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## Methodical suggestions for forming models during science and mathematics lessons

- At the beginning of the semester the teacher informs the pupil that he has to hand in a description of a model of a scientific/mathematical notion, proces or phenomenon .The teacher explains to the pupils what a model should look like , shows the models formed by other pupils , informs about the evaluation and criteria.
- The pupil can use explanation of any notion, process or phenomenon studied during this semester within this subject as a model.
- The teacher agrees with the pupils about the terms of handing in the task. It is optimal , if a pupil hands in a worksheet (1) no later than 2 weeks before the day of receiving the final semester mark.
- The teacher evaluates the worksheet (1) handed in by the pupil and writes his evaluation in the summary evaluation sheet (column 1-4). The teacher organizes theevaluation of the models in rhe class.Each pupil gets another pupil's model for evaluation. The pupil evaluates it and writes his evaluationand suggestions for improving in the worksheet (2) , hands it in to the teacher.
- The teacher evaluates the worksheets handed in by the pupils.
- The teacher organizes the discussion of the models in English.Only the pupils whose models are qualitative, scientifically correct and who expressed the wish to present their models take part in the discussion.It can be organized as a common event for several classes or the online conference for pupils of different schools.
- The teacher fills in the summary evaluation sheets completely and puts the mark earned by the pupil in e-register.

### Model evaluation criteria

| Position to be evaluated | Criteria |
|---|---|
| Theoretical basis of a model-worksheet (1) | • The used scientific/mathematical notion , process or phenomenon is correctly explained in the theoretical basis, the source of information is indicated correctly.- ***2 points.***<br>• There are some inaccuracies and /or the source of information is not indicated correctly – ***1 point.***<br>• There are essential drawbacks , the source of information is not indicated cijas avots – ***0 points.*** |
| The description of the association chosen for the model -worksheet (1) | • The everyday or natural object, process or phenomenon esentially and correctly reflects the scientific /mathematical notion, process or phenomenon, the author has described it logically and comprehensibly – ***2 points.***<br>• The everyday or natural object, process or phenomenon esentially and correctly reflects the scientific /mathematical notion, process or phenomenon, but the author has allowed some inessential drawbacks in the description . – ***1 point.***<br>• The everyday or natural object, process or phenomenon does not reflect the scientific /mathematical notion, process or phenomenon . – ***0 points.*** |
| The visual perceptibility-worksheet (1) | • The model is visually attractive, simple, easily perceptible , without unnecessary information and unneeded details. – ***2 points.***<br>• There are some inessential drawbacks which prevents to perceive the information at |

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| | once – ***1 point.***<br>• The information in the model is incomprehensible and unperceivable – ***0 points.*** |
| The originality of the association -worksheet (1 ) | • The everyday or natural object, process or phenomenon is chosen with imagination and untraditionally reflects the scientific /mathematical notion, process or phenomenon. – ***1 point.***<br>• The everyday or natural object, process or phenomenon is often used in explaining the scientific /mathematical notion, process or phenomenon. – ***0 points.*** |
| Translation of the model description in English | Pupils evaluate in the worksheet (2 ) – max. ***2 points.*** |
| The analysis of the model -worksheet (2) | • Adequate evaluation in each position in the worksheet (2)with comments if necessary.A – ***2 points*** *about each position to be evaluated*.<br>• The evaluation is incomplete and /or no comments given when necessary. ***- 1 point*** *for each position to be evaluated* .<br>• No evaluation – ***0 points*** *for each position to be evaluated* .<br>• Constructive suggestions written and the reason is given why they would improve the quality of the modelto be evaluated – ***2 points.***<br>• Suggestions are logical , but unfounded – ***1 point.***<br>• No ideas for improvement – ***0 points.*** |
| Presentation of the model in English | • The pupil expresses his own wish to present the model in English , takes part during the event , can give reason of the main idea of the model -2 ***points.***<br>• The pupil expresses his own wish to present the model in English , takes part during the event , but can give reason of the main idea of the model only partly – ***1 point.***<br>• The pupil takes part in the event only formally , does not give his opinioni – ***0 points.*** |

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