



YSISTE

ASSESSMENT OF SCIENCE AND TECHNOLOGY ACHIEVEMENT PROJECT (ASAP)

Science and Technology Exemplars

Grade 2: Energy and Control – Energy from Wind and Moving Water

Exemplar Task (2ECPT02/Feb 2002)

Windy



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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, the students will design and make an invention that uses moving air as its energy source.



Suggested materials and equipment:

pieces of wood	plastic cups
plastic containers	wood dowels
tinfoil	pieces of cloth
aluminum containers	balloons
glue	tape
paint	saw
nails	hammer
fan/hairdryer	scissors
additional materials at teachers discretion	



Suggested Timeline:

4 x 65 minutes



Suggested Grouping:

pair/share or groups of three



Safety Considerations:

- care with saws and wood
- safety goggles when using tools and low temperature glue guns
- care with sharp equipment
- tools and materials on a separate table

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Student Task Sheets

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WINDY

When air moves it is called **wind**. Wind can be used to make things move.

Design and make a device that uses the moving air to make it move.

1. Look at the pictures.

- Draw a **circle** around the things that use **wind** to move.

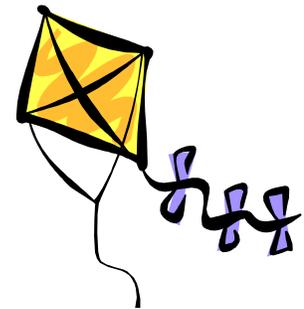
- Draw a **square** around the things that use **water** to move



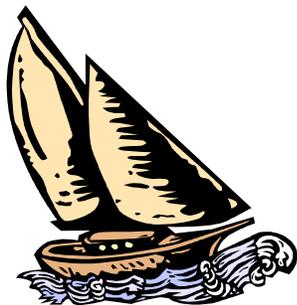
Windmill



Water Wheel



Kite



Sailboat



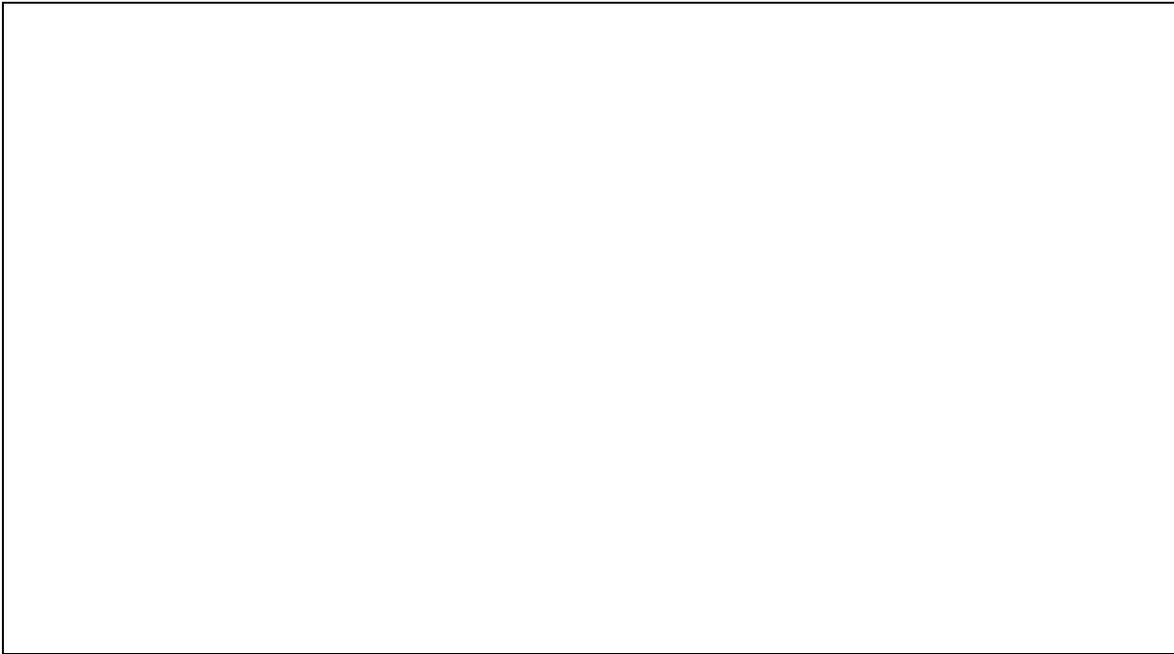
Parachutist



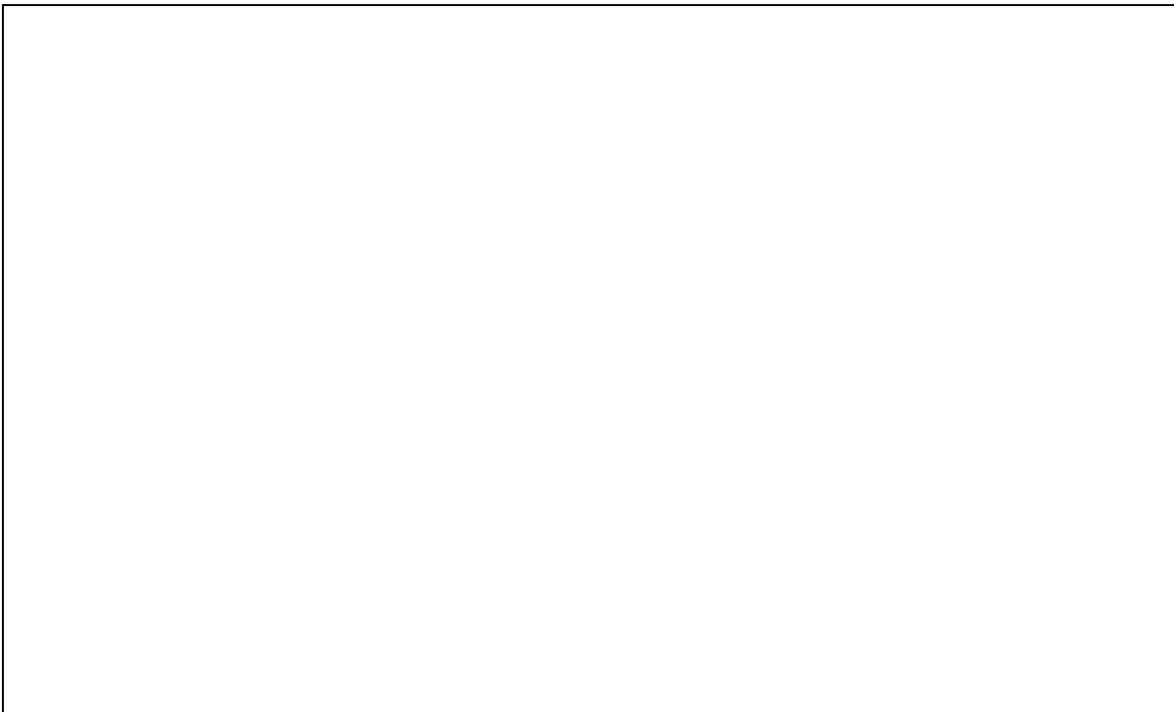
Surfer

2. Sketch two ideas for your device.

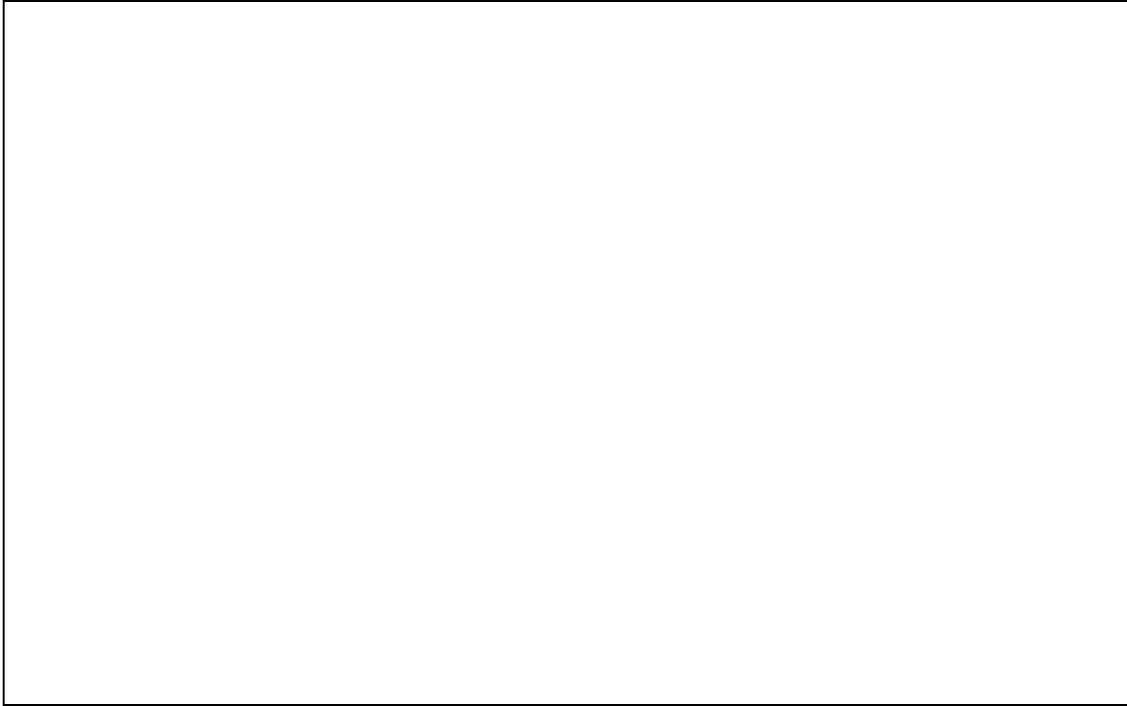
Idea 1:



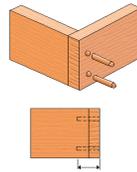
Idea 2:



3. Choose one of your ideas and explain, using a drawing and words, how moving air makes it move.

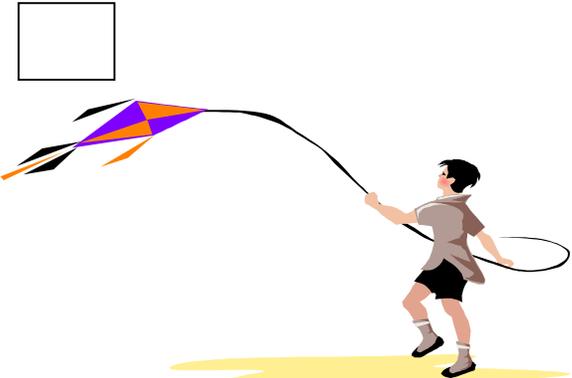


4. Draw a **circle** around some of the materials you will need to use to build your device.

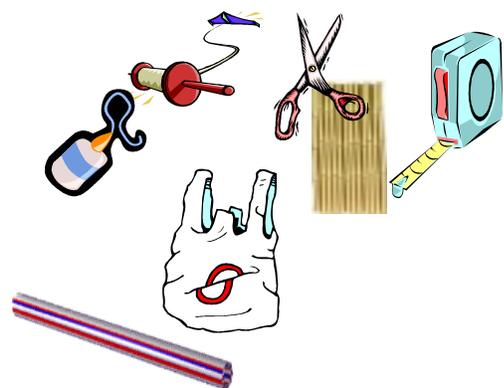


5. List the other materials you will need.

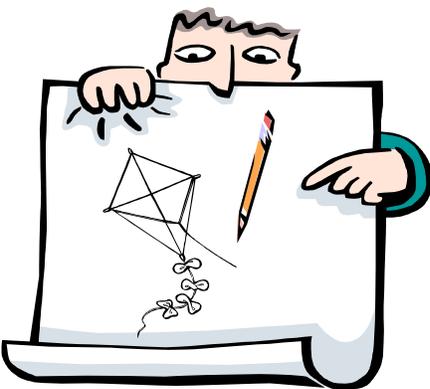
6. Number these boxes from 1 to 6 to show the plan you will follow.



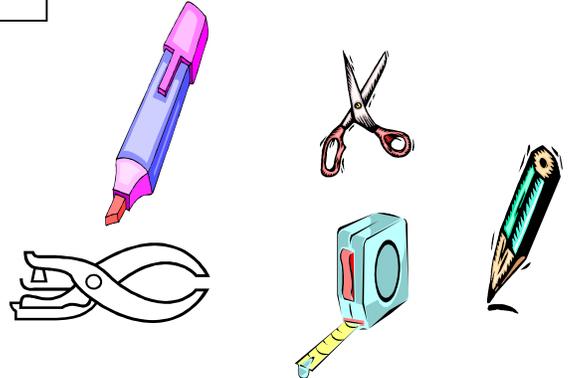
I will test my device



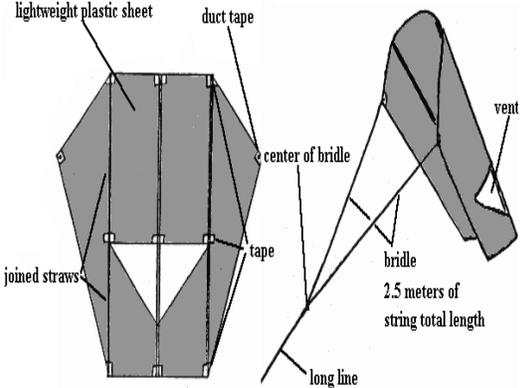
I will collect my materials and tools



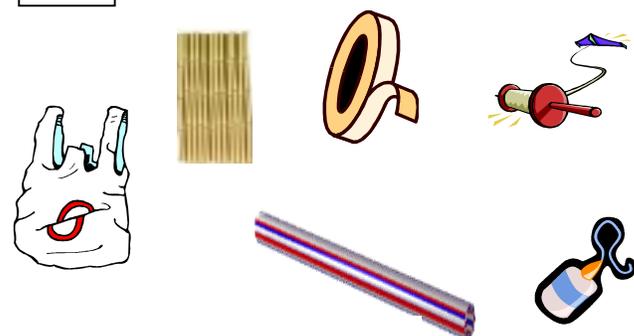
I will design my device



I will choose my tools



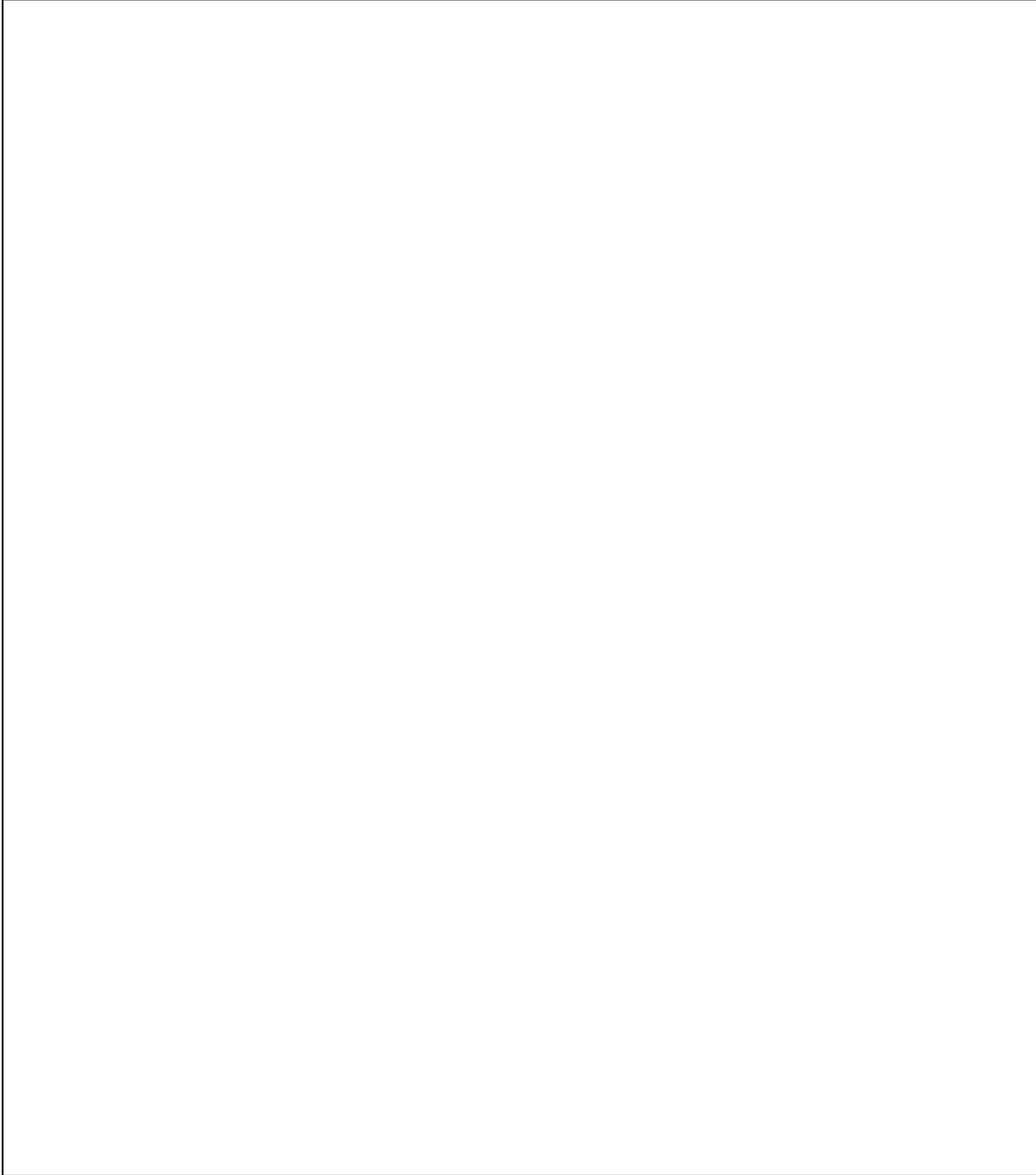
I will build my device



I will choose my materials

7. Build your wind device.

8. Draw the device you made.



9. Describe what happens when you test your device with moving air.



10. Draw a **circle** around the activities that need water or wind.



drawing



sailing



swimming



flying



eating



fishing



flying a kite



jumping

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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

- **recognize that it is the movement of air and water that produces energy and that air and water are not by themselves sources of energy**



Developing Skills of Inquiry, Design and Communication

- **design and construct a device propelled by air (e.g., a kite, a pinwheel, a balloon rocket)**
- **record relevant observations, findings, and measurements, using written language, pictures, and charts (e.g., draw a diagram of their device; prepare a chart to present data on the distance travelled by their device over time)**
- **communicate the procedures and results of investigations and explorations for specific purposes, using drawings, demonstrations, and oral and written descriptions (e.g., prepare a show of different devices that are propelled by wind energy; explain the effect of wind direction and speed on the displacement of wind-propelled devices)**



Relating Science and Technology to the World Outside the School

- **identify devices that use moving air and moving water as energy sources (e.g., windmills, water wheels) and describe what happens to these devices when the air or water is still**
- **list activities that are affected by moving water and wind (e.g., fishing, sailing, flying a plane)**
- **recognize that moving air and moving water can be sources of energy for electrical power**



Prior Knowledge Required:

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

- that the movement of air and water are sources of energy
- how the movement of air and water can be useful in solving problems
- that wind and moving water are renewable sources of energy



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

Movement, energy, device, materials, tools, renewable, recycle, safety goggles



Prior Skills Required:

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

- designing and constructing devices
- using appropriate equipment and materials
- cooperatively working in a group



Suggested Introductory Activities:

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

- read the challenge aloud
- allow the students to explore and manipulate the materials
- recap safety rules
- brainstorm possible devices as a class
- recap how to draw a diagram of their device and put example on chart paper
- read the final question aloud to the class after they have completed their designs



Cross-curricular Links:

Links can be made to *The Ontario Curriculum Grade 1-8 Language Writing: Grade 2, Visual Presentation*. The expectations that can be addressed are:

- use words and pictures to create a message
- print legibly

Links can be made to *The Ontario Curriculum Grade 1-8 Mathematics Geometry and Spatial Sense: Grade 2*. The expectations that can be addressed are:

- create a three dimensional model from an illustration
- explain how they used three dimensional figures and concrete materials in building a structure or model



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”.

RUBRIC FOR GRADE 2: Windy

Knowledge/Skills The student	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"> recognizes evidence that the movement of air can be a source of energy 	<ul style="list-style-type: none"> recognizes that the movement of air can be a source of energy with difficulty and error 	<ul style="list-style-type: none"> recognizes that the movement of air can be a source of energy with some difficulty and error 	<ul style="list-style-type: none"> recognizes that the movement of air can be a source of energy with little difficulty or error 	<ul style="list-style-type: none"> recognizes that the movement of air can be a source of energy with no difficulty or error
Design Skills <ul style="list-style-type: none"> designs and constructs a device that uses wind to make it move 	<ul style="list-style-type: none"> applies few of the required skills and strategies uses materials and equipment safely and correctly only with assistance 	<ul style="list-style-type: none"> applies some of the required skills and strategies uses materials and equipment safely and correctly with some assistance 	<ul style="list-style-type: none"> applies many of the required skills and strategies uses materials and equipment safely and correctly with occasional assistance 	<ul style="list-style-type: none"> applies all, or almost all, of the required skills and strategies uses materials and equipment safely and correctly with no assistance
Communication of Required Knowledge <ul style="list-style-type: none"> communicates procedures and results 	<ul style="list-style-type: none"> communicates with little clarity or precision rarely uses science and technology terms correctly 	<ul style="list-style-type: none"> communicates with some clarity or precision sometimes uses science and technology terms correctly 	<ul style="list-style-type: none"> generally communicates with clarity and precision frequently uses science and technology terms correctly 	<ul style="list-style-type: none"> consistently communicates with clarity and precision always uses science and technology terms correctly
Relating Science and Technology <ul style="list-style-type: none"> identifies devices that use air/water as energy source identifies activities affected by moving water or wind 	<ul style="list-style-type: none"> identifies few devices identifies few activities 	<ul style="list-style-type: none"> identifies some devices identifies some activities 	<ul style="list-style-type: none"> identifies most devices identifies most activities 	<ul style="list-style-type: none"> identifies all devices identifies all activities