



MentiMATH - The concept of Fractions

Application and short description

This Mentimeter template elaborates with the concept of fractions and the intended target group is students in 6th grade. The template is designed foremost as an introduction but can also be used in the middle or as a form of reinforcement at the end of a subject block surrounding fractions.

Target group

- 6:th grade (US curriculum).

Estimated time

- Approximately 40-90 minutes for **all slides**.
- Approximately 1-5 min for **each slide**. (The amount of time each slide takes could depend on several variables, for example the students' mathematical knowledge, the teacher's need for clarification within each slide and what work has been done in advance)

Learning goals

- Look at a fraction as parts of a number line
- Be able to divide by fractions and get a visual understanding of this operation by using the number line.

Theoretical background: Fractions are a part of every person's life and even children need to learn how to divide stuff equally among their friends. Research has shown that fractions are often conceived as 'a slice of a whole' but to obtain a deeper understanding for the conceptual for fraction, one way is to work with *magnitude understanding* presented within number lines. Number lines could according to Gersten, et al. (2017) broaden the understanding of fractions and for example shed light on why the magnitude of zero can't be divided into any parts, and how a magnitude can't be divided into zero parts. In other words why we are allowed to have zero in the numerator but not in the denominator.

How to use the template: Here follows some ideas on how the slides are intended to be used but feel free to use the template however you like. Included in each cell is the purpose and other information that could be of use for you as a teacher. A general idea regarding all questions is that the students should work after the model Think-Pair-Share (TPS). When implementing TPS the students should first answer the question individually, then discuss in pairs (or groups of three) followed by a classroom discussion led by the teacher. As a concluding remark, the content in the slides are designed primarily for developing students' understanding of *mathematical concepts* rather than the procedural 'know how'. Therefore, discussions and questions from the students is a central part of using the presentation where your expertise as a teacher is important to clarify misconceptions and lead the classroom discussion.

Important keyboard shortcuts: To get the most out of presenting with Mentimeter, there are a few keyboard shortcuts you need to know.

- Toggle between hiding and showing results: **H**. It is important to not show results before everyone has had a chance to give their response since this can influence other students' thinking.
- Countdown timer: **1** (60 seconds), **8** (30 seconds) **9** (10 seconds), **0** (stop countdown). It is good to be flexible and to start a timer (either, 60, 30 or 10 seconds) when you feel that the majority of the group is ready to move on from a discussion.
- Show correct answers: **ENTER**. Wait until all students have answered a multiple choice question before you show the correct answer(s).

Go to www.menti.com and use the code 7361 7743




The concept of fractions

Results are hidden

Slide 1 - The graph of a logarithms.

Introduce the theme of the lecture. For example, you could mention that the concept of logarithms could be applied in the real world as a 'tool' for handling a large set of numerical data.

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Introduction

You are going to work with the concept of fractions. On every problem you submit your answers individually. After that you discuss in pairs (or in a group of three), then the whole class together.

All answers are anonymous except for the quiz in the end where you type in your name.

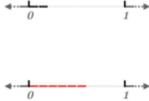
To be able to answer the question, go to www.menti.com, then plug in the code you can see at the top of this slide.

Results are hidden

Slide 2 - General information.

Inform the students regarding the TPS methodology and how they can access the presentation.

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Criteria for success: Be able to use the number line to simplify $\frac{6}{10}$.

Results are hidden

Slide 3 - Criteria for success.

Introduce a 'criteria for success' for the lesson with a problem that will be revisited and solved at the end of the lesson. The idea here is to make the learning visible, so the students can see for themselves that they've actually learned something.

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According to you, a fraction is a....



Press 9 to show image

Slide 4 - According to the students, a fraction is...

Let the students individually write down how they see the concept of fractions. This can help clarify potential misconceptions.

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Numerator

Quotient

Denominator

$$\frac{1}{4} = 0.25$$



Results are hidden

Slide 5 - Prerequisites for this lesson.
[Content slide]

Introduce what the numerator, denominator and quotient is.

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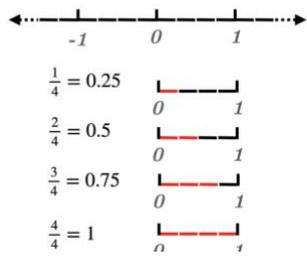


Pin how do you see the fraction $\frac{1}{4}$ in your mind's eye




Slide 6 - A fraction as a 'slice of a whole' or as 'part of a number line'

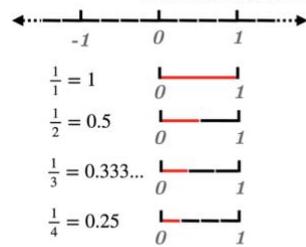
Research has shown that it is beneficial to be able to see a fraction represented by a number line. This slide aims to introduce that a fraction can be represented in different ways.



What happens to the quotient when the *numerator* increases (numerator and denominator are positive)?

Slide 7 - What happens to the quotient when the numerator increases?

Here the aim is that the students should start to understand what an increase or decrease of the numerator means for the quotient.



What happens to the quotient when the *denominator* increases (numerator and denominator are positive)?

Slide 8 - What happens to the quotient when the denominator increases?

Here the aim is that the students should start to understand what an increase or decrease of the denominator means for the quotient.

Rank the following fractions, where 1 is the largest.

1st | 1/2
2nd | 4/5
3rd | 9/5
4th | 3/4

Slide 9 - Rank fractions

Let the students rank the fractions by order of magnitude. This can help them consolidate their newly found understanding of fractions, and lets you as a teacher see potential misconceptions.

If x and y are positive and $x > y$, then $\frac{x}{y}$ is always...

Greater than 1 Less than 1 Impossible to know with the available information

Slide 10 - If x and y are positive and $x > y$, then x/y is always...

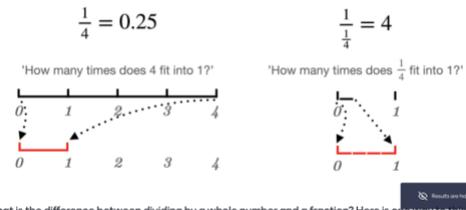
This is a continuation from the previous two slides. This is a good chance to evaluate if the students have grasped what it means when the numerator is larger than the denominator.

If you have any positive number x , and divide it by y , $0 < y < 1$, what is true about the quotient?

The quotient is less than x The quotient is greater than x You can't tell if the quotient is greater or less than x

Slide 11 - If you have any positive number x , and divide it by y , $0 < y < 1$, what is true about the quotient?

The idea here is to realize that whatever number you choose on x , you can only get a quotient that is bigger than x itself. Because you always divide x into smaller parts than what x consists of as a whole.



Slide 12 - What is the difference between dividing by a whole number and a fraction?

Give a visual representation using the number line of what it means to divide by a fraction.

Simplify $\frac{2}{\frac{1}{3}}$. Remember How many times does $\frac{1}{3}$ fit into 2?

Slide 13 - Practice dividing by a fraction using the number line.

Let the students practice on using the number line to solve fraction division.

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Criteria for success revisited: Use the number line to simplify $\frac{6}{\frac{2}{10}}$

Slide 14 - Criteria for success revisited.

Return to the problem that was introduced in the beginning of the lecture to make the students realize they've actually learnt something.

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What is still unclear about fractions?

No questions from the audience!
Incoming questions will show up here so that you can answer them one by one.

Slide 15 - Q & A.

Let the students individually write down what they still feel is unclear about fractions.

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Quiz!

Slide 16 - 22 - Quiz competition!

Ask the students to enter their real names. Let the students compete in a fun way while you as a teacher can get a sense of the individual level of knowledge. This information could be used to give support for students in need of extra guidance.

References:

Gersten, R., Schumacher, R. F., & Jordan, N. C. (2017). Life on the number line: Routes to understanding fraction magnitude for students with difficulties learning mathematics. *Journal of Learning Disabilities, 50*(6), 655-657.