

Ideas for mathematical modelling tasks with PTs and students in grades 1-7

Giouli and Camilla

What we aimed to include

1. Tasks for different grades
2. Multilingualism as a resource
3. CME
4. Tasks where pupils have control and do not depend on the teacher giving them answers and telling them what is right or wrong
5. Outdoor tasks

1: Don't let your hiking go to waste

What can you do to solve this problem and how can you convince Bergen commune to follow your suggestion(s)?



Possible solutions



Placing trash cans



**Giving a fee for throwing trash
in nature**

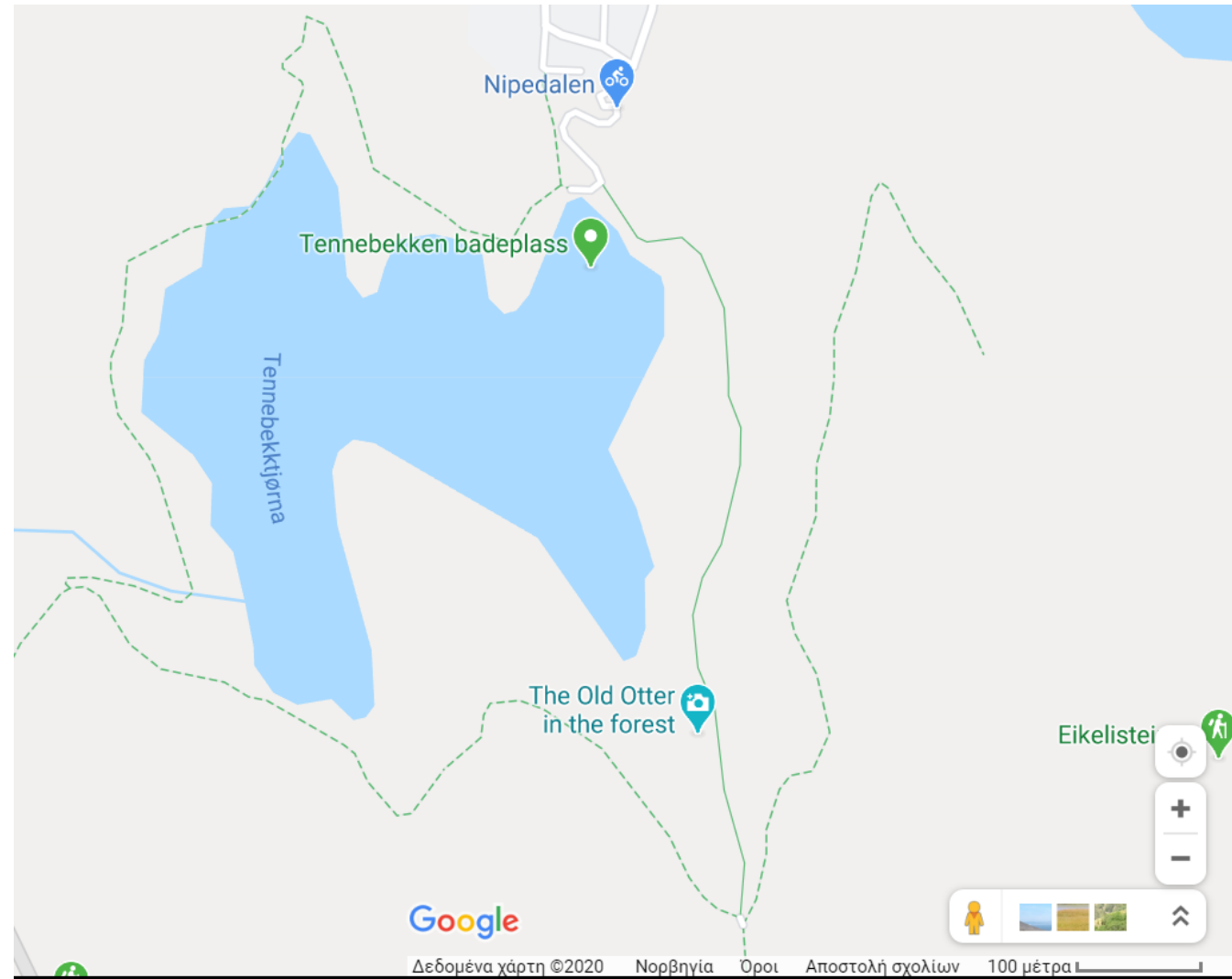


**Non mathematical
suggestions(?)**

- Doing a protest
- No hiking allowed in the path!
- Creating a campaign with hashtags

Placement

- Using a map
 - Choosing a set distance between the trash cans, e.g. 1 km
 - Choosing appropriate instruments for measuring
 - Accessibility (BIR)



Placement

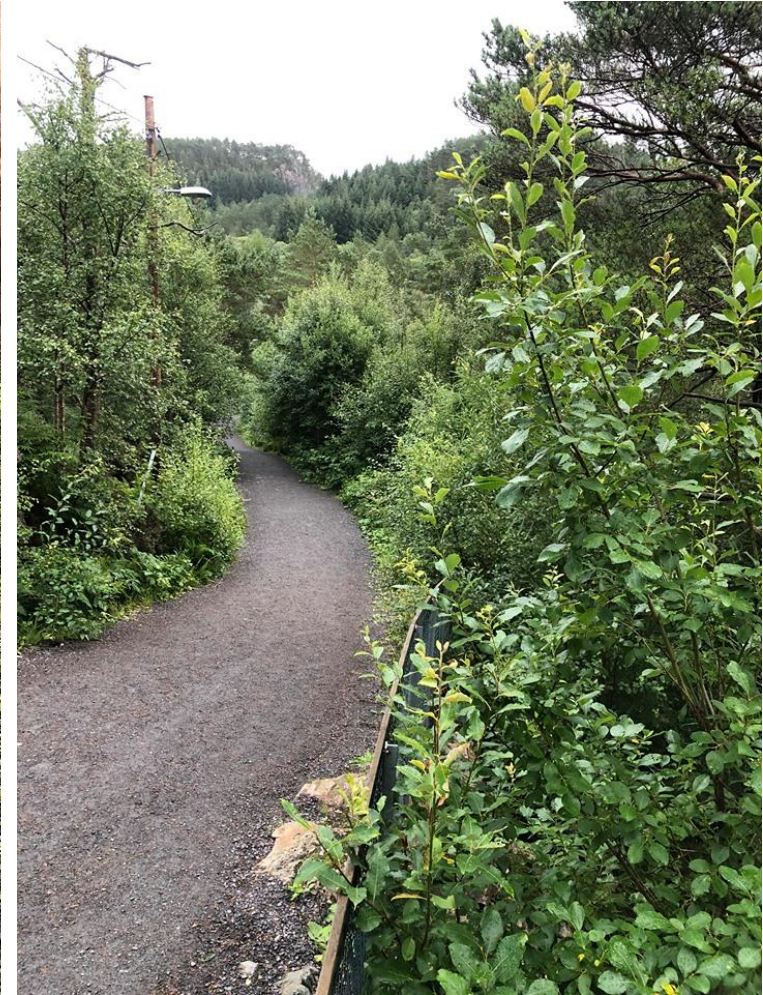
- Collecting, locating and sorting trash
 - Statistics



Placement

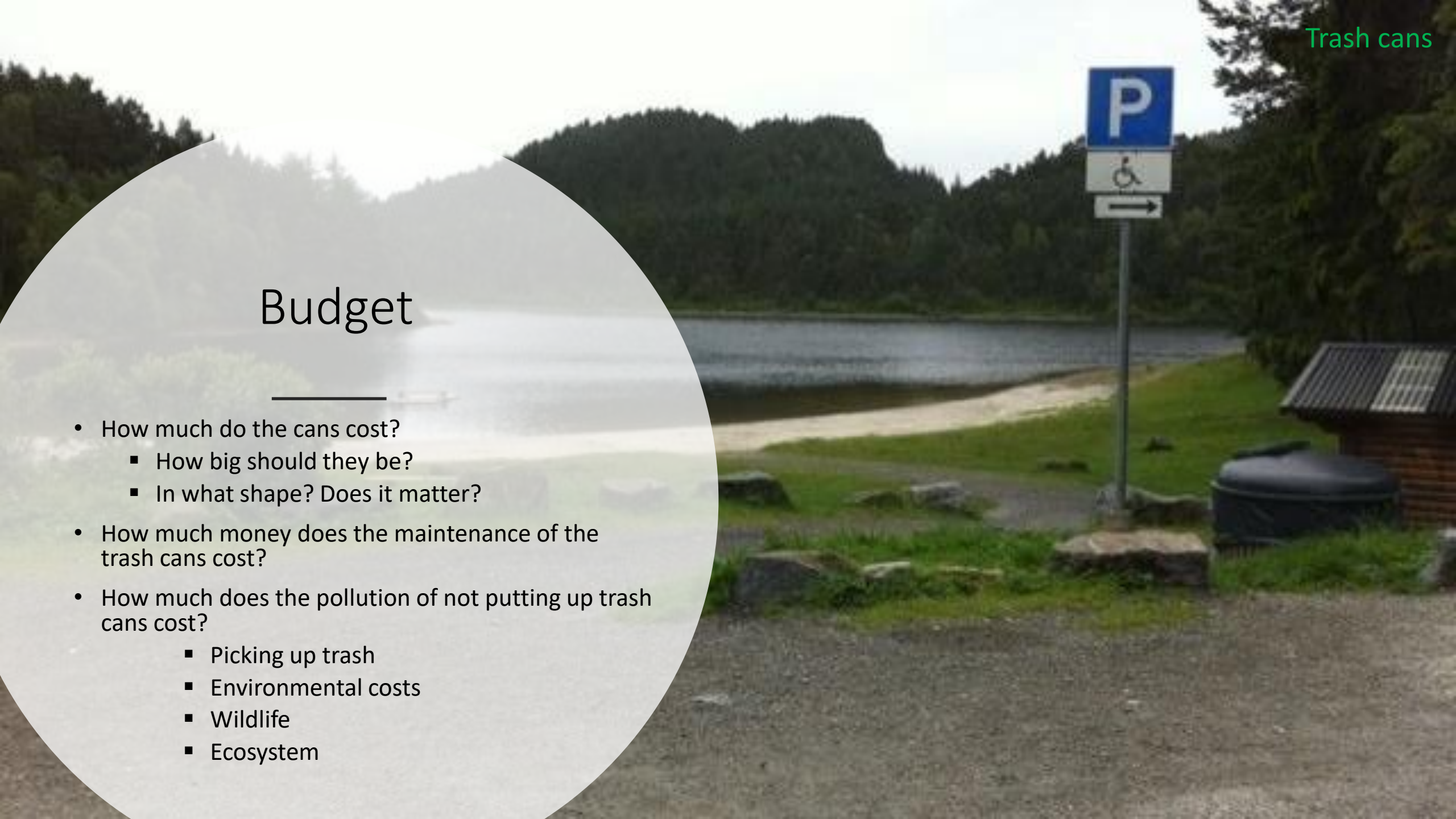
- Asking hikers
 - Their perspective
 - Can they cross on a map?
 - Multiple languages
 - Signs

500m til søppelbøtte
500m. to trash can
500μ. για κάδο απορριμμάτων



Budget

- How much do the cans cost?
 - How big should they be?
 - In what shape? Does it matter?
- How much money does the maintenance of the trash cans cost?
- How much does the pollution of not putting up trash cans cost?
 - Picking up trash
 - Environmental costs
 - Wildlife
 - Ecosystem



Giving fees for littering

- How do you find the “guilty”? Ethics?
- Who benefits from the fees?
- How much should the fee be?



Questions for the workshop

1. Should we talk about placing trash cans, or should we leave the task open and allow more suggestions?
2. How can we do this task with our PTs?
 - a) Having an introductory lesson
 - b) Having one outside close to the path where they solve the problem (Self-study)
 - c) Having one where the PTs present their solutions
3. How do we handle the non-mathematical suggestions (and are there more possible ideas, solutions that you see that we did not include?)



2. Manny on Ice

*Thinking back in history,
could Manny float on ice?
Why/why not?*



How thick must the ice be to carry a mammoth?

- What is the mammoth's weight?
- The density of the ice (too high level for GLU1-7?)
- Distribution of weight (on four legs, position on the surface)
- Method?
 - Perform small-scale experiments to try out the different parameters - weight in relation to thickness, and/or placement on the ice.
 - Creating tables → graphs → equation (Different representations)
 - Estimate the given situation and arguing

How long can he float?

- Measure the thickness of the floe (isflak) and how that changes as the floe melts and maybe compare this to how thick the floe must be to carry a mammoth
- Measure the area of the ice:
 - How does it change over time due to natural conditions?
 - What is its shape?
 - How can you compare it to the size of the mammoth and the area it covers?
 - Google
 - Scales from the picture
 - Small figures

Conditions that could be taken into consideration:

- Food supplies (Not mathematical?)
- Weather: sunburned, no shadow/shelter, cold, water temperature

Ice Thickness	Permissible Load	Ice Thickness	Permissible Load
3 inches	Single person on foot	12 inches	Heavy truck (8-ton gross)
4 inches	Group in single file	15 inches	10 tons
7½ inches	Passenger car (2-ton gross)	20 inches	25 tons
8 inches	Light truck (2½-ton gross)	30 inches	70 tons
10 inches	Medium truck (3½-ton gross)	36 inches	110 tons

***Solid, clear, blue/black pond and lake ice**

Slush ice has only half the strength of blue ice. The strength value of river ice is 15 percent less.

Samisk kultur og språk som resurs

- Å beskrive og forklare forhold ved reingjetingen til andre, er en viktig del av reingjeternes oppgaver
- Måling og lokalisering: *hvor tykk er isen for å bære en flokk med rein? i hvilke deler av vannet er isen utrygg?*
- Hvis reingjetere misforstår hverandre, kan det få uante negative konsekvenser. Derfor er det nødvendig med et presist og nøyaktig språk.



Questions for the workshop

4. Is this situation even possible to model at level 1-7?

5. How much does it matter if you can't find patterns (with functional thinking) when modelling the situation?