

ASSESSMENT OF SCIENCE AND TECHNOLOGY ACHIEVEMENT PROJECT (ASAP)

Science and Technology Exemplars

Grade 4: Matter and Materials – Materials that Transmit, Reflect, or Absorb Light or Sound

Exemplar Task (4MM/PT01/Dec 2000)

Orchestra



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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

In this task students are asked to use a variety of materials to investigate the ways that they can be manipulated to produce different sounds. They are asked to design and build a musical instrument and demonstrate and explain how it produces sound.



Suggested Timeline

Part 1

- investigating sounds (60 minutes)
- writing the report (30 minutes)

Part 2

- design, and test your instrument (2 x 60 minutes)
- writing the report (60 minutes)



Suggested Grouping

- inquiry and design activities (student pairs)
- writing reports (individual)

This task assesses the following **specific expectations**:



Understanding Basic Concepts

- investigate, through explorations, ways in which different properties of materials, including their shape, affect the nature of sound
- identify and describe, using their observations, physical changes in a material that can alter the sound it makes



Developing Skills of Inquiry, Design and Communication

- design and make instruments for a specific purpose or function
- formulate questions about and identify problems related to the ways in which materials transmit, reflect or absorb sound or light, and explore possible answers
- plan investigations for some of these answers and solutions, identifying variables that need to be held constant to ensure a fair test and identifying criteria for assessing solutions
- use appropriate vocabulary including correct science and technology terminology in describing their investigations, explorations and observations

- communicate the procedures and results of investigations and explorations for specific purposes using media works, oral presentations, written notes and descriptions, drawings and charts
- follow safe work procedures in all investigations



Relating Science and Technology to the World Outside the School

- compare materials in terms of the sounds that they can be made to produce



Materials & Equipment Needed

Yoghurt containers	Cardboard	String
Rubber bands	Straws	Scraps of wood
Glass bottles	Water	Spoons
Plastic tubes	Glue	Glue sticks
Tools	Balloons	Rice
Low heat glue guns	Tape	Fishing line
Gardening gloves	Found materials	



Prior knowledge and skills

Students should have been taught the background knowledge required for this task (see Appendix 1).



Students should also be familiar with:

- investigating, designing and constructing
- using and choosing materials and tools appropriately and safely



Introductory activities

Display the materials and equipment for the students.

Brainstorm with the whole class to allow them to explore possible sounds that could be produced with the materials.

Allow the students to respond with ideas.

Read the scenario to the whole class, this may have to be repeated with individual students.

Discuss the assessment criteria with the students.

Assign the student work sheets.

Clarify how each student will be presenting his/her work (see Collecting the Evidence).



Safety First

Students should be familiar with using the equipment required for the task.

Students should be reminded of safety procedures when using scissors and glue guns. Students using tools must wear safety goggles. Students should wear gloves when using glue guns. A separate area of the class is strongly recommended for students to use tools and glue guns.



Collecting the Evidence

Teachers will need to collect evidence to submit for the exemplars project. In this task students should produce the following:

- completed responses written on student sheet
- oral responses scribed by teacher onto student sheet if appropriate
- a photograph (digital preferred) of the finished instrument
- if limited writing skills a video or audio tape of student responses

In addition we require a teacher completed observation checklist – should be completed with a brief comment and a circled level (Appendix 2). **Please number student work to correspond with the checklist.**

DRAFT RUBRIC FOR GRADE 4: ORCHESTRA

Knowledge/Skills	Level 1 The student:	Level 2 The student:	Level 3 The student:	Level 4 The student:
Understanding basic concepts	<ul style="list-style-type: none"> investigates with much assistance properties of materials that affect the sound it makes identifies and describes with many errors physical changes in materials that affect the sounds they make 	<ul style="list-style-type: none"> investigates with some assistance properties of materials that affect the sound it makes identifies and describes with some errors physical changes in materials that affect the sounds they make 	<ul style="list-style-type: none"> investigates with little assistance properties of materials that affect the sound it makes identifies and describes with few errors physical changes in materials that affect the sounds they make 	<ul style="list-style-type: none"> investigates with no assistance properties of materials that affect the sound it makes identifies and describes with no errors physical changes in materials that affect the sounds they make
Inquiry skills				
Design skills	<ul style="list-style-type: none"> observes the materials and uses them to make sounds chooses inappropriate materials and equipment develops and follows a limited plan needs frequent reminders to use tools, equipment and materials safely constructs instrument which is poorly built and partially functional tests instrument with limited success 	<ul style="list-style-type: none"> attempts to investigate the differences in sound made by the materials chooses some appropriate materials and equipment develops and follows an adequate plan which may be unclear needs some reminders to use tools, equipment and materials safely constructs instrument which is adequately built and functional tests instrument with some success 	<ul style="list-style-type: none"> investigates ways in which the different materials make different sounds chooses mostly appropriate materials and equipment develops and follows an appropriate and clear plan needs few reminders to use tools, equipment and materials safely constructs instrument which is well built and functional tests instrument with success 	<ul style="list-style-type: none"> investigates and explains how the different materials make different sounds chooses all appropriate materials and equipment develops and follows a detailed and efficient plan consistently uses tools, equipment and materials safely constructs instrument which well built and very functional tests instrument with much success
Communication of required knowledge	<ul style="list-style-type: none"> communicates with limited clarity and precision rarely uses science and technology terminology 	<ul style="list-style-type: none"> communicates with some clarity and precision sometimes uses science and technology terminology 	<ul style="list-style-type: none"> communicates clearly and precisely in most of the task often uses science and technology terminology 	<ul style="list-style-type: none"> communicates clearly and precisely through all of the task always uses science and technology terminology
Relating Science and Technology to the world outside the school	<ul style="list-style-type: none"> compares with many errors materials and their sounds 	<ul style="list-style-type: none"> compares with some errors materials and their sounds 	<ul style="list-style-type: none"> compares with few errors materials and their sounds 	<ul style="list-style-type: none"> compares with no errors materials and their sounds

Appendix 1



Background knowledge – Orchestra

Students should have been introduced to different materials and the sounds that they can make when struck, plucked, blown, bent, etc. They should be aware that different materials make different sounds.

Students should have been taught that different properties of materials cause them to make different sounds. Examples of this are:

- solid or hollow
- made of metal or wood or glass
- large or small
- flexible or rigid

Students should have been taught that materials can be changed physically to make different sounds. Examples of this are:

- bending a piece of plastic around to make a tube
- filling a bottle with water
- stretching an elastic band
- flicking a ruler on a desk
- making holes in straws or tubing

Students should have been taught to describe the sounds they hear in a variety of ways e.g. high pitch, low pitch, loud, soft, quiet.



Glossary

Pitch –the quality of a sound that is determined by the frequency of the wave.

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Student Task Sheets

2. Complete this chart to show which of the materials made different sounds and why. Add one of your own.

Sound made	Name of material	Explain why
Loudest		
Quietest		
High pitch		
Low pitch		

PART TWO - BUILDING AN INSTRUMENT

1. List the materials and tools you will use to build your instrument.

2. Use words and/or pictures to explain how you will build your instrument.

3. **Draw** a design drawing of your musical instrument. Label the important features of your design.

4. Use words and/or a picture to explain how the shape of your instrument will affect the sound it makes.

5. Use words and pictures to explain how you will **test** your musical instrument.

Build and test your musical instrument.

6. Use words and/or pictures to explain how you change the **pitch** and **volume** of the sound your instrument makes.
