ASSESSMENT OF SCIENCE AND TECHNOLOGY ACHIEVEMENT PROJECT (ASAP)

Science and Technology Exemplars

Grade 4: Earth and Space Systems – Rocks Minerals and Erosions

Exemplar Task (4ESPT01/Feb 2002)

Erosion

Preface

This task is one of a series developed by the Assessment of Science and Technology Achievement Project (ASAP) which is being used for the ASAP Science and Technology Exemplars Project.

This task is organised in three parts:

A. Task Overview
B. Student task sheet – designed to be photocopied for the students
C. Teacher Information – providing essential information relating specifically to this task

For further information, contact the ASAP office at 416-736-5006 or email: asap@edu.yorku.ca

Task Overview

Description of the Task:

> *This is a culminating activity designed to assess a cluster of expectations for this grade and strand. Students should have been taught the concepts and skills required to perform this task prior to attempting it.*
>
> *Students will investigate factors that cause erosion in specific areas, identify ways to control it and create a plan to reduce erosion when building roads*

Suggested Materials and Equipment:

scissors
tape
bristol board or display board
safety glasses

Suggested Timeline:

4 x 90 minutes

Suggested Grouping:

Groups of 2/3

Safety Considerations:

Students should take care when using scissors.

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## Student Task Sheets

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EROSION

Challenge:

You have been hired by a company to build a new road through a mountain pass. There are steep banks on either side of the proposed road. You must identify the types of erosion taking place throughout the seasons and develop methods to keep the road safe. Be prepared to present your proposal to the company on a display board.

For this task, consider:
➢ which seasonal changes take place
➢ how wind, rain, snow and ice would affect the landscape
➢ other environmental conditions which would affect the area
➢ types of diagrams, charts, or graphs you will need
➢ who your audience will be
➢ your presentation will be a display board

Steep bank

Road

Steep bank

Student Task Sheets
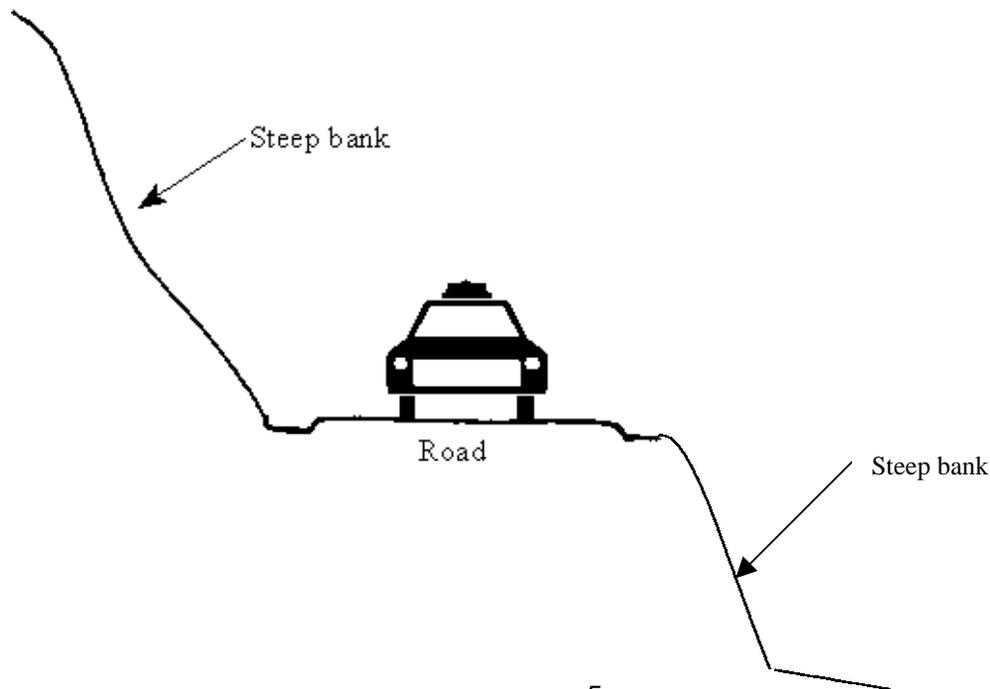
Suggested Layout of the Display Board:

Finding Out About Erosion	My Plan	Effects of Erosion on the Road
Finding out about wind erosion	**Place ideas for the road in the centre section. Using what you have found out about erosion, explain using words and pictures how you would reduce the erosion of this roadway. What do you think it will be the effects of these changes on the local plants, animals, and people?**	**Description or labeled drawing of the area around the road**
Finding out about rain/water erosion		**Conditions and changes that could occur to the road due to erosion**
Finding out about snow and ice erosion		

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Erosion
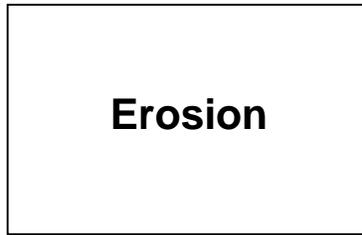
Teacher Information Sheets

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Expectations

This task addresses the following cluster of expectations. Expectations assessed by the rubric are highlighted in bold.

Understanding Basic Concepts

- **describe the effect of wind, water, and ice on the landscape, and identify natural phenomena that cause rapid and significant changes in the landscape**

Developing Skills of Inquiry, Design and Communication

- **formulate questions about and identify needs and problems related to objects and events in the environment, and explore possible answers and solutions**
- **use appropriate vocabulary, including correct science and technology terminology, in describing their investigations and observations**
- **communicate the procedures and results of investigations for specific purposes and true specific audiences, using media works, oral presentations, written notes, and descriptions, drawings, and charts**

Relating Science and Technology to the World Outside the School

- **identify ways in which soil erosion can be controlled or minimised, and create a plan for reducing erosion of soil in a local field or plot**
- **determine positive and negative effects of human alteration of the landscape**

Prior Knowledge Required:
Before attempting this task students should have been taught the following:

- the effects of wind, water and ice on the landscape
- about natural phenomena that can cause rapid and significant changes in the landscape e.g., floods, tornadoes, heavy rainstorms
- ways that soil erosion can be controlled or minimized e.g., planting trees, building retaining walls

Students should be familiar with the following science and technology terminology:
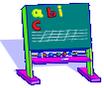
Erosion, weathering

Prior Skills Required:
Before attempting this task students should have experience of the following:

- designing building and testing their own systems
- use of tools and equipment safely and appropriately
- compiling data and presenting results

Suggested Introductory Activities:
The following activities are suggested to introduce this task to the students:

- discuss the activity and brainstorm as a class, the types of erosion taking place and how it could be prevented
- recap ways of preventing soil erosion on chart paper
- clarify details of their presentation and what it should contain e.g., charts, scientific information

Cross-strand Links:

Every strand in the Science and Technology document has a common set of expectations clustered under the title ***Developing Skills of Inquiry, Design and Communication.*** This task is therefore appropriate to assess and evaluate these skills for every Grade 4 strand.

Cross-curricular Links:

This activity provides an opportunity for students to be assessed and evaluated on their ability to work cooperatively as part of a group. Students should be made aware that this will be an integral part of the evaluation and should have prior experience of working with a group before being assessed. This provides a cross-curricular link with *The Ontario Curriculum Grades 1-8 Language*, Grade 4: Oral and Visual Communication - Group Skills.
Links could also be made to *The Ontario Curriculum, Social Studies, Grade 4:* Provinces and Territories expectations:
• identify the characteristics of the physical regions of Ontario
• identify the physical regions of Canada
• describe and compare the physical environments of these regions

Reading and Writing Skills:

This task has been constructed to take into account the possible limited reading and writing skills of some students at this grade level. At the end of Grade 4 students are expected to be able to write a sentence (see MET Writing Exemplars 1999). Depending on the achievement level of the children in the class and the time in the school year that this task is administered, teachers will need to take into account the diverse abilities in their classes. The task could be presented orally and evaluated through teacher/student conferences.

Considerations for Combined Grade Classes:

Appropriate strategies are as follows:

• Teach one grade while the other grade completes the task which does not require active teacher guidance
• Create separate learning centers for student investigation specific to each grade topic and strand. The methods of science and technology (inquiry and communication) would provide the whole class focus
• Introduce self-directed student activities connected to specific expectations
• Reorganize students into grade groupings for the purposes of teaching a given topic
• Teach specific grade expectations when part of the class is working with another teacher
• Make thematic connections by clustering the overall expectations around a unifying organizer such as "Form and Function".

RUBRIC FOR GRADE 4: Erosion

Knowledge/Skills	Level 1 The Student:	Level 2 The Student:	Level 3 The Student:	Level 4 The Student:
Understanding of basic concepts • describe effects of wind, water and ice on the roadway	• shows limited understanding of the concepts of erosion	• shows some understanding of the concepts of erosion	• shows nearly complete understanding of the concepts of erosion	• shows cpmplete understanding of the concepts of erosion
Inquiry skills • Identify needs and problems and explore possible solutions to soil erosion (e.g. asks questions, researches erosion, plans investigation, and reports on findings.)	• demonstrates limited knowledge of the skills and strategies of inquiry	• demonstrates some knowledge of the skills and strategies of inquiry	• demonstrates knowledge of the skills and strategies of inquiry	• demonstrates detailed knowledge of the skills and strategies of inquiry
Communication of required knowledge • clarity and precision of work • use of appropriate science and technology terminology	• presents a limited number of ideas and details with little clarity • includes few terms in context	• presents some ideas and details with some clarity • includes some terminology in context	• presents most of the main ideas and details clearly • includes mostly terminology in context	• presents all of the main ideas clearly and precisely • includes all terminology in context
Relating science and technology to each other and the world outside the school • identify ways soil erosion can be minimized along the roadway • identifies the effects of human alteration of the landscape	• provides simple solutions and the effects of those solutions	• provides partial solutions and the effects of those solutions	• provides detailed solutions and the effects of those solutions	• provides complex solutions and the effects of those solutions