# Light

Reflection and refraction. What do I see in a mirror?

# SAILS inquiry and assessment unit overview

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| **Name** | Light |
| **Key content/concepts** | * Sources of light * Representation of how light travels * Shadows, and what determines the size of the shadow on a screen * Composition of white light, primary colours and the effect of filters * Reflection and image formation in plane mirrors * Refraction and image formation in lenses |
| **Level** | * Lower second level * Upper second level |
| **Inquiry skills assessed** | * Planning investigations * Developing hypotheses * Forming coherent arguments * Working collaboratively |
| **Assessment of scientific reasoning and scientific literacy** | * Scientific reasoning (making reasoned decisions) * Scientific literacy (explaining concepts scientifically) |
| **Assessment methods** | * Classroom dialogue * Teacher observation * Self-assessment * Worksheets |

Table 1: Rubric for the assessment of asking inquiry questions

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| --- | --- | --- | --- |
| **Inquiry skill** | **Level 1** | **Level 2** | **Level 3** |
| **Asking inquiry questions** | The student poses a number of questions, but does not make a distinction between questions possible to investigate and questions not possible to investigate | The student, with the support of others, revises questions, so that they become possible to investigate. | The student revises own or others’ questions, so that they become possible to investigate systematically. |

Table 2: Rubric for the assessment of developing hypotheses

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| --- | --- | --- | --- |
| **Inquiry skill** | **Level 1** | **Level 2** | **Level 3** |
| **Developing hypotheses** | The student formulates a prediction about what will happen, but does not explain why. | The student formulates a prediction about what will happen and explains why. The explanation builds on own (or others’) experiences. | The student formulates a hypothesis, that is, makes a prediction that is scientifically well-founded. |

Table 3: Rubric for the assessment of planning investigations

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| **Inquiry skill** | **Level 1** | **Level 2** | **Level 3** |
| **Planning investigations** | The student suggests how an investigation might be designed, but not in detail. | The student suggests how an investigation might be designed, but the design is incomplete in some respect (for instance by lacking some of the bullet points to the right). The design can, with some revisions, be used for systematic investigation | The student plans an investigation, where the design includes...  ...which variables to change and which to be held constant,  ...in which order to perform different parts of the investigation,  ...which equipment is to be used. |

Table 4: Rubric for the assessment of carrying out an investigation

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| --- | --- | --- | --- |
| **Inquiry skill** | **Level 1** | **Level 2** | **Level 3** |
| **Carrying out an investigation** | The student…  …carries out an investigation from the beginning to the end, but is in need of constant support by the teacher, peers, or detailed instructions.  …uses equipment, but may handle the equipment in a way that is not always safe.  …sporadically documents the investigation in writing and with pictures. | The student…  …carries out an investigation from the beginning to the end, but is sometimes in need of support by the teacher, peers, or detailed instructions.  …uses equipment safely.  …documents the investigation in writing and with pictures, but the documentation may be incomplete or lack in accuracy. | The student…  …carries out an investigation from the beginning to the end, either alone or as an active participant in a group.  …uses equipment safely and appropriately.  …accurately documents the investigation in writing and with pictures. |

Table 5: Rubric for the assessment of scientific reasoning (interpretation and conclusions)

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| **Inquiry skill** | **Level 1** | **Level 2** | **Level 3** |
| **Scientific reasoning (interpretation of results; forming conclusions)** | The student…  …draws conclusions, but only uses a limited amount of the results from the investigation.  …compares the results from the investigation with the hypothesis. | The student…  …draws conclusions based on the results from the investigation.  …compares the results from the investigation with the hypothesis. | The student…  …draws conclusions based on the results from the investigation.  …relates the conclusions to scientific concepts (or possibly models and theories).  …compares the results from the investigation with the hypothesis.  …reasons about different interpretation of the results. |

Table 6: Rubric for the assessment of scientific reasoning (observations)

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| **Inquiry skill** | **Level 1** | **Level 2** | **Level 3** |
| **Scientific reasoning (observations)** | The student…  …identifies easily observable properties among the objects studied | The student…  …identifies easily observable properties among the objects studied, as well as less obvious properties.  …uses several different properties to describe an object. | The student…  …identifies easily observable properties among the objects studied, as well as less obvious properties.  …uses several different and relevant properties to describe an object.  …makes use of more than one of the senses, and also makes use of appropriate technological aids, when observing objects. |