



# Understanding the Concept of Numeracy for First Grade of Elementary School Students through Bundle of Sticks

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## ABSTRAK

Rendahnya kemampuan numerasi di kelas 1 sekolah dasar berdampak signifikan terhadap pemahaman konsep numerasi pada jenjang pendidikan selanjutnya. Penelitian ini bertujuan untuk membuktikan adanya pengaruh pembelajaran menggunakan media Bundle of Stick terhadap pemahaman konsep numerasi peserta didik. Tujuan ini ditentukan mengingat rendahnya pemahaman konsep numerasi pada peserta didik di sekolah dasar. Penelitian ini menggunakan metode kuantitatif eksperimen dengan jenis True Experimental Design. Data dikumpulkan melalui observasi dan lembar tes penilaian pilihan ganda. Penelitian ini menggunakan sampel sebanyak 24 peserta didik di setiap kelas. Analisis data dilakukan menggunakan T-test dan Paired Sampel T-test. Hasil uji Independen sample t-test menunjukkan nilai signifikansi  $0,00 < 0,05$  yang artinya hipotesis nol ( $H_0$ ) ditolak dan hipotesis alternatif ( $H_a$ ) diterima. Hal ini menunjukkan bahwa, kemampuan pemahaman konsep numerasi peserta didik akan lebih baik apabila diterapkan media pembelajaran Bundle of Stick dibandingkan dengan pembelajaran konvensional. Selanjutnya hasil uji Paired Sample t-test menunjukkan nilai signifikansi  $0,00 < 0,05$  yang berarti  $H_a$  diterima dan  $H_0$  ditolak. Hal ini menunjukkan bahwa, penerapan media pembelajaran Bundle of Stick dapat meningkatkan pemahaman konsep numerasi. Berdasarkan temuan tersebut, dapat disimpulkan bahwa inovasi penerapan media Bundle of Stick efektif dalam meningkatkan pemahaman konsep numerasi peserta didik kelas 1. Penelitian ini berimplikasi pada penguatan kemampuan numerasi peserta didik, sehingga lebih siap untuk menerima materi pada jenjang pendidikan selanjutnya.

## ABSTRACT

The low numeracy ability in first grade of elementary school has a significant impact on the understanding of numeracy concepts at the next level of education. This study aims to prove the influence of learning using Bundle of Stick media on students' understanding of numeracy concepts. This objective was determined considering the low understanding of numeracy concepts in elementary school students. This study uses a quantitative experimental method with the True Experimental Design type. Data were collected through observation and multiple-choice assessment test sheets. This study used a sample of 24 students in each class. Data analysis was carried out using the T-test and Paired Sample T-test. The results of the independent sample t-test showed a significance value of  $0.00 < 0.05$ , which means that the null hypothesis ( $H_0$ ) was rejected and the alternative hypothesis ( $H_a$ ) was accepted. This shows that students' understanding of numeracy concepts will be better if the Bundle of Stick learning media is applied compared to conventional learning. Furthermore, the results of the Paired Sample t-test showed a significance value of  $0.00 < 0.05$ , which means that  $H_a$  was accepted and  $H_0$  was rejected. This shows that the application of Bundle of Stick learning media can improve the understanding of numeracy concepts. Based on these findings, it can be concluded that the innovation of implementing Bundle of Stick media is effective in improving the understanding of numeracy concepts of first grade students. This study has implications for strengthening students' numeracy skills, so that they are more ready to receive material at the next level of education.

## 1. INTRODUCTION

Numeracy skills are not only about the ability to count, but the ability to apply the concept of counting in an abstract or real context. Numeracy is a fundamental skill in all aspects of life (Mahmud & Pratiwi, 2019; Robson, 2018). Therefore, numeracy is a mandatory and important skill for students to have (Niswah et al., 2022; Maulidina & Hartatik, 2015). Students are expected to have good numeracy skills. Good numeracy skills can be seen from the ability to use numbers and symbols to solve problems and the ability to analyze information in the form of tables, graphs, charts, etc (Mariamah et al., 2021; Maulidina & Hartatik, 2015). Numeracy can be interpreted as the ability to apply number concepts and mathematical skills in everyday life (Yunarti & Amanda, 2022; Fitriana & Ridlwan, 2021). However, in reality not all students can apply the numeracy concept. The concept of numeracy is needed in elementary school to recognize numbers and arithmetic operations so that students are able to have good arithmetic skills for continuation at the next level (Sadiyah in Arfi & Hidayati, 2023; Friantini et al., 2021). Students' ability to understand numeration can be demonstrated by being comfortable with numbers and being able to use mathematics skills in life (Dantes & Handayani, 2021; Mahmud & Pratiwi, 2019). Students' numeracy skills are key to problem-solving skills (Iswara et al., 2022; Nurcahyono, 2023). However, students' understanding of numeracy learning is still quite low. The low understanding of students in numeracy learning is influenced by several factors. Factors that can influence are caused by the lack of student learning motivation (Ardi & Dessty, 2023; Permatasari et al., 2023). The low level of numeracy learning is also caused by students' low intellectual abilities (Adawiyah et al., 2023; Ali & Ni'mah, 2023). Several previous studies have shown various student problems which prove that students' understanding of numeracy is still low (Unaenah & Sumantri, 2019; Arnidha, 2017).

The difficulty of students in understanding the concept of numeracy during the learning process is related to the application of inappropriate learning methods or strategies. This is supported by several previous studies which state that problems in students' understanding of the concept of numeracy are due to the application of strategies or models that are less appropriate to learning (Lestari, 2022; Lestari, 2019). Less interesting learning is also the cause of students' low numeracy skills (Panglipur & Yana, 2023; Widiastuti & Kurniasih, 2021). Several previous studies also stated that students' understanding of numeracy concepts is still relatively low (Anita et al., 2023; Udil & Samo, 2023; Widodo & Umar, 2022). The lack of learning media can also result in low student numeracy skills (Karyadiputra et al., 2023; Amelia & Ma'arif, 2022). Lower grade students need concrete media as an intermediary to understand learning concepts (Dewi & Ekawati, 2022; Ulfaeni, 2017). Understanding the basic concepts of numeracy can help students understand or build the foundation of Mathematics (Kiom & Aini, 2023; Siregar, 2022). This study has the possibility to provide new contributions to educators in terms of mathematics learning at the initial level, especially the concept of numeracy. The results can also help teachers and educators improve mathematics teaching to grade 1 elementary school students.

Students in the concrete operational period do not only need appropriate learning methods or strategies. Because in the learning process, first grade students tend to focus on the teacher, which hinders the understanding of the numeracy provided. In order for students to be active and easily understand the learning, teachers can use learning media as an intermediary. Learning media is needed to support the learning process. Learning media is a tool that can be used by teachers to convey information related to lesson materials to students so that they are easier to understand (Fadilah et al., 2023; Zahwa & Syafi'i, 2022). Learning media is useful for making teaching materials more concrete and interesting, so that students can more easily understand the contents of the material (Zain & Pratiwi, 2021; Nurrita, 2018).

In numeracy learning, it is inseparable from the concept of counting. Students can do counting activities with objects in the surrounding environment. Including using used objects that are around the environment. Used objects around can help students in numeracy skills (Rizkiyah et al., 2024; Khoirunnisa et al., 2023). Used objects that can be used can be a collection of sticks. Students can use a collection of sticks as a medium for understanding numeracy, namely subtraction and addition. Sticks help understand mathematical concepts by improving reasoning through concrete objects. The understanding of the concept in question is like the place value of a number, whether between units, tens or hundreds. The lack of students' understanding of the concept of numeracy in the material on place value supports this study using Bundle Of Stick as the expected media and is expected to help understand the concept of numeracy for first grade students.

The understanding of the first grade numeracy concept that will be studied is related to the material of place value. Therefore, the Bundle of Stick media is used as an object that will represent numbers. The Bundle of Stick media is a learning media using ice cream sticks tied with rope to represent tens and units. The sticks that will be used have two colors. The red color represents tens and the yellow color represents units. Further explanation regarding the use of the bundle of stick media will be presented in the discussion section.

The difference between the research to be conducted and the previous research lies in the use of learning media, the implementation of the classes implemented and the learning materials. This research uses Bundle of Stick learning media which focuses on how bundle of sticks is used to teach students in grade 1 of elementary school with the material of place value of numbers. This research is relevant in efforts to improve the quality of Mathematics education at the elementary level, especially in an era that emphasizes innovative approaches in teaching. The urgency of this research is the lack of understanding of students' numeracy concepts in place value material. Therefore, this research aims to prove the influence of learning using Bundle of Stick media on students' understanding of numeracy concepts. The results of this study are expected to prove the effectiveness of the application of Bundle Of Stick media on understanding the concept of place value. Innovation of bundle of stick media in improving student numeracy. It is hoped that this can strengthen their numeracy skills, so that they are better prepared to receive material at the next level of education.

## 2. METHOD

This study uses a quantitative experimental method with the True Experimental Design type. This study was conducted to determine the effect of the independent variable, namely Bundle of Stick, on the dependent variable, namely the understanding of the concept of numeracy. The design of this study is a pretest-posttest control group design. The experimental group will be applied with Bundle of Stick media, while the control group will not be applied with Bundle of Stick media. Pretest and posttest are conducted to determine the level of success in implementing learning media. The pretest is given to students to determine the initial condition of the students' numeracy abilities. The posttest is given in order to provide an overview of success after the implementation of learning media. When there is a significant change in the understanding of the concept of numeracy in the experimental group of students, it can be said that the results of the experiment have an effect. This research was conducted at SDN Wotanmas Jedong Ngoro, Mojokerto because there were problems in understanding the concept of numeracy in grade 1 students. The population in this study were grade 1 students at SDN Wotanmas Jedong totaling 54 students consisting of two classes, namely 1A and 1B. The probability random sampling technique was used to determine the sample between the experimental class and the control class. Grade 1 students were collected first, then randomly selected to determine who would be the sample in the control group and in the experimental group. This experimental quantitative research was carried out in the odd semester of learning in the 2023/2024 academic year. There are two variables in this study, namely the independent variable with Bundle of Stick media and the variable of understanding the concept of numeracy.

Data collection techniques were obtained from observations to determine the activities carried out by students in the learning process in the experimental class and control class. Apart from observation, this research also used tests from pretest and posttest instruments to measure the influence of media on students' understanding of numeracy concepts. The instrument used in this research is an assessment test sheet to measure students' numeracy understanding abilities. The assessment test sheet is used as a pretest and posttest assessment. The pretest and posttest sheets consist of 10 multiple choice questions.

The pretest and posttest test sheets are given according to the indicators to be assessed. The pretest sheets are given to both experimental and control groups to determine the initial state of students' numeracy abilities. After the pretest is conducted, the experimental group will be given learning using the Bundle of Stick media. Meanwhile, the control group does not receive learning using the Bundle of Stick media. The posttest question sheets are also given to both groups to measure the effect of the application of the Bundle of Stick media on students' understanding of numeracy concepts. Indicators of understanding of numeracy concepts can be presented in [Table 1](#).

**Table 1. The Indicators of Understanding the Concept of Numeracy**

Concept Understanding Indicator	Numeracy Ability Indicator
1. Able to re-explain a concept.	1. Able to reuse various numbers and symbols related to basic mathematics to solve everyday problems.
2. Able to group objects based on the characteristics of an object.	2. Able to analyze information presented in the form of (graphs, tables, diagrams, etc.).
3. Able to apply concepts algorithmically.	3. Able to interpret results to make decisions.
4. Able to provide examples and non-examples.	
5. Able to apply a concept.	

Source: [Han et al., \(2017\)](#) with modification

The validity test of the instruments in this study was conducted using one expert lecturer and one first-grade teacher at SDN Wotanmas Jedong to determine the feasibility of the developed instrument. In addition to the validity test, a reliability test was also performed. The reliability test in this study used the

Kuder-Richardson (KR-20) formula. The data analysis techniques used included prerequisite tests, such as the normality test using the Shapiro-Wilk formula to determine whether the data follows a normal distribution, and the homogeneity test using the F-test to determine whether the research population has equal variances. After that, a hypothesis test was conducted to examine the effect of applying the Bundle of Stick media on students' numeracy understanding. The hypothesis test in this study was carried out using t-test statistics.

### 3. RESULT AND DISCUSSION

#### Result

Learning takes place by implementing Bundle of Stick media. Students are given yellow and red sticks, each totaling 10. After that, students are directed in the use of learning media. Learning begins by showing the specified number of sticks. Students one by one show the results of the bundle of sticks according to each student's understanding of the concept of numeracy. Before students are given numeracy concept understanding test questions, the test questions have been tested for validity and reliability. The results of the validity test show 10 multiple choice questions with a two-tier test model. The reliability test of the test questions also shows that the test questions are reliable. The statistical calculation data for the normality test regarding the testing of understanding of the concept of numeracy can be presented in Table 3.

**Table 3. The Normality Test**

	Shapiro Wilk		
	Statistics	df	Sig.
Experiment	0.933	24	0.113
Control	0.920	24	0.059

The table above shows that the significance value of the pretest and posttest in the experimental and control groups is  $>0.05$ . It can be stated that the pretest and posttest in the control group and the experimental group are normally distributed. After the normality test is performed, the next step is the homogeneity test using SPSS version 26 for Windows with the Levene test method. The results of the homogeneity test can be presented in Table 4.

**Table 4. The Homogeneity Test**

Lavender Statistics	df1	df2	Sig.
1.105	3	92	0.351

The table above shows a mean significance value of 0.351. The decision-making rule states that if the mean significance value is  $>0.05$ , the data that has been tested is declared homogeneous. Furthermore, the sample in this study was determined by the simple random sampling method. A total of 24 students were randomly selected from class 1A as the control group and 24 students from class 1B as the experimental group. After that, it was continued with pretest data analysis to analyze students' understanding of the concept of numeracy before the Bundle of Stick learning media was applied with the aim of knowing the difference in the average understanding of the concept of numeracy of students in the control and experimental classes. If the significance value is  $<0.05$ , then  $H_0$  (null hypothesis) is rejected, but if  $H_a$  (alternative hypothesis) is accepted, it indicates a significant difference. Hypothesis testing in this study was conducted using an independent t-test to understand the actual conditions in the control class and the experimental class, as well as to identify differences in understanding the concept of numeracy among students. The results of the independent pretest hypothesis test can be presented in Table 5.

**Table 5. The Independent Hypothesis Test Pretest**

Understanding the Concept of Numeracy	F	Df	Sig. (2-tailed)	Mean difference	Std. Error difference	Lower	Upper
Equal Variances Assumed	0.224	46	0.706	1.250	3.291	-5.375	7.875
Equal Variances not assumed		45.216	0.706	1.250	3.291	-5.378	7.878

The table above shows that the pretest results have a significance value of 0.706, which means that the significance value is  $>0.05$ . Because the significance result is  $>0.05$ , there is no difference in the understanding of the numeracy concept of grade 1 students at SDN Wotanmas Jedong, both in the control group and in the experimental group. Grade one students in both the control class and the experimental class have the same average ability to understand the concept of numeracy. This understanding can be seen from the results of the pretest questions given before students in the experimental class were given the application of the Bundle of Stick learning media. Furthermore, an independent posttest hypothesis test was carried out with the results presented in Table 6.

**Table 6. The Independent Posttest Hypothesis Test**

Understanding the Concept of Numeracy	t-test for Equality of Means			95% Confidence Interval of the difference			
	F	Df	Sig. (2-tailed)	Mean difference	Std. Error difference	Lower	Upper
Equal Variances Assumed	1.293	46	0.000	15.833	4.073	7.634	24.032
Equal Variances not assumed		43.562	0.000	15.833	4.073	7.622	24.045

Based on the table above, the independent t-test of the posttest of students shows a significance value of 0.00. This means that the resulting value is  $<0.05$ , so there is a difference in the understanding of the numeracy concept of students who are applied with the Bundle of Stick learning media and students who are not applied with the Bundle of Stick learning media. The difference in the ability to understand the concept of numeracy of students between the control and experimental classes shows that the Bundle of Stick learning media has an effect on the understanding of the concept of numeracy of class 1A students at SDN Wotanmas Jedong.

The difference in understanding of the concept of numeracy of first grade students is known from the posttest questions that have been done. The results of the experimental group on average showed an increase in scores from the scores during the pretest. However, in the control group, students who experienced an increase in scores were not many and on average students in the control group had a constant score between the pretest and posttest. After conducting an independent test, the last Dependent paired sample t-test was conducted to determine whether there was an increase in scores after the implementation of the Bundle of Stick learning media. The results of the dependent paired sample t-test can be presented in Table 7.

**Table 7. The Paired Dependent Test t-test**

Paired Differences		Paired Samples Test			95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Mean Error	Lower	Upper	t	df	Sig.	
Pair 1	Pretest-Posttest	-25.000	11.795	2.408	-29.981	-20.019	-10.383	23	0.000

The table above shows that the significance value produced is 0.00, which means that the value is less than 0.05. Therefore, it can be concluded that there is a significant influence on the understanding of the numeracy concept of class 1A students at SDN Wotanmas Jedong with the application of Bundle of Stick learning media. The application of Bundle of Stick learning media in this study makes students better understand the concept of numeracy in the material of place value. After the application of the Bundle of Stick learning media, students can work on the test questions that have been given. The test questions given to students are made according to the indicators of understanding the concept of numeracy.

The results of the dependent paired t-test showed that students experienced an increase in their understanding of the concept of numeracy. These results indicate that the Bundle of Stick media has a positive effect on the understanding of the concept of numeracy, especially on the material of place value in the experimental class. The Bundle of Stick learning media is designed to help students understand the learning process, especially in understanding numbers. Students are asked to build an understanding of the concept of numeracy with concrete objects around them.

## Discussion

Learning in the experimental class is carried out using bundle of stick learning media. Students are able to apply learning media according to the instructions given. Each student is given 10 yellow sticks and 10 red sticks. Students are directed to show the numbers according to what has been presented on the board. The red sticks that correspond to the number of tens are tied using rubber, then the yellow sticks are adjusted to the number of units and tied together with the tens stick. Learning media is designed with the addition of color to attract students' interest and increase their interest in the teaching and learning process. By using easily available media, this Bundle of Stick also teaches students to utilize simple materials around them to learn. The easy way to use media is very suitable for first grade students who tend to still need help and supervision.

The Bundle of Stick media is applied in a structured manner, so that students can use the learning media according to the steps that have been given. With the help of the Bundle of Stick media, students can more easily understand the material on place value and are able to apply it in everyday life. If each learning step can be followed by students well, then students can build an understanding of the concept of numeracy that was previously low. Increasing students' understanding of the concept of numeracy with the help of this Bundle of Stick learning media can also be applied to the control group and in the next first grade. Learning in the experimental class can be shown in [Figure 1](#).



**Figure 1.** The Learning with Bundle of Stick Media

During the learning process in the experimental group, students were given learning materials that were relevant to everyday life. Students were presented with a number and asked to explain the place value of the number as a trigger question. The teacher guided students in the process of explaining the place value of the number that had been provided. Learning took place actively and students were enthusiastic about learning to understand the concept of place value numeracy using the media that had been provided, namely the Bundle of Stick. In addition to during the learning process, during the process of working on the posttest questions, students in the experimental group experienced an increase. Students became more focused on the test questions given. The test questions given contained three indicators of numeracy ability and five indicators of conceptual understanding.

In theory, numeracy skills are students' ability to use numbers and mathematical symbols in everyday life (Yulinggar, 2019; Han et al., 2017). Numeracy abilities must also be supported by students' ability to understand a concept. Conceptual understanding is the ability to re-explain concepts that have been studied in one's own language without reducing the meaning of the concept. Understanding numeration cannot be separated from number material. One way to understand numbers in first grade elementary school is place value material.

In education, place value material is quite important material in learning so that it gets attention in the curriculum. If grade 1 students have understood the concept of place value material, then they will not have difficulty understanding the concept of place value at the next grade level. This is in line with previous research which states that grade 1 students are expected to have an understanding of the concept of place value material so that they do not have difficulty in understanding the concept of place value at the next level (Nabila & Pujiastuti, 2022; Matitaputy, 2018). Research conducted at SDN Wotanmas Jedong shows that many first grade students do not yet understand the concept of place value. In addition, some students also still do not understand the basic concept of numbers.

Process students' understanding of the concept of numeracy is supported by the application of learning media, one of which is Bundle of Stick. Bundle of Stick is a learning media made of ice cream sticks that are given two kinds of colors to represent the tens and units place values. On the red ice cream stick represents the tens place value and the yellow stick represents the units place value. Each ten will be represented by ten red ice cream sticks tied with rubber. Then for each unit will be represented by one ice cream stick that symbolizes one, two ice cream sticks for the number two and so on up to nine. After the red and yellow sticks have represented the instructed numbers, the sticks are then tied together between the tens stick and the units stick. The Bundle of Stick learning media used in students' understanding of the concept of numeracy can be presented on [Figure 2](#).



**Figure 2.** The Media Bundle of Stick

Bundle of Stick media can be applied in the place value material of first grade students. With the help of learning media in the form of sticks, students can distinguish between tens and units more easily. In addition, students can also determine the number of tens and units according to the teacher's instructions using concrete objects. Stick learning media can help students distinguish units and tens because it has a fairly good appeal to students, making it easier for students to practice learning ([Muis, 2023](#); [Arsyat in Sulfemi & Suhaemi, 2019](#)). The use of stick media can help students understand the material, so that difficult material can be understood easily ([Imanulhaq et al., 2020](#); [Romadiyah, 2014](#)).

Using Bundle of Stick media can support student learning, especially in understanding the concept of numeracy in place value material. The experimental group can have a good understanding of the concept of numeracy through the Bundle of Stick learning media that has been given. This is different from the control group who only get material through learning with the lecture method. Not applying learning media can make the teaching and learning process seem boring and students become less active during learning. The application of concrete media can help students understand learning concepts, because grade 1 elementary school students still need physical objects as support to interpret various materials. This media makes it easier for them to learn and makes the learning process more effective.

Concrete media in mathematics learning enables students to better understand the learning concepts provided ([Hendriani, 2021](#); [Saleh et al., 2018](#)). Numeracy or mathematical skills become effective if teachers are able to implement learning in everyday life ([Ernia & Mahmudah, 2023](#); [Kenedi et al., 2019](#)). The understanding of the concept of numeracy, especially in the material of place value at SDN Wotanmas Jedong showed an increase after being given the application of the Bundle of Stick learning media in the experimental group. This is evidenced by the difference in the ability to understand the concept possessed by the experimental group and the control group.

In this study, the Bundle of Stick media is a solution for educators in numeracy learning using concrete learning media to help students' understanding of the concept of grade 1 elementary school. This study has differences with previous studies. Previous studies conducted research in grade 5 using simple learning media such as used objects and were less effective in improving understanding of numeracy concepts ([Mumpuni et al., 2022](#)). Another study conducted research using the STEAM approach assisted by ice cream stick media on multiplication material to improve numeracy skills ([AR et al., 2023](#)). Furthermore, there is research conducted in the upper class, namely class 5, using the inquiry learning method assisted by ice cream stick media to improve the completion of numeracy learning outcomes ([Nasir, 2022](#)).

This research has implications for strengthening students' numeracy skills, so that they are better prepared to receive material at the next level of education. The results of this study can be used by educators for teaching mathematics in grade one of elementary school with materials that focus on understanding the concept of numeracy. In addition, the innovation of Bundle of Stick in improving numeracy skills can be a reference for educators in choosing media that can be applied to grade 1 elementary school students, especially in understanding the concept of numeracy. This study shows that grade 1 elementary school students need concrete learning media. In addition, it is hoped that this study can evaluate the use of Bundle of Stick media as a simple and effective tool to be applied to lower grade students, especially in grade 1.

The limitation of this research is that it was only conducted in one school, so if it is applied to other schools with different student abilities, further research needs to be conducted first. Therefore, the findings may be difficult to generalize to all grade 1 elementary school students as a whole. Further research can involve more schools with various student characteristics. In addition, this research was conducted with limited time, so further research is expected to maximize the duration of the research to obtain more in-depth and comprehensive results. Finally, the sample used in this study is limited. Further research can use a more representative sample, covering various school backgrounds and environments. Thus, the research results can be more relevant and can be applied to a wider context.

#### 4. CONCLUSION

The results of the study indicate that the application of Bundle of Stick learning media has an influence on the understanding of numeracy concepts of grade 1 students at SDN Wotanmas Jedong. Based on the results of data analysis, it was found that there was a significant influence of the application of Bundle of Stick learning media on the understanding of numeracy concepts of grade 1 elementary school students. It can be concluded that the innovation of Bundle of Stick learning media can improve the ability to understand numeracy concepts of grade 1 elementary school students. Bundle of Stick learning media can help grade 1 elementary school students understand numeracy concepts better.

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