

ASSESSMENT OF SCIENCE AND TECHNOLOGY ACHIEVEMENT PROJECT (ASAP)

Science and Technology Exemplars

Grade 1: Matter and Materials – Characteristics of Objects and Properties of Materials

Exemplar Task (1MMPT01/Feb 2002)

Watery Paper



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Preface

This task is one of a series developed by the Assessment of Science and Technology Achievement Project (ASAP) that 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.

In this task students will conduct an investigation to determine that the properties of materials are important when deciding which paper to choose for a specific purpose. After their investigation, students will design and construct a boat from their choice of paper to see if it will float for one minute.

Suggested Materials and Equipment:



For each group:

4 different kinds of paper construction paper, card, paper towel, waxed paper
measuring spoon or eye dropper – (for dropping water onto paper)
water
tray
paper fasteners
paper cups
instructions for boat building
scissors
5 pennies



Suggested Timeline:

Planning – 2 x 30 minutes
Building – 3 x 30 minutes
Testing and Reporting 2 x 30 minutes



Suggested Grouping:

Pair/share
each child should make their own boat



Safety Considerations:

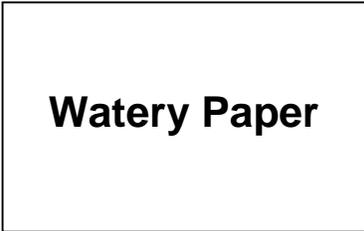
- students are not to mouth draw water using straws to drop water onto paper for testing.
- care should taken with sharp objects and scissors

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Student Task Sheets

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Watery Paper

You have to build a paper boat that floats for one minute.
You have 4 kinds of paper to choose from.

Part A

My Prediction:

Look at the four kinds of paper. Which paper do you think will be best to build your boat? Glue a piece of that paper here:



Explain why you think this paper is best to build your boat.

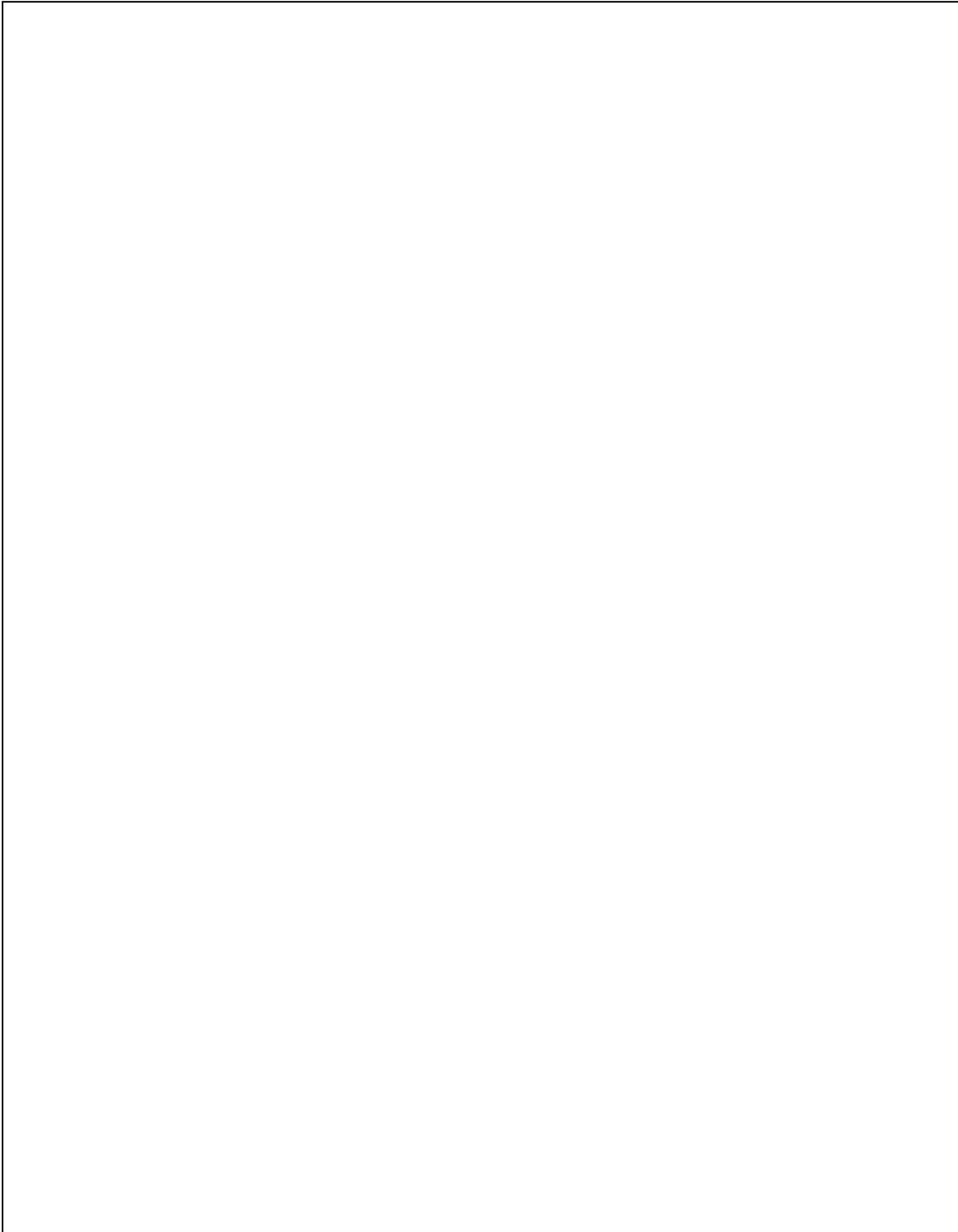
Procedure

Put water onto each kind of paper using an eyedropper. Show what happens in this chart.

Paper	What happened when water was put onto paper
Waxed Paper	
Paper Towel	
Construction Paper	
Card Paper	

Results

Glue a piece of the best paper here for building the boat:

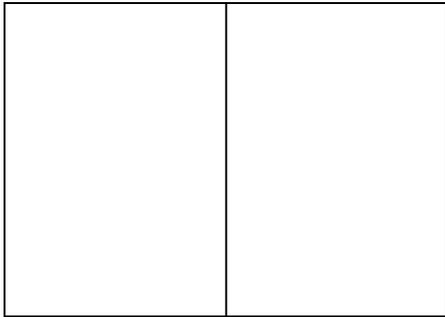
A large, empty rectangular box with a thin black border, intended for students to paste a piece of paper for building a boat.

RUBRIC FOR Grade 1: Watery Paper

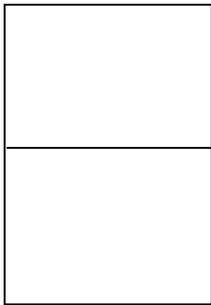
Build the boat

Take a piece of the paper you considered best and build your boat.

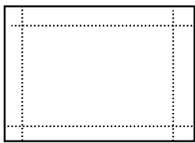
1. Take a piece of paper and cut it in half.



2. Take half and cut it in half, length-wise.



3. Fold along the edges like this



4. Fasten the corners to make a flat bottomed boat

5. Place 5 pennies into the boat before floating

6. Float the boat in water and time it for 1 minute.

7. List objects that are made of the 4 types of paper used in this task

Paper

What objects are made from this type of paper

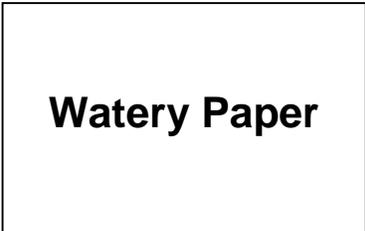
Waxed Paper	
Paper Towel	
Construction Paper	
Card Paper	

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Watery Paper

Teacher Information Sheets

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



Understanding Basic Concepts

- **identify properties of materials that are important to the purpose and function of the objects that are made from them (e.g., the flexibility of plastic makes plastic wrap useful for covering food in order to keep it fresh)**



Developing Skills of Inquiry, Design and Communication

- **ask questions about and identify needs and problems related to objects and materials, and explore possible answers and solutions (e.g., test materials to determine which ones insulate more efficiently; test different fabrics to determine which are waterproof)**
- **use appropriate vocabulary in describing their investigations, explorations, and observations (e.g., use words such as *soft, smooth, rough, and sticky* when describing textures)**
- **record relevant observations, findings, and measurements, using written language, drawings, charts, and concrete materials (e.g., make a display board and record the results of their testing of chalk of different materials)**
- **communicate the procedures and results of investigations for specific purposes, using demonstrations, drawings, and oral and written descriptions (e.g., display examples of materials tested and indicate which ones were best for writing on).**



Relating Science and Technology to the World Outside the School

- **Identify, through observation, the same material in different objects**



Prior Knowledge Required:

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

- the properties of materials e.g., shiny, soft, see-through, waxy
- the properties of materials that are important to the purpose and function of items e.g., paper can be folded
- materials that can be used to fasten
- how objects can be reused in daily activities e.g., plastic containers to store food



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

Smooth, shiny, flexible, waterproof



Prior Skills Required:

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

- constructing using paper
- working co-operatively in groups
- planning and carrying out investigations



Suggested Introductory Activities:

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

- read the instructions to the students
- demonstrate the four different types of paper
- brainstorm which paper would be best for building a boat as a class
- brainstorm and list reasons for this choice on chart paper
- demonstrate how to drop water onto paper to test it
- demonstrate how to fold the boat (could be done as a whole class)



Cross-strand Links:

Link can be made to Grade 1 Structures and Mechanisms, the specific expectations that can be assessed with this task are:

- explain the function of different structures
 - use appropriate natural and manufactured structures to make structures
 - explain the function of a structure they have made and describe how they made it
 - identify structures whose function is indicated by their shape
 - examine different kinds of fasteners and indicate where they are used
 - choosing materials; safely and accurately using appropriate tools and materials to construct their boats
-
- 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 1



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 team. 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 1: Oral and Visual Communication – Group Skills.



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 One students are expected to be able to write a simple 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 paper boats 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

Grade 1: Watery Paper

- 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 1: Watery Paper

Knowledge/Skills	Level 1 The Student:	Level 2 The Student:	Level 3 The Student:	Level 4 The Student:
Understanding of Basic Concepts <ul style="list-style-type: none"> identify properties of materials that are important to their purpose and function 	<ul style="list-style-type: none"> gives simple explanation that shows limited understanding 	<ul style="list-style-type: none"> gives partial explanation 	<ul style="list-style-type: none"> gives nearly complete explanation 	<ul style="list-style-type: none"> gives complete and detailed explanation
Inquiry Skills <ul style="list-style-type: none"> observes, chooses materials, follows a plan, tests, records and reports uses materials and equipment safely 	<ul style="list-style-type: none"> demonstrates few of the skills and strategies of inquiry needs frequent reminders about safety 	<ul style="list-style-type: none"> demonstrates some of the skills and strategies of inquiry needs some reminders about safety 	<ul style="list-style-type: none"> demonstrates most of the skills and strategies of inquiry needs occasional reminders about safety 	<ul style="list-style-type: none"> demonstrates all of the skills and strategies of inquiry needs no reminders about safety
Communication of Required Knowledge <ul style="list-style-type: none"> clarity and precision of the written report use of science and technology terminology 	<ul style="list-style-type: none"> presents a limited number of ideas and details with little clarity contains few terms in context 	<ul style="list-style-type: none"> presents some ideas and details with some clarity contains some terminology in context 	<ul style="list-style-type: none"> presents most of the main ideas and details clearly contains most terminology in context 	<ul style="list-style-type: none"> presents all of the main ideas clearly and precisely contains all terminology in context
Relating Science and Technology to each other and the World Outside the School <ul style="list-style-type: none"> Identify, through observation, the same material in different objects 	<ul style="list-style-type: none"> Identifies one object for one material 	<ul style="list-style-type: none"> Identifies one object for two materials 	<ul style="list-style-type: none"> Identifies one object each material 	<ul style="list-style-type: none"> Identifies more than one object each material