

# Breaks at school – teacher guide

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## Background to the task

This task is designed for a half day mathematics modeling event for teams of students in lower secondary education. No advanced mathematics is required. The task offers possibilities for exploration, analysis, reasoning, calculation and design. It is sufficiently 'authentic', asking for a 'real' product, without being too complex. The task has a somewhat closed start, a middle part that is mainly aimed at the evaluating and a well-reasoned adjustment of an existing situation, and finally an open design task, in which there is also room for reflection. In the last part the students are expected to take up a role of a professional (that of advisor to the school board). Simultaneously, the mathematics involved (reasoning with tables and graphs) is sufficiently recognizable. The task is set up as such that all teams can start, but that there are also options for differentiation. There will especially be differences in the results of the final task in creativity, depth and the use of mathematics.

## Practical instructions

Your students will be working on a large open problem all day (ca. 5 hours) or during a sequence of lessons. This is probably new to them, and perhaps even to you, therefore we will give you the following practical tips and tools. See also the checklist with points of attention preceding the actual task.

- Set up teams (of three or four students) beforehand. Experience shows that teams that represent a diversity of qualities -e.g. in the field of: maths, writing, cooperation, management, monitoring the mood - usually delivering good work;
- make sure there is a sufficient number of copies of the appendices and a sufficient number of computers/laptops (at least one per team);
- make it an extraordinarily special activity;
- give a short central introduction at the beginning of the day on how to work, the breaks, and the moment to hand everything in. Then hand out the task;
- you could start on the task plenary by e.g. going over the points of attention together;
- stimulate the teams at regular intervals by checking on them and asking them how far they are;
- it might be necessary to point out to the teams that it is time to start on the report.

## The assessment

This task does not prescribe an assessment model. A diversity of methods can be used. We will provide three short descriptions, followed by a list of general points of interest for the assessment.

1. Take a look at the task with a colleague beforehand and set up an assessment model; define categories in which you assess the students and assign points to each category.
2. A bit more work, but comparable to the aforementioned, is designing a rubric; then you do not assign points per section, but you give a qualification to certain characteristics.
3. The simplest way is probably to globally go over the results first and to categorize them then in three or four categories (good, sufficient/moderate, insufficient); subsequently, you amplify your criteria and refine the format, so you can reach a final sequence; when you do not have too many papers and work together with a colleague, you could each make this format and compare them.

### Points of attention in assessing papers

The aim of assessment is reaching a classification in quality. This is best accomplished when certain criteria are formulated. The criteria for the assessment are divided in two categories. Firstly, there are a number of general criteria for the report in a paper with such an task, e.g.:

- Overall impression after glancing through, e.g.: layout, structure, ...;
- readability and spelling;
- professional use of language, e.g.: informative instead of narrative;
- supported by diagrams, graphs, drawings, etc., possibly in appendices;
- presence of useful remarks exceeding the direct solution of the problem.

Secondly, there are criteria that result from the content of the task, e.g.:

- The search process (strategy) is clearly documented;
- the assumptions are clearly stated;
- calculations and the use of graphs are correct;
- the points of attention with the final task are recognizably processed or there is indicated why this has not been taken into account;
- there is clearly indicated how the lower learning effectiveness of adolescents between 8:00 am and 10:00 am has been taken into account, e.g. in combination with the used graphs. NB students have to come up with a solution on their own, and support this;
- advantages and disadvantages of different schedules are clearly formulate and supported well;
- an advice is given, based on convincing arguments.

Depending on the personal preferences and/or consultation with colleagues criteria can be added or omitted and valuation factors can be used.

Good luck and enjoy the task!