Grade 2
Structures and Mechanisms

Making a Toy

The Task

Students were asked to build a toy for a young child incorporating mechanisms and simple machines. Specifically they were to:

- clarify the problem;
- brainstorm some possible solutions;
- draw design sketches for three of the solutions;
- choose one sketch as their plan;
- design and build a model;
- test the model and make any necessary changes;
- reflect on their learning.

For the scenario and task instructions that were presented to students, see page 102.

Students submitted completed worksheets for assessment. Once they had completed their worksheets, they were asked to respond orally to questions posed by the teacher. These interviews were videotaped, and the videos were also used for assessment purposes. (A copy of the videotape is included with this document.)

Expectations

This task gave students the opportunity to demonstrate their achievement of all or part of each of the following selected overall and specific expectations from the strand Structures and Mechanisms: Grade 2 – Movement. (The codes that follow the expectations are from the Ministry of Education's *Curriculum Unit Planner*.)

Students will:

1. describe the position and movement of objects, and demonstrate an understanding of how simple mechanisms enable an object to move (2s66);
2. design and make simple mechanisms, and investigate their characteristics (2s67);
3. recognize that different mechanisms and systems move in different ways, and that the different types of movement determine the design and the method of production of these mechanisms and systems (2s68);
4. ask questions about and identify needs or problems related to structures and mechanisms, and explore possible answers and solutions (2s74);
5. plan investigations to answer some of these questions or solve some of these problems, and describe the steps involved (2s75);
6. communicate the procedures and results of investigations and explorations for specific purposes, using drawings, demonstrations, and oral and written descriptions (2s78).

Prior Knowledge and Skills

To complete this task, students were expected to have some knowledge or skills related to the following:

- attaching axles and wheels
- making hinges and other simple linkages
- recognizing different simple machines
- using a design-process model
- connecting parts to create movement in different ways and directions

In the teacher's notes and comments accompanying the student samples that follow, the examples cited are either from the student worksheets (indicated by a "P", for "print") or from the videotape (indicated by a "V").

For information on the process used to prepare students for the task and on the materials and equipment required, see the Teacher Package, reproduced on pages 102–109 of this document.

Task Rubric – Grade 2: Making a Toy

Expectations*	Level 1	Level 2	Level 3	Level 4
Understanding of Basic Concepts				
	The student:			
1	– demonstrates limited understanding of how mechanisms enable movement and changes in direction	– demonstrates some understanding of how mechanisms enable movement and changes in direction	– demonstrates general understanding of how mechanisms enable movement and changes in direction	– demonstrates thorough understanding of how mechanisms enable movement and changes in direction
Design Skills				
	The student:			
– identifying the problem/need **4, 5**	– describes with limited clarity the challenge of designing and building a model of a toy incorporating simple machines – lists a few of the steps needed to execute the plan	– describes with some clarity the challenge of designing and building a model of a toy incorporating simple machines – lists some of the steps needed to execute the plan	– clearly describes the challenge of designing and building a model of a toy incorporating simple machines – lists most of the steps needed to execute the plan	– precisely describes the challenge of designing and building a model of a toy incorporating simple machines – lists in a detailed manner all or almost all of the steps needed to execute the plan
– making the plan **5**	– creates a minimally labelled plan	– creates a partially labelled plan	– creates a fully labelled plan	– creates a detailed, fully labelled plan
– executing and evaluating the plan **2**	– makes a few modifications to the plan as needed	– makes some modifications to the plan as needed	– makes appropriate modifications to the plan as needed, giving reasons for the modifications	– makes appropriate, detailed modifications to the plan as needed, giving reasons for the modifications
	– creates a model that resembles the plan to a limited extent	– creates a model that resembles the plan to some extent	– creates a model that resembles the plan, including most recorded modifications	– creates a model that closely resembles the plan, including all or almost all recorded modifications
	– makes limited improvements to the model	– makes some improvements to the model	– makes considerable improvements to the model	– makes insightful improvements to the model

Expectations*	Level 1	Level 2	Level 3	Level 4
Communication of Required Knowledge				
	The student:			
6	– makes limited use of appropriate science and technology vocabulary to describe simple machines and their mechanisms – explains with limited clarity how the mechanism or simple machine is used to create movement, including changes in speed and direction – provides a simple explanation of how the toy could be used to improve fine-motor skills	– makes some use of appropriate science and technology vocabulary to describe simple machines and their mechanisms – explains with some clarity how the mechanism or simple machine is used to create movement, including changes in speed and direction – provides a somewhat clear explanation of how the toy could be used to improve fine-motor skills	– makes general use of appropriate science and technology vocabulary to describe simple machines and their mechanisms – explains clearly how the mechanism or simple machine is used to create movement, including changes in speed and direction – provides a clear explanation of how the toy could be used to improve fine-motor skills	– makes extensive use of appropriate science and technology vocabulary to describe simple machines and their mechanisms – explains precisely how the mechanism or simple machine is used to create movement, including changes in speed and direction – provides a complex and detailed explanation of how the toy could be used to improve fine-motor skills
Relating of Science and Technology to Each Other and to the World Outside the School				
	The student:			
3	– describes in limited detail similarities between the model and mechanisms and simple machines in real-life objects	– describes in some detail similarities between the model and mechanisms and simple machines in real-life objects	– describes in detail similarities between the model and mechanisms and simple machines in real-life objects	– describes in rich detail similarities between the model and mechanisms and simple machines in real-life objects

*The expectations that correspond to the numbers given in this chart are listed on page 58.

Note: This rubric does not include criteria for assessing student performance that falls below level 1.