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ASSESSMENT OF SCIENCE AND TECHNOLOGY ACHIEVEMENT PROJECT (ASAP)

Science and Technology Exemplars

Grade 3: Earth and Space Systems – Soils in the Environment

Exemplar Task (3ESPT01/Aug 2000)

Growing Healthy Plants



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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 416-736-5269 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.

In this task students will conduct an inquiry to determine which soil type is best suited for the growing conditions of specific plants



Materials and Equipment Required

Per group:

sieve (can be made by poking holes into a margarine container)
magnifying glass
4 coffee filters
funnel
water
scoop or spoon
measuring cup or spoon
4 containers (approx. 150 ml)
4 soil samples – a) sand, b) potting compost, c) soil from schoolyard, d) mixture of sand, potting compost and gravel



Suggested Timeline:

Planning – 2 x 30 minutes
Inquiry – 60 – 120 minutes
Reporting – 2 x 30 minutes



Suggested Grouping:

Groups of 3/4

Safety Considerations:



- Care with water spillage
- Washing hands after using soils
- Care with work area
- Care with tools and equipment.

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Student Task Sheets

Growing Healthy Plants!

A garden centre near you sells geraniums.

The garden centre wants to pot the plants before they are sold.

Look at the four types of soil they could use. Your group has been asked to investigate which soil would be best to use.

1. My Prediction:

Which type of soil do you think will be best?

Explain your thinking.

2. My Plan:

Use words and pictures to tell how you will investigate the soils.

3. My Results:

Complete this chart to show what you found.

Soils	Different materials (if any)	Does it hold water?	Describe the texture	What living things do you see, if any
Sand				
Potting Compost				
Schoolyard Soil				
Mixture				

4. Which soil do you think the garden centre should use?

5. Explain why you think this.

1. **Circle** the things in this list that are soil:

sand



wood



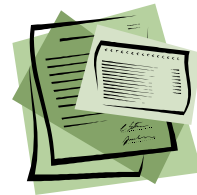
humus



clay



paper



plastic



gravel



pebble



glass



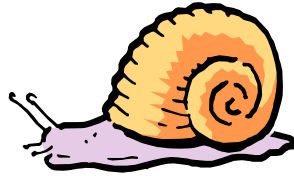
peat



7. Circle below the living things you could find in soil.



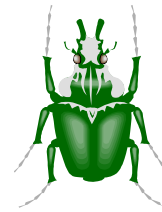
worm



snail



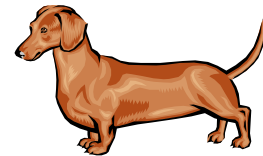
mouse



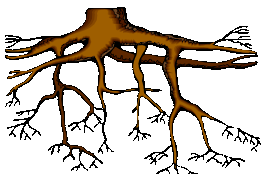
beetle



slug



dog



root



larvae

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Teacher Information Sheets

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



Understanding Basic Concepts

- **describe using their observations, the various components within a sample of soil (e.g., pebbles, decaying plants)**
- describe, using their observations, the differences between sand, clay, humus, and other soil components (e.g., texture, smell, malleability), and compare and describe soil samples from different locations (e.g., school yard, forest, marsh, beach)
- **compare the absorption of water by different earth materials, and describe the effects of moisture on characteristics of the materials (e.g., on texture, coherence, ability to hold a shape)**
- describe through experimentation how soil can be separated into its different components (e.g., sieving, sedimentation)



Developing Skills of Inquiry, Design and Communication

- **plan investigations to answer some of these questions or find ways of meeting these needs, and explain the steps involved**
- **use appropriate vocabulary in describing their investigations, explorations, and observations (e.g., use terms such as *clay*, *sand*, and *pebbles* to describe the earth materials in soil)**
- **record relevant observations, findings, and measurements, using written language, charts, and drawings (e.g., create a tally chart to record the water absorption of different earth materials)**
- **communicate the procedures and the results of investigation for specific purposes and to specific audiences, using drawings, demonstrations, simple media works, and oral written descriptions (e.g., record what happens when soil and water are shaken together in a container; prepare a display comparing the composition of soils for different locations)**



Relating Science and Technology to the World Outside the School

- **identify living things found in the soil (e.g., roots, earth worms, larvae)**
- **recognize the importance of understanding different types of soil and their characteristics (e.g., enables people to determine which crops can be grown in a particular area enables gardeners and farmers to improve plant growth)**
- **describe how the use of different soils affects the growth of indoor plants**



Prior Knowledge Required:

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

- to identify different components of soil e.g., pebbles, decaying plants, sand etc.
- the difference between sand, clay, humus and other soils
- the types of soil that are best for plants
- living things that are found in soils



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

clay, sand, humus, texture, peat, pebbles, gravel, compost



Prior Skills Required:

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

- working in groups
- planning and carrying out investigations



Suggested Introductory Activities:

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

- read the scenario aloud to the class
- demonstrate the four samples of soil to the class and discuss the characteristics of each
- brainstorm predictions and reasons for the best type of soil
- recap components of soil on chart paper
- discuss ways of testing the soil – use the recording chart as a guideline



Cross-strand Links:

Every strand in the Science and Technology document has 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 3 strand.

Links can also be made to Grade 3 Life Systems – Growth and Changes in plants



Cross-curricular Links:

Links can be made to *The Ontario Curriculum Grades 1-8 Language Oral and Visual Communication: Grade 3*. The expectation that could be addressed is:

- contribute ideas appropriate to the topic in group discussion and listen to the ideas of others

Links can be made to *The Ontario Curriculum Grade 1-8 Math – Measurement and Data Management: Grade 3*. The expectations that could be addressed are:

- estimate, read, and record temperature to the nearest Celsius
- use mathematical language (e.g., possible, impossible) in discussion to describe probability
- collect and organize data
- predict the probability that an event will occur

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 Three 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. Teachers could use the questions on the student task sheet to guide their conferences. Students could make oral presentations about their observations to the class. Their presentation could be based upon the questions outlined in the student task sheet. Grade 5/6 students could act as reading/writing buddies to read out questions and transcribe answers.



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”.

DRAFT RUBRIC FOR GRADE 3: Growing Healthy Plants

Knowledge/Skills		Level 1	Level 2	Level 3	Level 4
Understanding of Basic Concepts <ul style="list-style-type: none"> describe the various components of soil compare absorption of water by different earth materials 		The Student: <ul style="list-style-type: none"> gives simple descriptions and explanations that shows limited understanding 	The Student: <ul style="list-style-type: none"> gives partial descriptions and explanations that shows some understanding 	The Student: <ul style="list-style-type: none"> gives nearly complete descriptions and explanations that shows good understanding 	The Student: <ul style="list-style-type: none"> gives complete descriptions and explanations that shows detailed understanding
S K I L L S	a) Inquiry Skills <ul style="list-style-type: none"> developing and following a plan safe use of equipment carries out fair test 	The Student: <ul style="list-style-type: none"> develops and follows a limited plan needs frequent reminders about safety tests appropriately only with assistance 	The Student: <ul style="list-style-type: none"> develops and follows an adequate plan needs some reminders about safety tests appropriately with some assistance 	The Student: <ul style="list-style-type: none"> develops and follows an appropriate plan needs few reminders about safety tests appropriately with little assistance 	The Student: <ul style="list-style-type: none"> develops and follows an appropriate, detailed plan needs no reminders about safety tests appropriately with no assistance
	or				
b) Design Skills					
Communication of Required Knowledge <ul style="list-style-type: none"> clarity and precision of work use of appropriate science and technology terminology 		The Student: <ul style="list-style-type: none"> presents a limited number of ideas and details with little clarity includes few appropriate terminology 	The Student: <ul style="list-style-type: none"> present some ideas and details with some clarity includes some appropriate terminology 	The Student: <ul style="list-style-type: none"> presents most of the main ideas and details clearly includes mostly appropriate terminology 	The Student: <ul style="list-style-type: none"> presents all of the main ideas clearly and precisely includes all appropriate terminology
Relating Science and Technology to each other and the World Outside the School <ul style="list-style-type: none"> identifies living things found in the soil 		The Student: <ul style="list-style-type: none"> identifies few 	The Student: <ul style="list-style-type: none"> identifies some 	The Student: <ul style="list-style-type: none"> identifies most 	The Student: <ul style="list-style-type: none"> identifies all

