

MATH HUNGER!

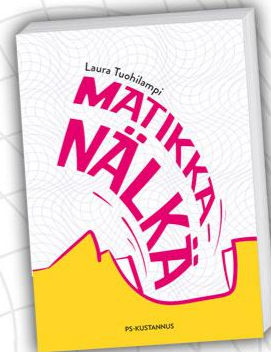
**Deepening mathematical thinking, enjoyment and engagement
through collaborative problem solving**

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HOW TO FIND MATHS INTERESTING?

Find intriguing problems

Solve (and discuss) them with your friends

Don't stress yourself by trying to remember the rules. Allow yourself to think wrong, find the mistake and motivate your justification. (It's you who you have to convince)

Anna, 4 years, brought some toys to her kindergarten



On the next day some of them were gone!



Who is guilty?

Frank, 4y: I haven't taken any animals!

Ida, 2y: The red pony was so cute!

Edward, 3y: I know where the yellow toys are.



Three Super Mario Bros. figurines are standing on a gravel surface. On the left is Luigi, wearing his green hat with a white 'L' and blue overalls, with his right fist raised. In the center is Yoshi, a green dinosaur with a white belly and orange shoes, with his hands raised. On the right is Mario, wearing his red hat with a white 'M' and blue overalls, with his right fist raised. The background is a blurred outdoor setting.

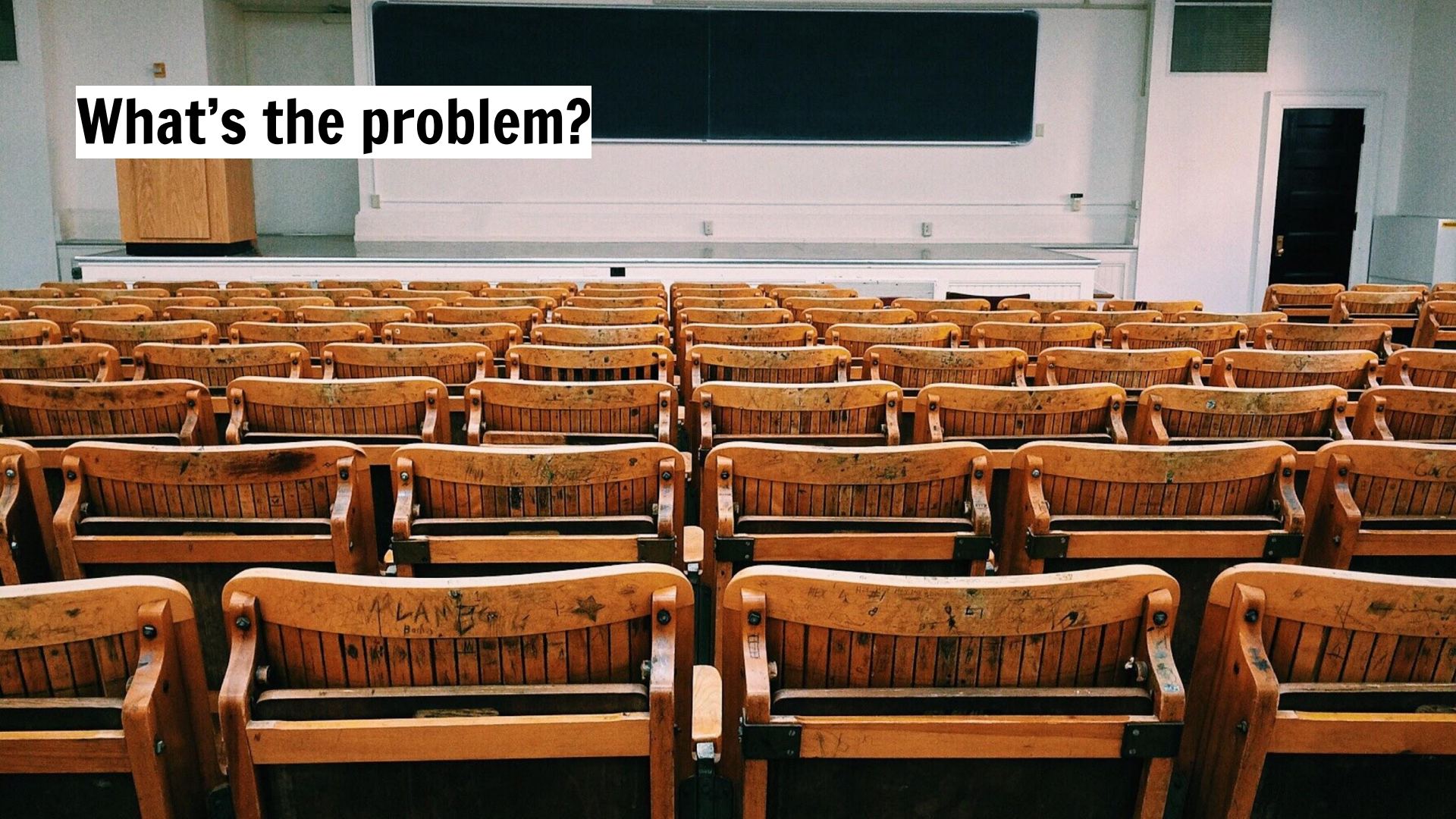
When kids start going to school...

"I can, I like, I am willing"

Lots of competences, less willingness to use them?



What's the problem?



A 100 ml tube of toothpaste costs 1.50 euro. If the volume of the package is increased by 25%, and the price by 40% at the same time, by how much has the price increased?



”Young people have the idea ... that you can accomplish anything, as long as you want it enough. What we don’t see is that people come from different starting points and social realities. People have different chances to make choices, based on *different perceptions of themselves.*”

Dr. Mari Käyhkö



CATCH AND HOLD!

Hidi & Renninger, 2006

SITUATIONAL INTEREST (CATCH)

- 1. emerging**
- 2. maintained**

PERSONAL INTEREST

- 3. emerging**
- 4. well developed**

http://www.tandfonline.com/doi/abs/10.1207/s15326985ep4102_4

MATHS SHOULD BE

→ Emotionally triggering

→ Multilayered

→ A shared construction

CASE 1: TRIGGER SOME REACTIONS





HS (FINNISH NEWSPAPER) 2.2.2014

”According to Oxfam report, **world’s 85 richest people own as much as the poorest half of the world population.** In addition to that, one percent of all people own 50 percent of the whole wealth of the world. **The numbers are dreadful.**”



HS (FINNISH NEWSPAPER) 2.2.2014

“The whole wealth of the world is estimated as **270 trillion dollars**. Both the poorest 50 percent and the richest 85 people own, according to the report, **approximately 1.7 trillion dollars**, that adds up 3.4 trillion altogether.”



WHERE IS THE MONEY LURKING?

85 richest people own as much as the poorest half of the world population.

The whole wealth of the world is estimated as **270 trillion dollar**. Both the poorest 50 percent and the richest 85 people own, according to the report, **approximately 1.7 trillion dollars**, that adds up 3.4 trillion altogether.

MATH CAN BECOME EMOTIONAL, IF...

The curriculum gives enough flexibility to provide open discussions that might progress unexpectedly

Students are shown that they are expected to add their own thinking into their learning process

CASE 2: MULTILAYERED MATH



Multilayered math: something to grasp on every level

Alternative to tasks that are “flat”, e.g.

$$2 + 3 =$$

Differentiate $2x^3 - 3x^2 + 1$

What is the hypotenuse of a right triangle, if the two perpendicular sides are 3 and 4?

Daddy goes jogging, and starts really fast. After ten minutes, his speed halves. After next ten minutes, it halves again. This happens every ten minutes. Will he still be running after one hour?



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Tables, graphs, calculations, functions, fractions and percentages, ideas of non-linearity and exponential change ← all gathered together and creating a complete picture of the situation

Aha-moments when understanding the density of the real numbers - Does it get negative? When does it reach zero? ← Hypotheses that can be tested and discussed

MATH CAN BECOME MULTILAYERED, IF...

Schools emphasize inclusion allowing (and supporting) students with heterogeneous capacities to study together.

The tasks are open, easy to start with, and possess opportunities to deepen your thinking

CASE 3: MATH AS A SHARED CONSTRUCTION



Student gives a correct answer, but with a clearly wrong justification.

Traditionally

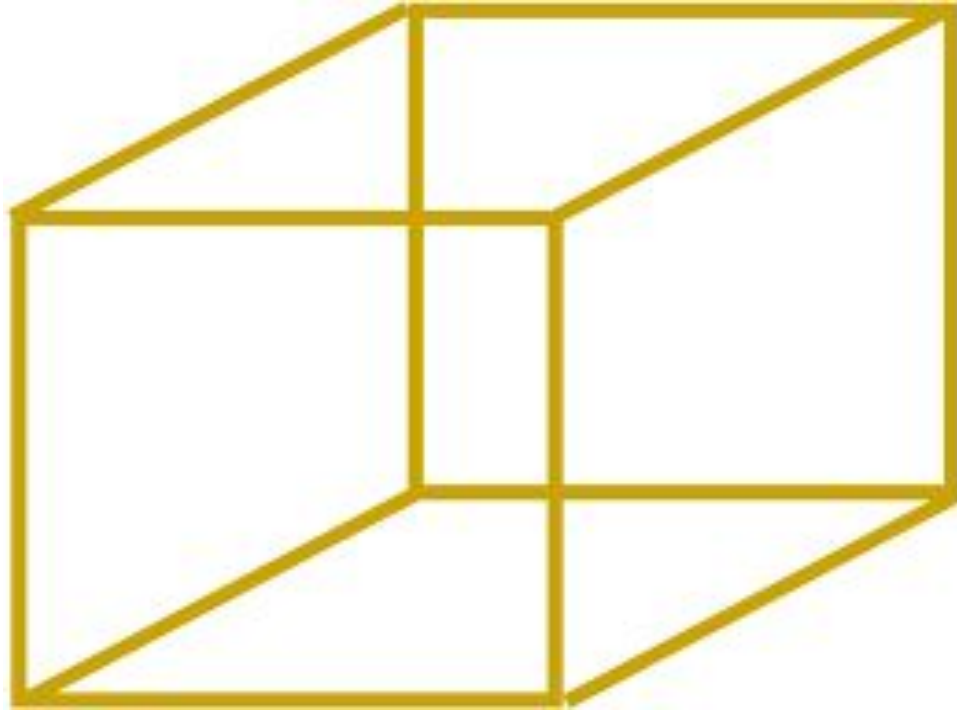
- **Teacher's job is to correct the wrong answer and provide the right justification.**
- **Students' role is to find a way to what teachers holds and administers.**

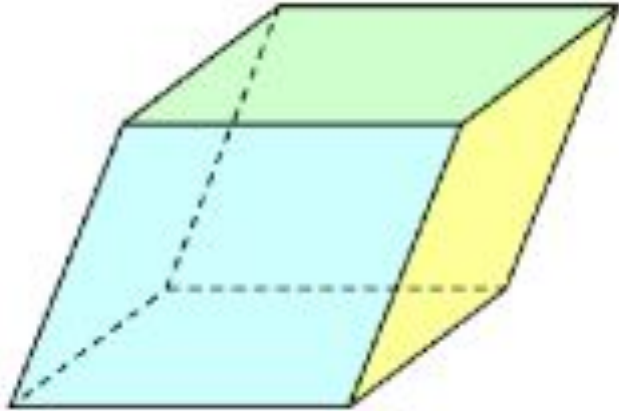
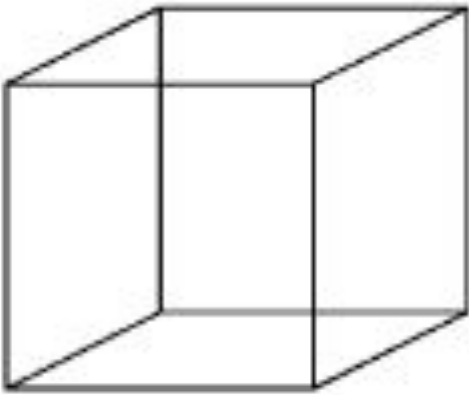
If constructed together

- **The class finds out together, whether the justification applies in that particular case, whether it applies in other cases and in all cases, and why / why not.**

Based on Lerman's (1990) article Alternative Perspectives of the Nature of Mathematics and their Influence on the Teaching of Mathematics

CUBIC METER WITH STICKS





MATH CAN BE CONSTRUCTED TOGETHER, IF...

The teacher education aims to give teachers boldness, creativity and trust to co-operate with students, as well as listen to their ideas

The teachers know how to benefit social media, and they share their ideas and utilize others' creations actively

OVER TO YOU

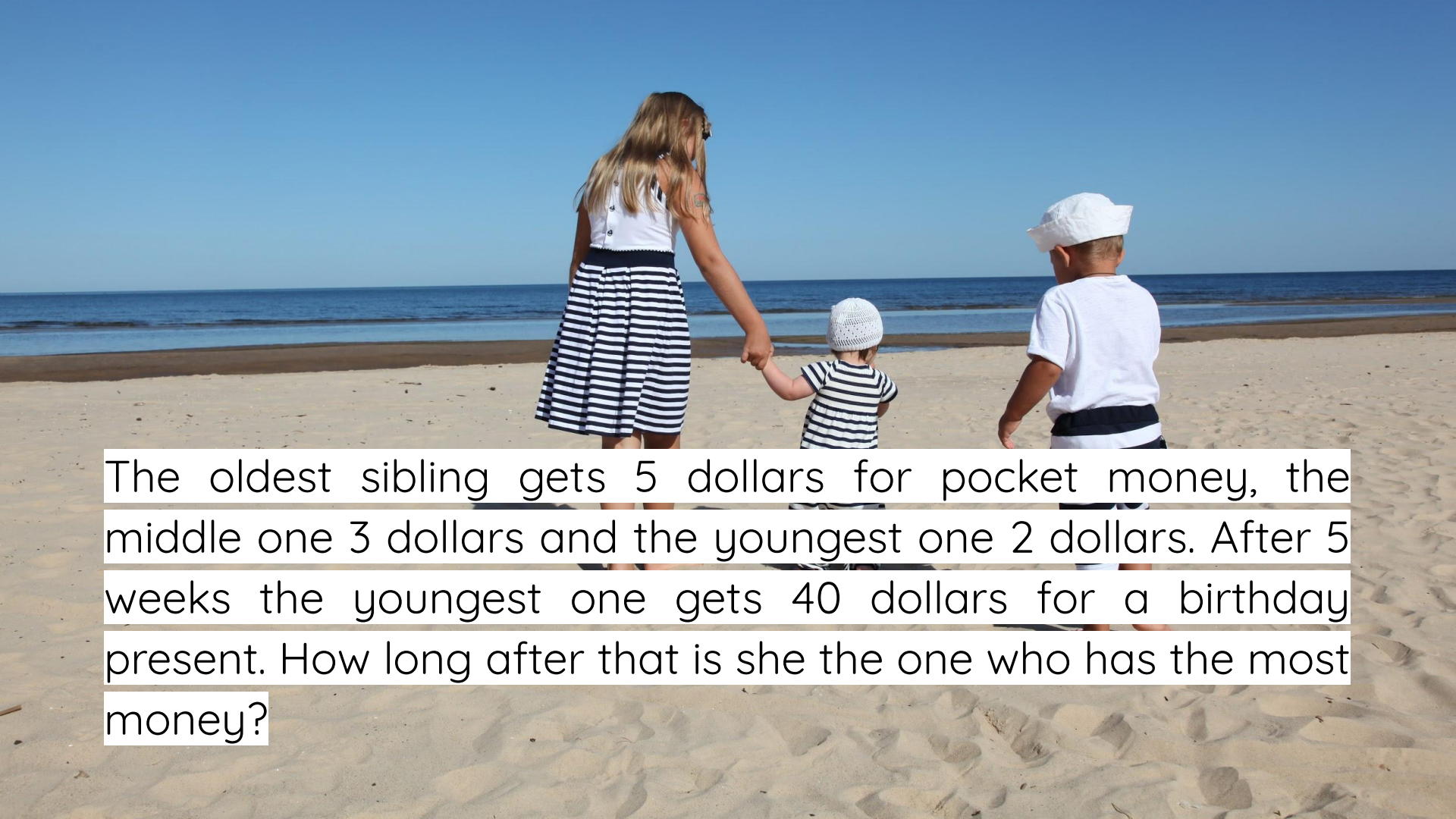
Think of *slope* as a mathematical concept. Discuss with the person next to you

- to which other concepts in maths is slope connected?**
- in which grades should/can it be discussed?**
- what kind of tasks are there addressing slope?**
- how would you make the concept interesting, multilayered and to be constructed collaboratively?**

DISCUSSING STEEPNESS

- **What does steepness mean?**
 - **the angle?**
 - **it's just... steeper?**
 - **the more it rises by the same amount of reference time / distance, the steeper it is**

→ **delta y / delta x**



The oldest sibling gets 5 dollars for pocket money, the middle one 3 dollars and the youngest one 2 dollars. After 5 weeks the youngest one gets 40 dollars for a birthday present. How long after that is she the one who has the most money?

MATHS SHOULD BE

Emotionally triggering
to prevent problems of boredom

Multilayered
to diminish problems with self-initiative and prevent struggle with tasks that are not at the appropriate level of difficulty

A shared construction
to increase autonomy, joy and purposefulness

Once a week / once a month

What happens on your mathematics classes?	f (%) control group	f (%) intervention group
We focus on the content according to teacher's instructions	10.4	18.1
We focus on the content through discussions and by helping each other	2.6	30.6
The students misbehave and do not engage with the content	3.9	11.1
It is boring	70.1	27.8
It is inspiring	3.9	5.6
It is emotionally ambivalent	9.1	4.2
n	77	72



Card magic

ENGAGEMENT PHASE

How would you arrange the cards to be able to do the same?

Try it out!





math_hunger

math_hunger Let's do some conversions. Dogs are said to be approximately 7 times their age in "human age". That taken as an assumption, how old would the fluffy driver need to be in order to make it legal? Let your students show off their dog trivia, if they know a better approximation rate! 😊



#math #maths #enjoymaths #mathlearning #mathlesson #mathtask #mathactivity #creativemaths #inspiringmaths #mathteacher #mathstudent #hungryformaths #mathhunger #dogmath #dogs



neighbour_to_santa, diffuusiokeksi, sonjalarmo, amansner ja justinbieshaar tykkäävät tästä

2 PÄIVÄ SITTEEN



math hunger

THANK YOU!



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