



YSISTE

ASSESSMENT OF SCIENCE AND TECHNOLOGY ACHIEVEMENT PROJECT (ASAP)

Science and Technology Exemplars

Grade 2: Matter and Materials – Properties of Liquids and Solids

Exemplar Task (2MMPT04/Aug 2000)

Exploring Ice



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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.

Students will investigate the three states of water, properties of liquids and solids and dissolving solids in this inquiry.



Materials and Equipment Required:

ice cubes	kettle
sugar	sand
cooking oil	plastic beakers/plastic cups
stir sticks	thermometers



Suggested Timeline:

20 x 60 minutes



Suggested Grouping:

pair/share or groups of three



Safety Considerations:

- boiling water in kettle should be demonstrated by teacher

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Exploring Ice

Student Task Sheets

You make a cool drink in the summer. To keep the drink cool, you put ice cubes in the drink. When you finish the drink, the ice cubes are gone. Where do the ice cubes go?

Use some ice cubes to carry out an investigation.

Put the ice and thermometer in the beaker.

1. Draw and label the ice, beaker and thermometer



2. Explain what **ice** is;

Put your beaker in a warm place for 20 minutes.

3. What do you think will happen to the ice?

4. What do you think will happen to the thermometer?

Watch your teacher boiling the kettle.

5. What happens to the water when it boils?

Watch your teacher put a spoonful of sugar in water.

6. What happens to the sugar?

Watch your teacher put a spoonful of sand in water.

7. What happens to the sand?

Look at the oil and look at the water

8. Write some words in these boxes to show how oil is the **same** as water, and how it is **different**.

Same	Different

We use liquids at home.

8. Look at the pictures below.

Write the name of each liquid and tell how it is used.



Name of Liquid _____

How is it used? _____



Name of Liquid _____

How is it used? _____



Name of Liquid _____

How is it used? _____

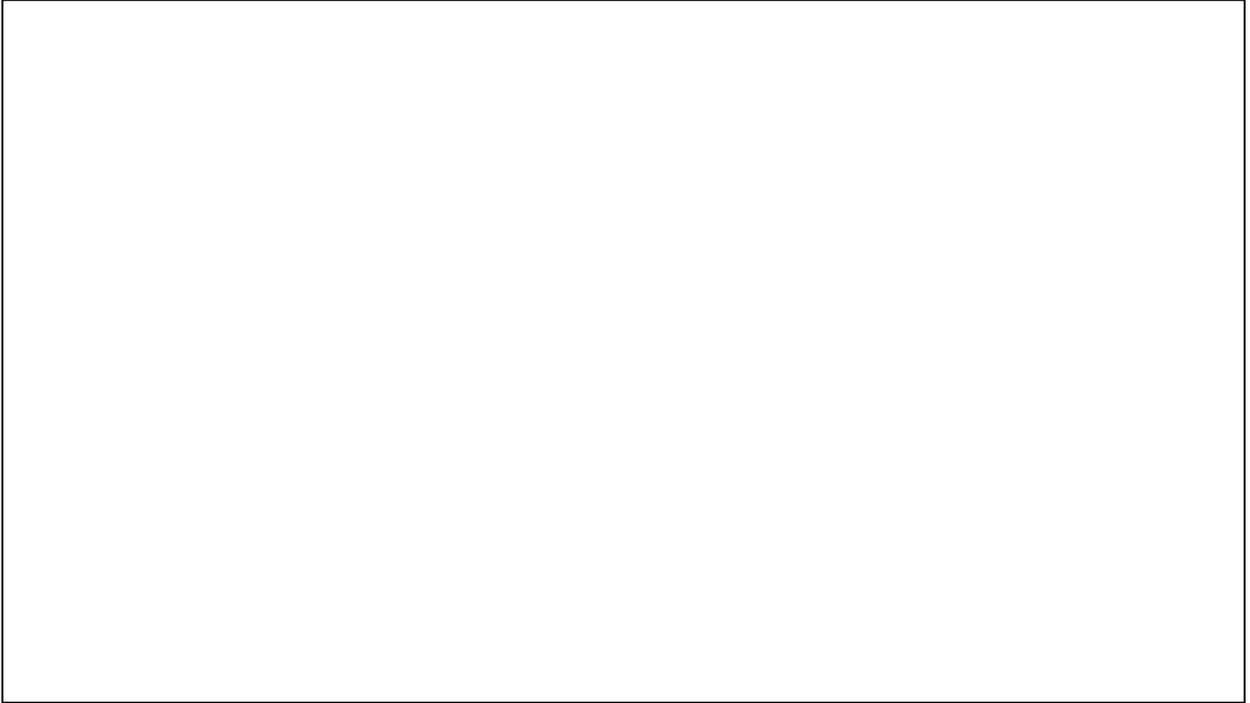


Name of Liquid _____

How is it used? _____

Now collect your beakers and look at your ice.

10. Draw your beaker and its contents



11. What has happened to the ice?

12. Why did this happen?

13. How could you turn the water back to ice?

14. How is the water different from the ice?

You have used liquids and solids to do this investigation.

Look at these words and pictures. Draw a **circle** around the solids and a **square** around liquids.

sand

honey

air

beaker

water

glass

petrol

ice

cake

sugar

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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 the properties of liquids and solids, using their observations
- distinguish between solids that dissolve in water, and identify the conditions that cause changes from one state to another (e.g., water turns to ice when placed in a freezer)
- identify reversible changes in materials (e.g., the changing of ice to water)



Developing Skills of Inquiry, Design and Communication

- ask questions about and identify needs and problems related to the use of liquids and solids, and explore possible answers and solutions (e.g., devise and explain a plan to build a model raft; predict changes that will occur when ice or water is heated or cooled)
- plan investigations to answer some of these questions or solve some of these problems, and describe the steps involved
- use appropriate vocabulary in describing their investigations, explorations, and observations (e.g., use such words as *clear runny*, and *greasy* when describing liquids, and *granular*, *hard*, and *opaque* when describing solids)
- record relevant observations, findings and measurements, using written language, drawings, charts, and concrete materials (e.g., record data from experimentation with liquids and solid on a chart; list characteristics of different liquids that they have observed)



Relating Science and Technology to the World Outside the School

- compare the properties of liquids with those of solids to determine which materials take the shape of their container (e.g., water will fill a margarine container completely but ice cubes will leave spaces)
- compare the properties of water with the properties of at least one other liquid (e.g., detergent, oil, molasses)
- identify liquids used in the home and describe how they are used (e.g., milk for drinking and cooking; detergent for cleaning)
- identify objects in the immediate environment as solids (e.g., sand, ice, rocks) or liquids (e.g., milk, vinegar, water)



Prior Knowledge Required:

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

- the difference between solids and liquids
- how solids or liquids remain constant in specific circumstances e.g., solid remain solid when broken and liquid remain liquid when poured
- types of solid that dissolve in water and those that do not e.g. sugar dissolves in water, sand does not
- the importance of liquids and solids in our daily lives



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

runny, greasy, temperature, thermometer, solid, liquid, ice, water, steam, gas, dissolve, melted frozen



Prior Skills Required:

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

- working in groups co-operatively
- planning and carrying out investigations



Suggested Introductory Activities:

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

- read the task aloud to the students
- demonstrate the ice cubes in the beaker and brainstorm as a class what will happen to them – as a class answer questions 1, 2, 3 and 4
- demonstrate the kettle and allow the students to write the answers
- demonstrate the sand and sugar and allow the students to write answers
- give groups of students the oil and water to compare and record in chart



Cross-strand Links:

Links can be made to Earth and Space Systems. The expectations that could be addressed are:

- recognise that water exists in three states on earth
- describe the different uses of water and identify some that are essential for maintaining our health
- 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 2 strand.



Cross-curricular Links:

Links can be made to *The Ontario Curriculum Grades 1-8 Mathematics* Measurement: Grade 2. The expectations that can be addressed are:

- relate changes in temperature to their own experiences
 - use a thermometer to determine whether temperature is rising or falling
- Data Management and Probability: Grade 2. The expectation that can be addressed is:
- organise data using graphic organisers

Links can also be made to *The Ontario Curriculum Grades 1-8 Language* Oral and Visual Communication: Grade 2. The expectations that can be addressed are:

- participate in group discussions, demonstrating a sense of when to speak, when to listen and how much to say
- use speech appropriately for various purposes



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 Two 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 2: Exploring Ice

Knowledge/Skills		Level 1	Level 2	Level 3	Level 4
Understanding of Basic Concepts <ul style="list-style-type: none"> describe the properties of liquids and solids distinguish between solids that dissolve in water identify reversible changes in materials 		The Student: <ul style="list-style-type: none"> gives simple explanation that shows limited understanding 	The Student: <ul style="list-style-type: none"> gives partial explanation that shows some understanding 	The Student: <ul style="list-style-type: none"> gives nearly complete explanation that shows good understanding 	The Student: <ul style="list-style-type: none"> gives complete explanation that shows detailed understanding
S K I L L S	a) Inquiry Skills				
	<div style="border: 1px solid black; padding: 2px; display: inline-block;">or</div>	The Student: <ul style="list-style-type: none"> develops and follows a limited plan records simple observations with limited clarity 	The Student: <ul style="list-style-type: none"> develops and follows an adequate plan records observations with some clarity 	The Student: <ul style="list-style-type: none"> develops and follows an appropriate plan records observations with clarity and some detail 	The Student: <ul style="list-style-type: none"> develops and follows an appropriate, detailed plan records detailed observations with clarity and precision
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"> presents 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"> compare properties of liquids with those of solids identify liquids used in home identify objects as solids 		The Student: <ul style="list-style-type: none"> provides simple description 	The Student: <ul style="list-style-type: none"> provides partially detailed description 	The Student: <ul style="list-style-type: none"> provides detailed description 	The Student: <ul style="list-style-type: none"> provides complex description

