the rod which divides</p> <p>into four and three equal part</p> <p>tively. Purple will divide and</p> <p>green will divide into four and</p> <p>equal parts respectively. Now</p> <p>two light green rods from the</p> <p>to represent <math>\frac{2}{4}</math> and one purple</p> <p>esent <math>\frac{1}{3}</math>.</p> |  |  |
|--|--|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|

|  |  |  |                                                                                                                       |  |  |
|--|--|--|-----------------------------------------------------------------------------------------------------------------------|--|--|
|  |  |  | <p>the two rods together and</p> <p>the them for white and compare</p> <p>the original whole to give the</p> <p>.</p> |  |  |
|--|--|--|-----------------------------------------------------------------------------------------------------------------------|--|--|