



YSISTE

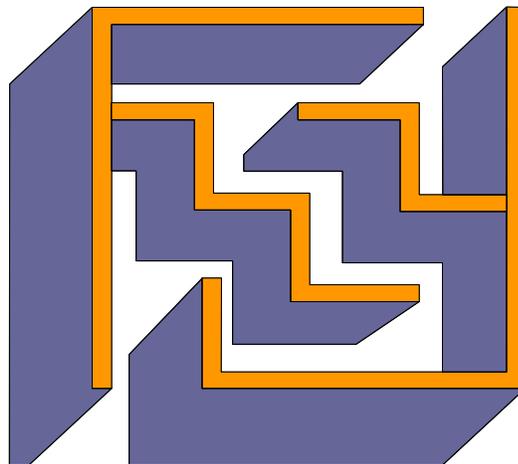
ASSESSMENT OF SCIENCE AND TECHNOLOGY ACHIEVEMENT PROJECT (ASAP)

Science and Technology Exemplars

Grade 3: Matter and Materials – Magnetic and Charged Materials

Exemplar Task (3MMPT04/Mar 27, 2001)

It's A-maze-ing!



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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 design and construct a maze and use magnetic force to move an object through.



Materials and Equipment Required:

plywood sheet	popsicle sticks
cardboard/bristol board/file folder	cotton balls
plasticine	pen/pencils
fabric	plastic bottles
construction paper	glue
paper clips	film canisters
magnets	pizza box
scissors	foam core



Suggested Timeline:

5 x 60 minutes



Suggested Grouping:

- Task to be completed in groups of 2 or 3
- Task report to be completed individually

Safety Considerations:



Care required with equipment e.g., scissors
The teacher must closely supervise students if a glue gun is used

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Student Task Sheets

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It's A-maze-ing!

Design and build a maze.

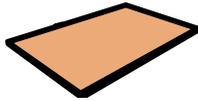
Then use a magnetic force to move a paper clip through the maze.

Activity #1:

Circle the things you will use to build your maze.



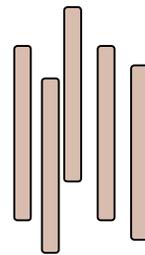
scissors



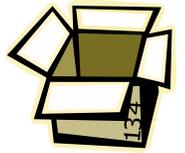
plywood sheet



magnet



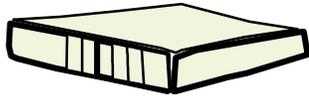
popsicle sticks



cardboard



fabric



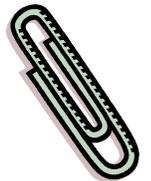
pizza box



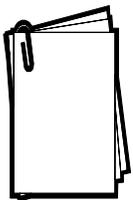
pens/pencils



cotton balls



paperclip



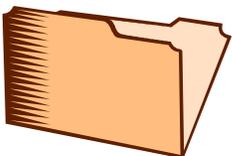
paper



glue



construction paper



file folder



plasticine



film canister



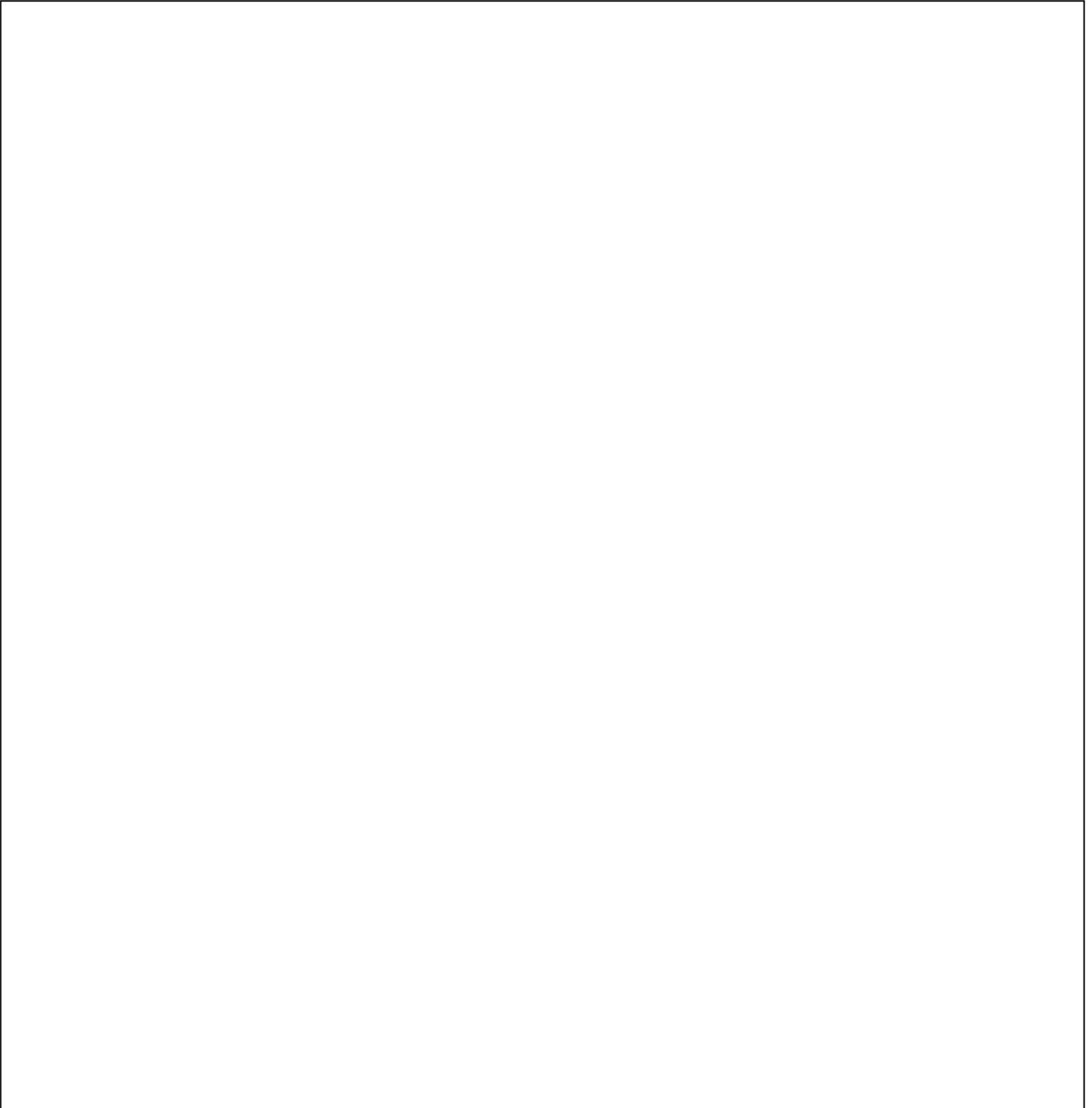
plastic bottles

Activity #2:

1. Use words and pictures to tell how you will make the maze.

Activity #3:

1. Build and test your maze.
2. Draw a top view picture of your maze. Label the materials you used to make the maze including the paperclip and the magnet.



3. Does your maze work? _____

4. Did you make changes to your maze? _____

5. Explain your answer _____

.

Activity #4

Circle below the things that use magnets to work



kitchen cupboards



tree



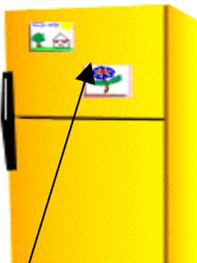
chair



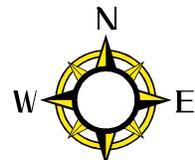
magnetic crane



pen



refrigerator magnet



compass

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Science and Technology Exemplars Project

Grade 3: Matter and Materials – Magnetic and Charged Materials

Exemplar Task (3MMPT04/Mar 27, 2001)

A rectangular box with a thin black border, centered on the page. Inside the box, the text "It's A-maze-ing!" is written in a bold, black, sans-serif font.

Teacher Information Sheets

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SPICE Model

The second goal of Science and Technology Education encourages students to develop the skills, strategies, and habits of mind for scientific inquiry and technological design. As students' design, construct and test devices to solve problems through the technological design approach, it is important that they accommodate the attributes of the design process similar to the SPICE Model as follows:

- S** – Situation – The situation or context provides an opportunity for something to be designed. It is the setting of the problem. Observe the scene and question.
- P** – Problem – The problem defines what is going to be solved using the phrase “Design and Make a ...”
This statement tells us clearly what is going to be built
- I** – Investigation – This step requires the problem to be brainstormed. Several different ideas should be explored. Identify the requirements, the available resources and the restrictions. Sketches are an effective way of brainstorming.
- C** - Construction – The construction step requires the problem’s solution in the form of a model to be built from real materials. List of materials can be generated and procedures established. Plan adequately and make the model safely
- E** – Evaluation – The evaluation is the testing and inspection of the model to see if it works to solve the problem. Look back at the problem and reflect on the achievements. Consider any improvement

By permission of Goeff Day

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



Understanding Basic Concepts

- **identify materials that can be placed between a magnet and an attracted object without diminishing the strength of the attraction (e.g., construction paper)**



Developing Skills of Inquiry, Design and Communication

- **design and construct a system that uses magnetic force to move an object (e.g., create a boat that holds papers clips, and move it through water using a magnet)**
- **communicate the procedures and results of investigation of specific purposes and to specific audiences, using demonstrations, drawings, simple media works and oral and written descriptions (e.g., demonstrate how an object moves through a magnetic maze they have created)**



Relating Science and Technology to the World Outside the School

- **identify uses of magnets in familiar things (refrigerator magnets, compasses, door seal and a refrigerator, magnetic catches on cupboards)**



Prior Knowledge Required:

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

- which materials can be placed between a magnet and an object



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

magnetic, force, attract, repel, north pole, south pole



Prior Skills Required:

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

- designing and constructing their own structures/devices
- draw and label top view and side view sketches of an object



Suggested Introductory Activities:

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

- brainstorm ideas about mazes and possible ideas for their design
- review learning about magnets



Cross-strand Links:

This task can be linked to Grade 3 Energy and Control. The expectations that could be addressed are:

- investigate the ways in which different forces can change the speed or direction of a moving object
- investigate the effects of magnets and electrically charged objects on the motion of different materials
- distinguish between kinds of motion and indicate whether the motion is caused indirectly or directly
- design and construct a device that uses a specific form of energy in order to move

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.



Cross-curricular Links:

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

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

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

- select the most appropriate unit of measure to measure length (centimetre, metre, kilometre)
- estimate, measure, and record linear dimensions of objects (using centimetre, metre, kilometre)
- estimate, measure, and record the mass of familiar objects using standard units (gram, kilogram)

Links can be made to *The Ontario Curriculum Grades 1-8 Visual Art-Creative Work: Grade 3*. The expectations that could be addressed are:

- use art tools, materials and techniques correctly to create different effects



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 connections by clustering the overall expectations around a theme

RUBRIC FOR GRADE 3: It's A-maz-ing!

Knowledge/Skills	Level 1	Level 2	Level 3	Level 4
Understanding of Basic Concepts <ul style="list-style-type: none"> identifies materials that can be placed between an object and a magnet without diminishing the strength of the attraction 	The Student: <ul style="list-style-type: none"> identifies and gives simple explanation that shows limited understanding 	The Student: <ul style="list-style-type: none"> identifies and gives partial explanation that shows some understanding 	The Student: <ul style="list-style-type: none"> identifies and gives nearly complete explanation that shows good understanding 	The Student: <ul style="list-style-type: none"> identifies and gives complete explanation that shows detailed understanding
Design Skills <ul style="list-style-type: none"> choice of materials and tools produces a design drawing developing and following a plan testing and modification 	The Student: <ul style="list-style-type: none"> chooses appropriate tools and materials only with assistance prepares a design drawing that lacks many details develops and follows a limited plan tests appropriately only with assistance does not attempt to modify design 	The Student: <ul style="list-style-type: none"> chooses appropriate tools and materials with some assistance prepares a design drawing that has some details develops an adequate plan tests appropriately with some assistance makes some attempt to modify design 	The Student: <ul style="list-style-type: none"> chooses appropriate tools and materials with little assistance prepares a design drawing that has adequate details develops a detailed plan tests appropriately with little assistance makes clear attempt to modify design 	The Student: <ul style="list-style-type: none"> chooses appropriate tools and materials with no assistance prepares a design drawing that has many details develops and follows an appropriate, detailed plan tests appropriately with no assistance makes a clear attempt to modify design with improved results
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 terms 	The Student: <ul style="list-style-type: none"> presents some ideas and details with some clarity includes some appropriate terms 	The Student: <ul style="list-style-type: none"> presents most of the main ideas and details clearly includes mostly appropriate terms 	The Student: <ul style="list-style-type: none"> presents all of the main ideas clearly and precisely includes all appropriate terms
Relating Science and Technology to each other and the World Outside the School <ul style="list-style-type: none"> identifies uses of magnetic in familiar things 	The Student: <ul style="list-style-type: none"> identifies few uses of magnets 	The Student: <ul style="list-style-type: none"> identifies some uses of magnets 	The Student: <ul style="list-style-type: none"> identifies most uses of magnets 	The Student: <ul style="list-style-type: none"> identifies all uses of magnets

Written using the Ontario Curriculum Unit Planner (March 2001)