NOVA SCOTIA Science OLYMPICS

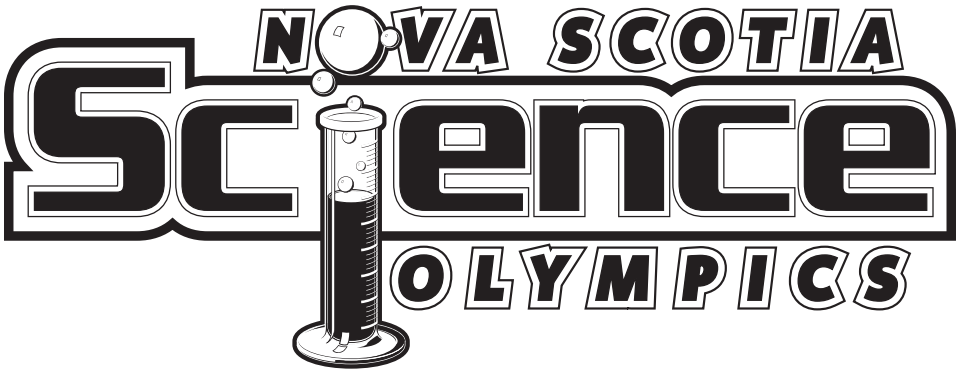
Science 4 and Science 5

A CURRICULUM RESOURCE

ACTIVITIES

conserve NOVA SCOTIA

NOVA SCOTIA Education



Science 4 and Science 5

A CURRICULUM RESOURCE

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Contents

Introduction

In October 2007 and October 2008, the Department of Education co-sponsored with Conserve Nova Scotia the first and second annual Science Olympics. This program gave students in grades 4 and 5 the opportunity to participate with other schools in a creative, fun-filled, friendly competition on various topics of science.

This booklet is intended as a guide for hosting your own classroom, school-wide, or invitational Science Olympics. This guide can be used as a regular part of your science lessons or as a unit start-up or ending. You may want to hold a school-wide Olympic event or invite other schools to participate. However you choose to use this guide, Science Olympics challenges will add an opportunity for students to engage hands-on, minds-on science activities.

Program Information

Description

Science Olympics were developed for students to work in teams to solve challenges by applying their scientific knowledge creatively. The challenges are laid out very clearly with guidelines for time and materials and specific instructions for each challenge. Outcomes addressed by each challenge are indicated on a corresponding Teacher Information sheet. The program takes little time to implement once you have the correct materials.

Purpose

The challenges are meant for all young scientists to use their problem solving skills, teamwork skills, and knowledge to successfully complete challenges. By engaging in a variety of hands-on, minds-on activities, students will explore science and accomplish tasks, as science comes to life for them.

Method

To begin, you will need to decide how you would like to incorporate Science Olympics into your classroom and/or school. You may wish to use this program as a regular activity with a final classroom challenge, as a school-wide challenge, or you may prefer to invite other schools to participate. You can offer the details in advance to other schools and students or spontaneously offer the details only on the day of the challenge.

Each Teacher Information sheet includes specific instructions for the challenge. Next, you will need to collect the materials for the challenges. See each challenge for the specific materials required. You will need to choose a location that will work. Do you have tables in your classroom? Are your desks grouped together in a way that will work? Can you use a gym with tables or do you have a school lab available? Finally, double check that you have the materials required. Copy a student challenge sheet for each team and set aside enough time to complete the challenge.

On the day of your challenge be sure you have enough space. Then get the materials ready. Pass out the student challenge sheets; let students have time to read over the directions, then start the timer.

Planning

There are several aspects to planning an Olympics that may be considered.

Did you think about …?

Participants: Science Olympics are a great way to include all students and encourage everyone to contribute.

Registration: Will you include the school, several classes, or only your class? If you are inviting other schools, have a desk or area designated for students to check-in when they arrive.

Scoring: Inviting adults to help with the scoring is one possibility. This allows independent scoring and the decision by the judges is final.

Media: The media could assist you with promoting the Olympics. Be sure to give them lots of notice and if they are going to attend, have someone available to answer any questions that might arise. Have you invited anyone to cover the event?

Awards: Certificates, ribbons, buttons, T-shirts, medals, small trophies, books, and so on.

Scheduling: Be sure to give lots of notice if you are inviting other schools. If you need to raise money to cover the costs of materials, let the schools know in advance.

Photos: Assigning a photographer is helpful to record the event.

Location: Classroom, gym, lab, cafeteria, or outside.

Materials: Will you charge a registration fee? Can you get any of the materials donated?

If you are inviting other schools, you may wish to have adults doing an activity at the same time as the students.

Sample Pre-/Post-Information Sheet

What do you think science is?	**What would your ideal science class look like?**
How do you use science in your daily life?	**When you grow up do you think science will affect what you do?**

Class Chart Sample

This chart gives you an idea of what you could create to keep an ongoing record of the Science Olympics team scores. Charts can be posted in your classroom or school.

Science Olympics	Challenge Name:	Challenge Name:	Challenge Name:	Challenge Name:	Challenge Name:	Final Score
Group Name						
Group Name						
Group Name						
Group Name						
Group Name						

Individual Activities

Creature Creation

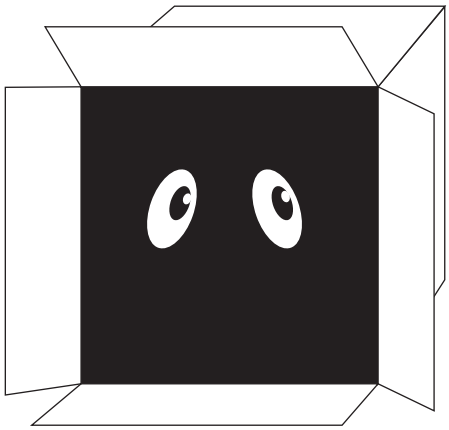
VARIES
Time Limit

The Challenge

Construct an imaginary creature, using the materials provided. Invent a name, habitat, life cycle, and environment for your creature.

The Rules

Using the materials provided, create an imaginary creature. Give it a name, and write a description of its life cycle. Describe its habitat, including the food it eats, enemies, environment, and method of nesting.



Materials

- cotton balls
- glitter glue
- googly eyes
- mini marshmallows
- modelling clay
- pipe cleaners
- toothpicks

Scoring

Creatures will be assessed based on the creative use of materials and the description of their habitats and life cycles.

Creature Creation

TEACHER INFORMATION

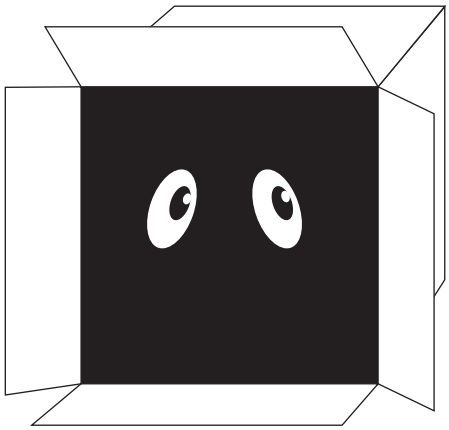
VARIES
Time Limit

The Challenge

Students should construct an imaginary creature, using the materials provided. They should invent a name, habitat, life cycle, and environment for their creature.

The Rules

Teachers should provide the materials so that students can create an imaginary creature. They should give it a name, and write a description of its life cycle. They should describe its habitat, including the food it eats, enemies, environment, and method of nesting.



Materials

- cotton balls
- glitter glue
- googly eyes
- mini marshmallows
- modelling clay
- pipe cleaners
- toothpicks

Scoring

Creatures will be assessed based on the creative use of materials and the description of their habitats and life cycles.

over

Science 4: Habitats

Students will be expected to

- identify questions to investigate the types of plants and/or animals at a local habitat using the terms habitat, popultion, and community (104-6, 204-1)
- compare the external features, behavioural patterns, structural, and/or behavioural adaptations for an animal to survive a particular habitat, real or imagined (204-3, 300-1, 300-2, 302-2)
- construct and/or maintain a model of a natural habitat and, through observations, suggest improvements to make it more habitable for organisms (205-5, 205-10, 206-6)

Science 5: Meeting Basic Needs and Maintaining a Healthy Body

Students will be expected to

- select and use tools in building models of body systems (205-2)
- propose questions to investigate how our body works, and what its components are, and relate bodily changes to growth and development (204-1, 301-8)
- describe the role played by body systems in helping humans and other animals to grow and reproduce and to meet their basic needs (302-4)

Pet Rocks

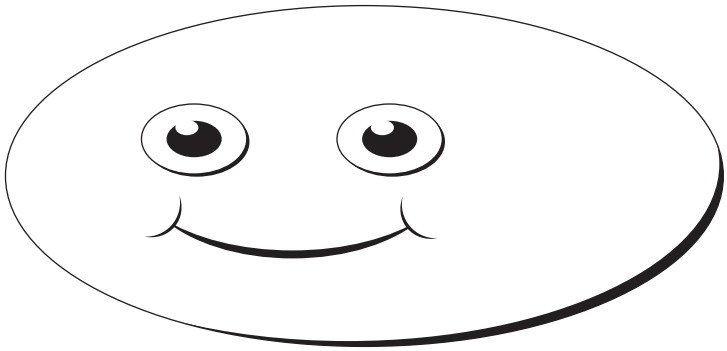
VARIES
Time Limit

The Challenge

Create a pet rock using the materials provided. Write your pet's autobiography and describe his or her habitat.

The Rules

Using the materials provided, create a pet rock. Write an autobiography for your rock, including scientifically appropriate terms and information about how you came to be in your current environment.



Materials

- cotton balls
- feathers
- glitter glue
- googly eyes
- modelling clay
- pipe cleaners
- rocks
- toothpicks

Scoring

Pet rocks will be assessed based on the creative use of materials and the description of habitats and adaptations.

Pet Rocks

TEACHER INFORMATION

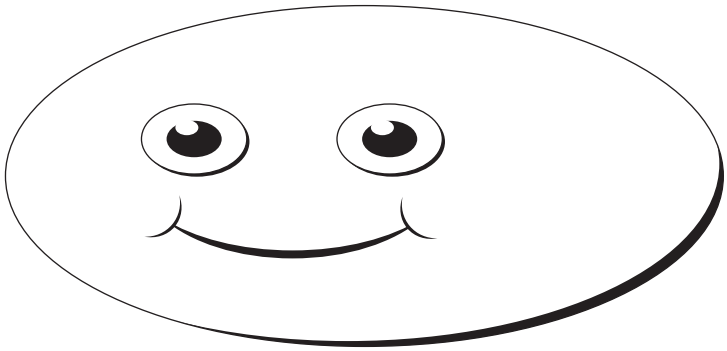
VARIES
Time Limit

The Challenge

Students should create a pet rock using the materials provided. They should write their pet's autobiography and describe his or her habitat.

The Rules

Teachers should provide the materials listed so that students can create a pet rock. Students should write an autobiography of their rock, including scientifically appropriate terms and information about how they came to be in their current environment.



Materials

- cotton balls
- feathers
- glitter glue
- googly eyes
- modelling clay
- pipe cleaners
- rocks
- toothpicks

Scoring

Pet rocks will be assessed based on the creative use of materials and the description of habitats and adaptations.

over

Outcomes

Science 4: Habitats

Students will be expected to

- compare the external features, behavioural patterns, structural, and/or behavioural adaptations for an animal to survive a particular habitat, real or imagined (204-3, 300-1, 300-2, 302-2)
- examine and investigate, using various methods and questions, local habitats and their associated populations of plants and animals (204-6, 302-1)

Science 4: Rocks, Minerals, and Erosion

Students will be expected to

- relate characteristics of rocks and minerals to their uses (300-8)
- investigate rocks and minerals and record questions and observations (204-1, 205-7)
- explore physical properties of local rocks and minerals, using appropriate tools to collect and compare with those from other places (204-8, 205-5, 300-5, 300-6)

Terminology: Rocks, Minerals, and Erosion

Earth materials: Clay, sand, gravel and soapstone

Erosion: Where materials of Earth's crust are loosened, dissolved, worn away

Extraction: The removal of rocks and minerals from Earth

Fossil: The remains, trace, or imprint of a plant or animal that has been preserved in Earth's crust

Igneous rock: A type of rock that forms from melted rock beneath Earth's surface (pumice, basalt, granite)

Landscape: Areas of land that are distinguished by differences in landforms, vegetation, land use, and aesthetic characteristics

Metamorphic: A type of rock that forms when the sedimentary or igneous rock is heated and new rock forms (marble, slate)

Rock hound: Collector of rocks and minerals

Sedimentary: A type of rock that forms on top of existing rock and is made up from materials derived from pre-existing rocks, shells or plants (limestone, shale, sandstone)

Weathering: The breaking up of rock and minerals into small pieces by natural processes

Olympiad Activities

A Quiet Neighbourhood

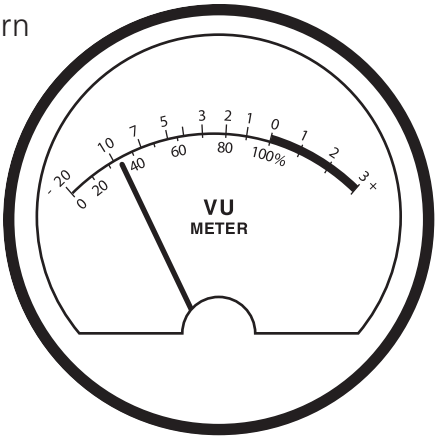
30 MINUTES
Time Limit

The Challenge

The increase in noise pollution has resulted in an increase in stress in humans. In this challenge, you will attempt to decrease noise pollution by using natural baffles to absorb and deflect sound.

The Rules

At one end of a table will be a buzzer or other sound source that could represent road noise. One metre away, representing a home, will be a decibel meter that measures sound intensity levels. You will be given a number of baffles that will simulate trees, fences, shrubs, and other natural baffles. You may arrange the baffles in any pattern you wish, but there must be at least a 20 cm open space in front of the buzzer as well as in front of the decibel meter. You may redesign and rebuild your sound-friendly neighbourhood up to three times within the given time limit. The referee will turn on the sound source and take the readings when you have finished constructing each trial neighbourhood. If you do two or three trials, the average decibel reading of the trials will be scored.



Materials

Each team will have the following materials:

- decibel meter, or a tape player or audio program with built in VU meters and microphone
- buzzer (alarm clock, kitchen timer, etc.)
- baffles, such as
  - 3 empty 2 L pop bottles
  - 4 rectangular Styrofoam/polystyrene blocks
  - 3 textbooks
  - 2 feather dusters
  - 4 balloons
  - 6 foam cups
  - towel

Scoring

The lower the decibel reading, the better the score. If the sound meter being used gives numerical readings, the average will be recorded if two or three trials are done. If the sound meter has a needle (VU meter type), the referee may decide to go with the lowest needle reading.

A Quiet Neighbourhood

TEACHER INFORMATION

30 MINUTES
Time Limit

The Challenge

The increase in noise pollution has resulted in an increase in stress in humans. In this challenge, students will attempt to decrease noise pollution by using natural baffles to absorb and deflect sound.

The Rules

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Baffle materials can be whatever is available as long as each team has the same number and types of baffles. Polystyrene foam building insulation can be cut into rectangular blocks roughly 30 cm long by 15 cm wide to represent trees.

Suggestions

- The buzzer and meter should be at table level. A microphone connected to a tape player, or audio recording software with a VU meter, could be used as an alternative to the decibel meter.

Possible Extension

- If teams finish early, the referee may decide to grant a bonus fourth trial.

Materials

Each team will have the following materials:

- decibel meter, or a tape player or audio program with built in VU meters and microphone
- buzzer (alarm clock, kitchen timer, etc.)
- baffles, such as
  - 3 empty 2 L pop bottles
  - 4 rectangular Styrofoam/polystyrene blocks
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over

Outcomes

Science 4: Sound

Students will be expected to

- demonstrate and describe how the pitch and loudness of sounds can be modified; design, construct, and evaluate a device that has the ability to create sounds of variable pitch and loudness (104-1, 205-2, 206-7, 301-3)

This activity could be used at the end of the Sound topic in your science instruction. It could take the place of the suggested activity in the Science 4 curriculum guide, which is very similar.

Possible Extension

Ask students to play a simple tune on their device.

Technology Connection

- Use sound software (such as Audacity) to record the sounds produced by the various devices.

Scoring Chart

Student or Team Name:_____

	Materials	Pitch	Volume Levels
More than 5	4	4	4
4 to 5	3	3	3
2 to 3	2	2	2
1	1	1	1
Points awarded			

Total: _____

Student or Team Name:_____

	Materials	Pitch	Volume Levels
More than 5	4	4	4
4 to 5	3	3	3
2 to 3	2	2	2
1	1	1	1
Points awarded			

Total: _____

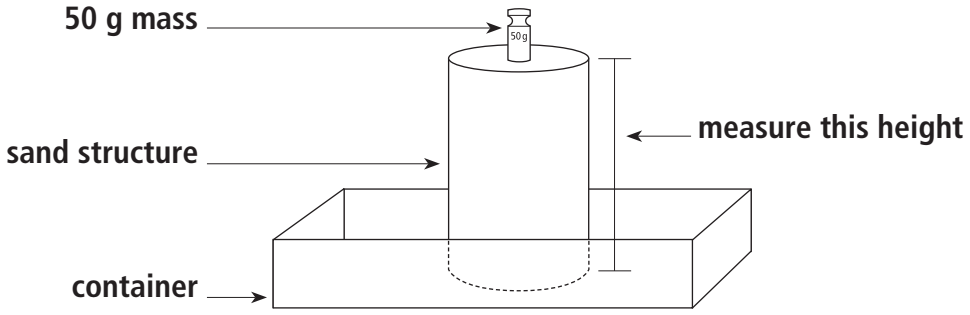
Castles in the Sand

30 MINUTES
Time Limit

The Challenge

Your group will construct a tower out of sand that is as tall as possible.

- You may use only the sand and water provided.
- Your structure must be able to support the weight of a 50 g mass on top of it, without collapsing.
- The goal is to have the 50 g mass as high above the base of the container as possible.



Materials

- dry sand
- water
- container
- 50 g mass
- metre stick
- construction tools provided by your teacher

Scoring

The height from the base of the container to the bottom of the 50 g mass will be measured. This height will become the score for your team.

Castles in the Sand

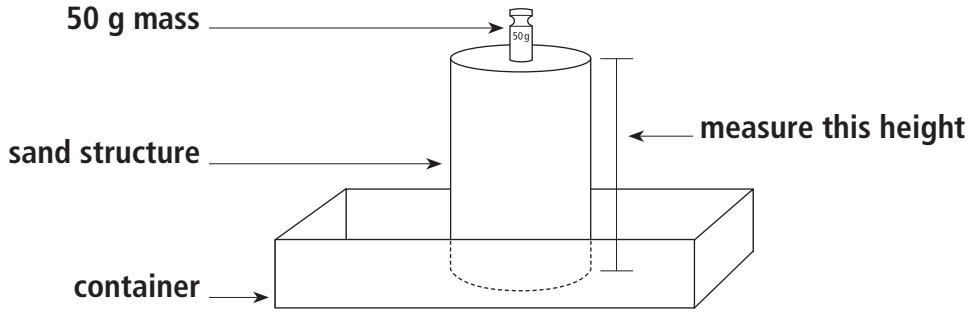
TEACHER INFORMATION

30 MINUTES
Time Limit

The Challenge

Each group of two or three students will construct a tower out of sand that is as tall as possible. They must use only the amount of sand provided and add as much water as needed to get an acceptable consistency for construction. Getting the sand wet enough is part of the challenge. Every group of students will need fresh sand, so it will be important to make arrangements for an adequate amount of sand for each group.

The ultimate goal is building a sand tower as tall as possible that can support a 50 g mass at the top. You may also choose to judge for creativity (see Extension).



Materials

- dry sand
- water
- container
- 50 g mass
- metre stick
- construction tools, such as
  – craft sticks
  – small shovels
  – paper cups
  – pails
  – plastic cutlery

Scoring

The height from the bottom of the sand container to the bottom of the 50 g mass can be measured in tenths of a centimetre. This height can be the actual score for the group of students.

over

Outcomes

Science 4: Rocks, Minerals, and Erosion

Students will be expected to

- describe ways in which soil is formed from rocks and demonstrate and describe the effects of wind, water, and ice on the landscape (301-4, 301-5)

Mathematics 5: Properties and Changes in Materials

Students will be expected to

- observe and identify changes in an object's appearance, state and/or reversibility and classify it as a physical change or not (301-9, 205-5, 301-10)

Extension

- Extra points can be awarded to groups showing creativity in the shape or decoration of their structure. Teachers should design the rubric/scoring criteria for this and communicate it to the students.
- Students could create sand figurines by mixing two parts sand with one part water and one part cornstarch. The mixture must be heated and stirred until it is thick. Allow the mixture to cool and then shape it. When it dries, it will harden. These could make interesting gifts.

Technology Connection

Take digital photographs of the various structures and create a slide show or movie of the different designs.

Erosion Prevention

30 MINUTES
Time Limit

The Challenge

Humans continue to cut down trees and clear the land to make way for more farms to feed the world's increasing population. Trees and other types of vegetation are important in preventing soil erosion. In this challenge, you will try to minimize the amount of erosion by using barriers and simulated plants.

The Rules

You will be given a length of plastic eavestrough and a one-litre container of sand. The sand must be evenly spread in the eavestrough. Erosion barriers and simulated plants may be then placed in any manner you wish to reduce the amount of sand washed out of the trough. When the trough is ready, all of a 500 mL bottle of water must be poured from the top of the trough. The water and any eroded sand will be collected in a beaker at the bottom of the trough. The upper end of the eavestrough must be held 30 cm higher than the bottom end to create the correct slope while the water is poured. Use the object provided by your teacher to prop up the eavestrough, or have a member of your group hold the eavestrough. The eavestrough should be held against a metre stick to obtain the correct height.

Materials

- 600 mL beaker
- 50 cm length of eavestrough
- 500 mL plastic water bottle
- one litre container of **damp** sand
- water tray, dish pan, or similar container to catch spills
- scissors
- metre stick
- 30 cm object to prop up one end of the eavestrough

Erosion Barriers and Simulated Plants

- 2 pieces of 7 × 7 cm screen door screen to represent sod
- 4 popsicle sticks (which can be broken into smaller pieces)
- 4 plastic straws (which can be cut up in any way)
- 12 toothpicks

Scoring

Points will be awarded according to amount of sand collected in the beaker. The goal is to have the least amount of sand.

- <50 mL of sand = 10 points
- 51 to 100 mL = 9 points
- 101 to 150 mL = 8 points
- 151 to 200 mL = 7 points
- 201 to 250 mL = 6 points
- 251 to 300 mL = 5 points

Erosion Prevention

TEACHER INFORMATION

30 MINUTES
Time Limit

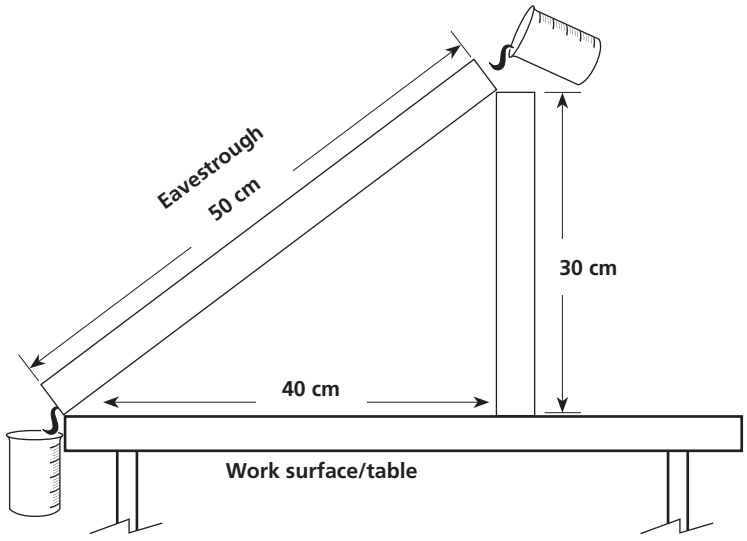
The Challenge

Humans continue to cut down trees and clear the land to make way for more farms to feed the world's increasing population. Trees and other types of vegetation are important in preventing soil erosion. In this challenge, teams of students will try to minimize the amount of erosion by using barriers and simulated plants.

Suggestions

In order to ensure the set-up is similar for each team, an object 30 cm high should be placed approximately 40 cm from the edge of a table. The eavestrough should be held at both ends with one end on the object and the other end at the table's edge. The 600 mL beaker should be held at the bottom of the eavestrough. See the diagram below.

- The water pouring could be done by an independent person to add control.
- Every team starts with unused (new) damp sand.
- Clean sand will enable a more accurate beaker reading.
- Sand must be damp to start.
- All sand should be the same dampness by adding the same amount of water to the same amount of sand.
- Once the activity is completed, let the sand dry and save for future experiments.



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Materials

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- 101 to 150 mL = 8 points
- 151 to 200 mL = 7 points
- 201 to 250 mL = 6 points
- 251 to 300 mL = 5 points

Outcomes

Science 4: Rocks, Minerals, and Erosion

Students will be expected to

- describe ways in which soil is formed and demonstrate and describe the effects of wind, water, and ice on the landscape (301-4, 301-5)
- demonstrate and record a variety of methods of weathering and erosion, including human impact on the landscape (301-6,108-6)

Mirror Madness

30 MINUTES
Time Limit

The Challenge

You will be given a piece of paper with several pictures on it. At a table, there will be a station where you can put your paper so that you cannot see the actual image, just its reflection in a mirror. Assign a timekeeper. Use the attached activity sheet to perform the following tasks:

1. Hockey

- Set up your paper so the section titled "Hockey" is visible in the mirror.
- You may want to tape the paper to a table so it will not move.
- Draw the path from the puck to the net. The timekeeper will measure the time you take to "score a goal."

2. Basketball

- Set up your paper so the section titled "Basketball" is visible in the mirror.
- You may want to tape the paper to a table so it will not move.
- Draw the path from the ball to the net. The timekeeper will measure the time you take to "score a goal."

3. Tracing Words

- Set up your paper so the section titled "Tracing Words" is visible in the mirror.
- You may want to tape the paper to a table so it will not move.
- Trace the letters of the words. The timekeeper will measure the time you take to trace both words.

4. Name

- Set up your paper so the section titled "Name" is visible in the mirror.
- You may want to tape the paper to a table so it will not move.
- Print your name on the paper so it appears correctly when viewed in the mirror. The timekeeper will measure the time you take to do this.

Note:

- A time limit of 30 minutes is given to complete all four activities.

Materials

- activity sheet with 4 different sections on the two sides
- pencil

Scoring

- The total time required to complete the four activities will become your score.
- In the event of a tie, the teacher may choose to judge your actual tests for accuracy of lines.

Mirror Madness

TEACHER INFORMATION

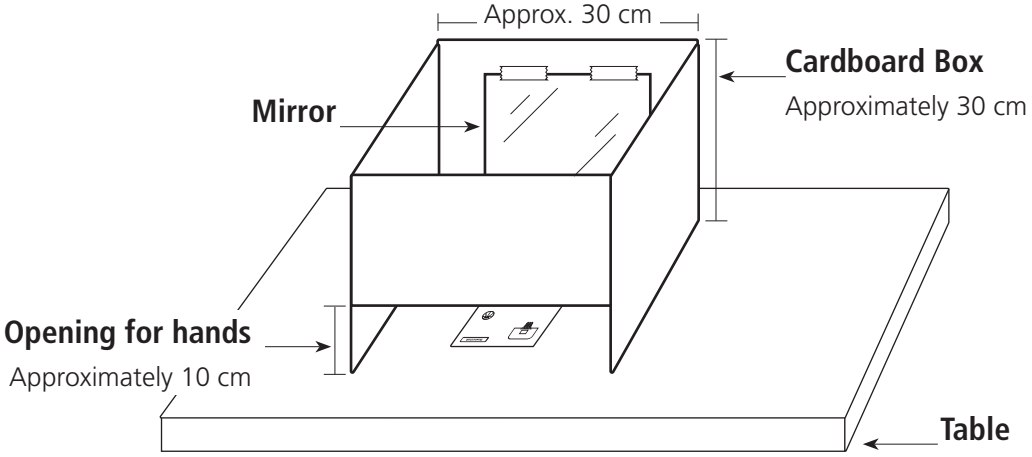
30 MINUTES
Time Limit

The Challenge

Prior to beginning the Mirror Madness challenge, a mirror station should be constructed (see diagram below). This could be done by using a cardboard box. Attach a mirror on the inside of one end of the box. Ensure that the opposite side of the box is covered so that students cannot see the activity sheet image—just the reflection in the mirror. An opening should be made (approximately 10 cm) to allow students to slide their hand in to draw on the activity sheet.

Suggestions

This activity will be done by each individual student. There are four parts to the activity. Scoring will be based on the total time for completing all four tasks. The four tasks can be photocopied (double-sided) on a single piece of paper for each student. The images on one side are upside-down so that the mirror station can be set up for half of a standard letter-size sheet of paper.



Materials

Each workstation will require

- mirror (about the size of a standard letter-size sheet of paper)
- cardboard box (approximately 30 cm square)
- activity sheet (for each student)
- pencil

Scoring

- The total time required to complete the four activities will become the score. Students should be timed from the moment they begin to draw.
- In the event of a tie, you may wish to examine the students' sheets to see if there was one set of lines that was more accurate than others.

over

1. **Hockey**
   - Students will draw the path from the puck to the net. The timekeeper will measure the time they take to "score a goal."

2. **Basketball**
   - Students will draw the path from the ball to the net. The timekeeper will measure the time they take to "score a basket."

3. **Tracing words**
   - Students will reproduce the letters of the words. The timekeeper will measure the time they take to trace both words.

4. **Name**
   - Have students print their names while looking into the mirror. Have them explain what is happening. The timekeeper will measure the time they take to do this.

Note:

- Students should do these tasks without prior practice.

Outcomes

Science 4: Light

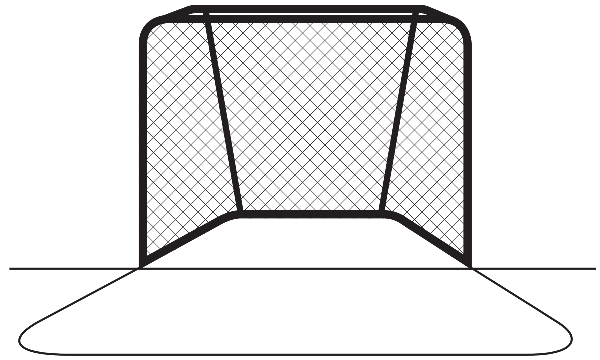
Students will be expected to

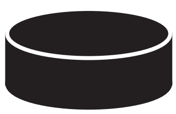
- compare and describe how light interacts with a variety of optical devices and construct an optical device that performs a specific function (107-1, 205-10, 303-8)
- make observations and collect information about the reflective and refractive properties of various materials of different shapes (205-5)

Technology Connection:

Set up a video camera to record students' attempts at these challenges.

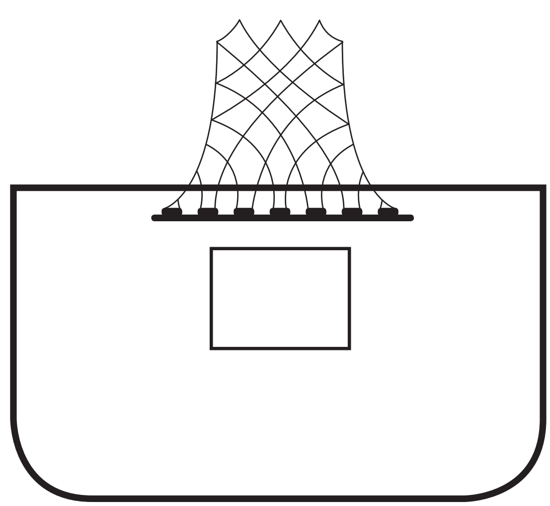
Hockey





Fold on dotted line. Insert this edge first for "Hockey" challenge.

Fold on dotted line. Insert this edge first for "Basketball" challenge.



Basketball

Tracing Words

YOURS MINE

Fold on dotted line. Insert this edge first for "Tracing Words" challenge.

Fold on dotted line. Insert this edge first for "Name" challenge.

Name

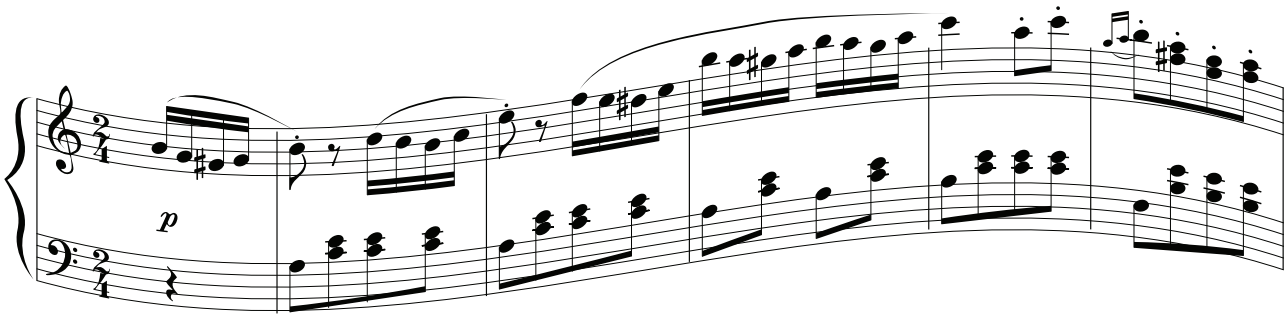
Music to My Ears

30 MINUTES
Time Limit

The Challenge

You will build your own device for making sounds. Your device must be able to make sounds that have variable pitch and loudness. The greater number of different materials needed to make your device work, the better.

You will be asked to demonstrate your device after the time limit is up. If you can play a tune with your device, that would be a good way to show what it can do.



Scoring Chart

Student or Team Name:_____

	Materials	Pitch	Volume Levels
More than 5	4	4	4
4 to 5	3	3	3
2 to 3	2	2	2
1	1	1	1
Points awarded			

Total: _____

Materials

- You may use any of the materials provided to construct your device. The greater number of different materials you use, the better your score.

Scoring

- You will be scored based on the pitch, as well as being able to vary the loudness of your sounds. See sample chart.
- The number of different materials you used in your design will also be included in the score. Decorations **will not** be counted.

Music to My Ears

TEACHER INFORMATION

30 MINUTES
Time Limit

The Challenge

Students are asked to build a device to make sounds of variable pitch and loudness. They will demonstrate the device at the end of the allotted time. Students may be asked to work individually, or in pairs.

Students should be provided with an array of easily-acquired items (see list below). They should select materials from this array to build their device. Part of the scoring rubric is based on the number of different materials used in the construction of the device. Decorative materials should NOT be included in the count.

Note: Students will have 30 minutes to construct and test their device. You may decide to change this time limit. If so, don't forget to change the length of time on the student sheet.

The list of materials below is a guideline of some of the items you may provide to your students. Any other materials you consider useful can be provided. Do not provide students with containers and water for creating sound.

Materials

- paper cups
- string
- small cardboard boxes (tissue size)
- craft sticks
- tin cans
- plastic wrap
- waxed paper
- beads (various sizes)
- elastic bands
- paper clips
- sticky tape
- scissors

Scoring

- The scoring will be based on the number of materials used to build the device, the number of different pitches the device can produce, and the ability of the device to make sounds of different volumes. Decorations will not be included in the count of number of materials used. A possible scoring rubric is included on the next page. This scoring rubric should be provided to the students as they begin their task.
- An alternate method of scoring could include requiring the smallest number of different materials in the construction of the device.

over

Outcomes

Science 4: Sound

Students will be expected to

- demonstrate and describe how the pitch and loudness of sounds can be modified; design, construct, and evaluate a device that has the ability to create sounds of variable pitch and loudness (104-1, 205-2, 206-7, 301-3)

This activity could be used at the end of the Sound topic in your science instruction. It could take the place of the suggested activity in the Science 4 curriculum guide, which is very similar.

Possible Extension

Ask students to play a simple tune on their device.

Technology Connection

- Use sound software (such as *Audacity*) to record the sounds produced by the various devices.

Scoring Chart

Student or Team Name:_____

	Materials	Pitch	Volume Levels
More than 5	4	4	4
4 to 5	3	3	3
2 to 3	2	2	2
1	1	1	1
Points awarded			

Total: _____

Magical Musical Materials

30 MINUTES
Time Limit

The Challenge

You are to play and sing the ABC song using the supplied equipment. You may use all eight glasses or any combination of any of the materials supplied. The pitch (how low or how high the sound is) for your glasses will be important for you to test before playing your song.

The Rules

- Tap the glasses to make sounds.
- Every group member must participate in making the music.
- Practise as much as you like during the 30 minutes.
- Groups will then take turns to perform for the judges.

Materials	Scoring
• 8 glasses of the same size and type • 2 metal forks • a container filled with water • a ladle/scoop • 1 sheet of blank paper • pencil	• pitch, 4 points • group participation, 4 points • song, 15 points • creativity, 2 points (e.g., jazz it up, flare, delivery)

Magical Musical Materials

TEACHER INFORMATION

30 MINUTES
Time Limit

The Challenge

Students are to play and sing the ABC song using the supplied equipment. They may use all eight glasses or any combination of any of the materials supplied. The pitch (how low or how high the sound is) for their glasses will be important for them to test before playing the song.

The Rules

- The student is to tap glasses to make sounds.
- Every group member must participate in making the music.
- Students can practise as much as they like during the 30 minutes.
- The judges will listen to the performance and score the group after the 30 minute time limit.

Outcomes

Science 4: Sound

Students will be expected to

- relate vibrations to sound production and compare how vibrations travel differently through a variety of materials (303-10, 303-11)
- demonstrate and describe how the pitch and loudness of sounds can be modified; design, construct, and evaluate a device that has the ability to create sounds of variable pitch and loudness (104-1, 205-2, 206-7, 301-3)

Science 5: Properties of and Changes in Materials

Students will be expected to

- observe and identify changes in an object's appearance, state, and/or reversibility and classify it as a physical change or not (301-9, 205-5, 301-10)

Materials

- 8 glasses of the same size and type
- 2 metal forks
- a container filled with water
- a ladle/scoop
- 1 sheet of blank paper
- pencil

Scoring

- pitch, 4 points
- group participation, 4 points
- song, 15 points
- creativity, 2 points (e.g., jazz it up, flare, delivery)

Maximum Light

30 MINUTES
Time Limit

The Challenge

As society becomes more energy conscious, we are trying to find ways to maximize the use of our energy resources. The object of the challenge is to construct a light passageway or tunnel away from your light source to provide maximum light. Teams should do the following:

1. Build the tunnel.
2. Shine your flashlight.
3. Measure brightness with the light meter.
4. Make any changes (materials, shapes) to increase the reading of the light meter.

The Rules

- The materials may be used in any way you choose to construct the passageway or tunnel.
- The passageway or tunnel cannot extend longer than 40 cm from the light source but can be any width or height and may be shorter than 40 cm if you choose.
- The light metering device will be placed 60 cm from the source (bulb).

Materials

Your team will be supplied with the following materials:

- a small flashlight or a bulb and battery combination with wires
- a light meter
- aluminum foil 30 cm × 30 cm
- 1 sheet of red, 1 sheet of white, 1 sheet of black, and 1 sheet of yellow construction paper
- a roll of clear tape

Scoring

- The challenge will be scored according to the reading on the light meter; the higher the reading, the higher the score.

Maximum Light

TEACHER INFORMATION

30 MINUTES
Time Limit

The Challenge

As society becomes more energy conscious, we are trying to find ways to maximize the use of our energy resources. The object of the challenge is to construct a light passageway or tunnel away from the light source to provide maximum light. Teams should do the following:

1. Build the tunnel.
2. Shine the flashlight.
3. Measure brightness with the light meter.
4. Make any changes (materials, shapes) to increase the reading of the light meter.

Suggestions

- The length of the metering device from the source may need to be adjusted according to the metering device available.
- Possible metering devices could be photographic hand-held light meters, computer light metering probes, or an SLR camera pointed at the light source.
- If light meters are in short supply, the students could build the passageway on a piece of cardboard and move it to the meter testing area for trials and the final attempt.
- Scoring points can be awarded in accordance with a higher lumen reading on a light meter or for higher F stops on an SLR camera. An arbitrary scale will have to be determined to suit the measuring device available.

Materials

Each team will be supplied with the following materials:

- a small flashlight or a bulb and battery combination with wires
- a light meter
- aluminum foil 30 cm × 30 cm
- 1 sheet of red, 1 sheet of white, 1 sheet of black, and 1 sheet of yellow construction paper
- a roll of clear tape

Scoring

- The challenge will be scored according to the reading on the light meter: the higher the reading, the higher the score.

over

Outcomes

Science 4: Light

Students will be expected to

- observe, demonstrate, and make conclusions about how light travels and is dispersed from a variety of light sources (204-7, 207-1, 303-3)
- investigate and predict how light interacts with a variety of objects (including changes in the location, shape, and relative size of a shadow in order to determine whether the objects cast shadows, allow light to pass, and/or reflect light (303-4, 303-5)
- make observations and collect information about the reflective and refractive properties of various materials of different shapes (205-5)

Science 5: Properties of and Changes in Materials

Students will be expected to

- observe and identify changes in an object's appearance, state, and/or reversibility and classify it as a physical change or not (301-9, 205-5, 301-10)

Nature & Habitats

2 HOURS
Time Limit

The Challenge

Design and construct a 3-dimensional habitat of a chosen animal or plant. Your habitat should show how your organism obtains food, water, and shelter. "Shelter" means protection from enemies and protection from the weather, including the seasons. You should also include at least two special weather events that might affect your organism (e.g., severe rain or snowstorms, hurricanes, tornadoes, or drought) and show how they might survive these events.

Your team will also produce written material to accompany your display. This could be a poster, a written report, a poem, or a labelled diagram. The written material should identify where your organism obtains food and water and how severe weather affects the organism's ability to get food, water, and shelter.

You could create a diorama as your habitat or any other method of displaying the required information. Your organism should be shown living in its habitat.

Special reminders:

- Habitats consist of living and non-living things.
- The habitat should be more than just the nest or home of the organism. It should show the surroundings where the organism lives.
- You should clearly identify the types of weather addressed, and how these weather events affect the food, water, and the survival of the organism.

Materials

- 1 box for each habitat team, sizes may vary
- Other materials as the group decides, such as craft items, art supplies, or natural items such as twigs, rocks, and leaves. Your teacher may have materials for you to use.

over

Scoring Chart

Task	Possible Points	Points Given
The habitat and the written material are produced.	2	
The food supply is identified.	1	
The water supply is identified.	1	
The shelter is shown accurately.	3	
Protection from enemies is shown.	1	
Weather events are shown with the effects on the habitat.	1 point for each event shown, to a maximum of 4 points	
Written information is provided.	3 points for clarity 3 points for presentation 3 points for explanation	

Nature & Habitats

TEACHER INFORMATION

2 HOURS
Time Limit

The Challenge

Each team is to design and construct a 3-dimensional habitat of a chosen animal or plant. The habitat should show how the organism obtains food, water, and shelter. "Shelter" should address protection from enemies and protection from the elements. Students should also address at least two special weather events that might affect their organism (e.g., severe rain or snow storms, hurricanes, tornadoes, or drought) and how they might survive these events.

Each team will also produce written material to accompany their display. This could be a poster, a written report, a poem, or a labelled diagram. The written material should identify where the organism obtains food and water and how the food, water, and shelter are affected during severe weather events.

These habitats could be made in the form of dioramas, with natural and craft materials being used to produce the various parts of the habitat. The organism should be placed in its habitat.

Special reminders:

- Habitats consist of living and non-living things.
- The habitat should be more than just the nest or home of the organism. It should show the surroundings in which the organism lives.
- The display should easily identify the types of weather addressed, and how these weather events affect the food, water, and the survival of the organism.
- Questions that may be addressed as extensions include How would weather affect the habitat? and How does the habitat meet the needs of the organism?

Notes:

- This activity may be done with individual students or in teams of two or three students. The choice would depend on your groups and the availability of materials. You may wish to assign various animals and plants to the groups or have each student or group choose its own organism.
- This task might be done over a period of time within the classroom setting. Visual arts time could be used for students to work on this. One might also want to have this as a group take-home project with the final product being brought to school for judgment.
- Large boxes, if available, might be provided to reflect the size of the animal or plant chosen.
- A public celebration of the habitats could be organized at the end of the competition.

over

Materials

- 1 box for each habitat team, sizes may vary
- other items as the group decides, such as craft items, art supplies, and natural items such as twigs, rocks, and leaves

Scoring Chart

Task	Possible Points	Points Given
The habitat and the written material are produced.	2	
The food supply is identified.	1	
The water supply is identified.	1	
The shelter is shown accurately.	3	
Protection from enemies is shown.	1	
Weather events are shown with the effects on the habitat.	1 point for each event shown, to a maximum of 4 points	
Written information is provided.	3 points for clarity 3 points for presentation 3 points for explanation	

Outcomes

Science 4

Students will be expected to

- construct and/or maintain a model of a natural habitat and, through observations, suggest improvements to make it more habitable for organisms (205-5, 205-10, 206-6)
- identify questions to investigate the types of plants and/or animals at a local habitat using the terms habitat, population, and community (104-6, 204-1)
- describe natural phenomena that cause rapid and significant changes to the landscape (301-7)

Science 5

Students will be expected to

- relate the transfer of energy from the sun to weather and discuss the sun's impact on soil and water (206-5, 303-21)
- relate the constant circulation of water on Earth to processes of evaporation, condensation, and precipitation (301-13)

Visual Arts 4

Students will be expected to

- 1.2.1 experiment with a range of materials and processes
- 2.1.1 work individually and with others to solve problems and express ideas

Visual Arts 5

Students will be expected to

- 1.3.1 use a combination of the visual elements and principles of design in art-making
- 2.1.1 work individually and collaboratively to apply learned skills, solve problems, and express ideas

Card Tower

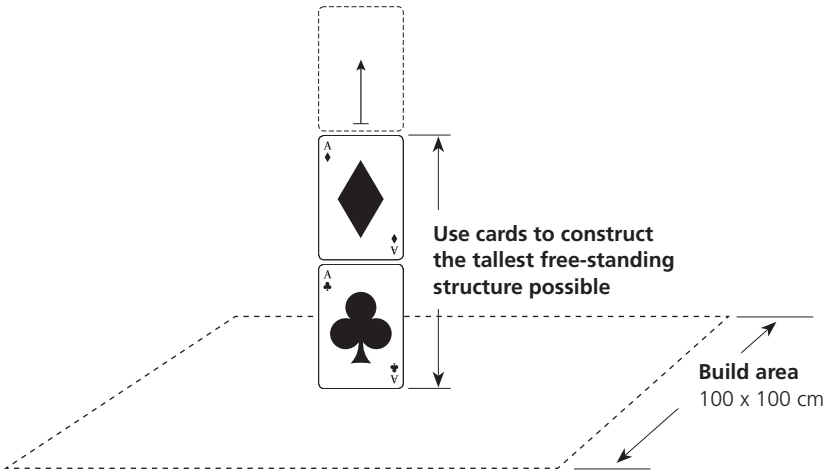
30 MINUTES
Time Limit

The Challenge

Your team is to build a free-standing structure made from cards.

The Rules

- Glue, tape, or other materials may not be used to hold the cards together.
- The area to build the card tower is 100 cm in length and 100 cm in width.
- Scissors may be used to cut the cards.
- Your team may use 104 cards or less.



Materials

- 104 cards (index or playing cards)
- scissors

Scoring

The highest point of the structure will be measured.
The highest score is the best.

Card Tower

TEACHER INFORMATION

30 MINUTES
Time Limit

The Challenge

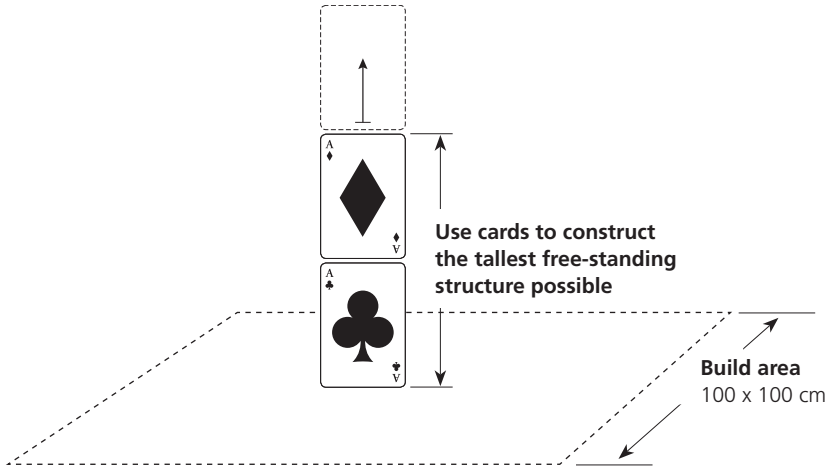
Teams are to build a free-standing structure made from cards. You will be measuring the structures and finding the tallest. The area to build the structure is to be 100 cm × 100 cm. You can provide students with either index or playing cards to use.

Notes

Teams will have 30 minutes to complete their structure. If you choose to change the time limit, number of cards, or area to build the structure, make sure you change it on the student information sheet.

The Rules

- Glue, tape, or other materials may not be used to hold the cards together.
- The area to build the card tower is 100 cm in length and 100 cm in width.
- Scissors may be used to cut the cards.
- Teams may use 104 cards or less.



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Materials	Scoring
• 104 cards (index or playing cards) • scissors	You will be measuring the highest point; the highest score is the best. The area where the students build the structure cannot exceed 100 cm × 100 cm, and they cannot use more than 104 cards.

Outcomes

Science 5: Forces and Simple Machines

Students will be expected to

- observe, investigate, and describe how forces can act directly (contact) or from a distance (non-contact) to move or hold objects in place (303-12, 303-13)
- demonstrate and describe the effect of increasing and decreasing the amount of force applied to an object (303-14)
- investigate and compare the effects of friction on the movement of objects over a variety of surfaces (204-1, 204-5, 303-15)

Eco-Friendly Trucking

30 MINUTES
Time Limit

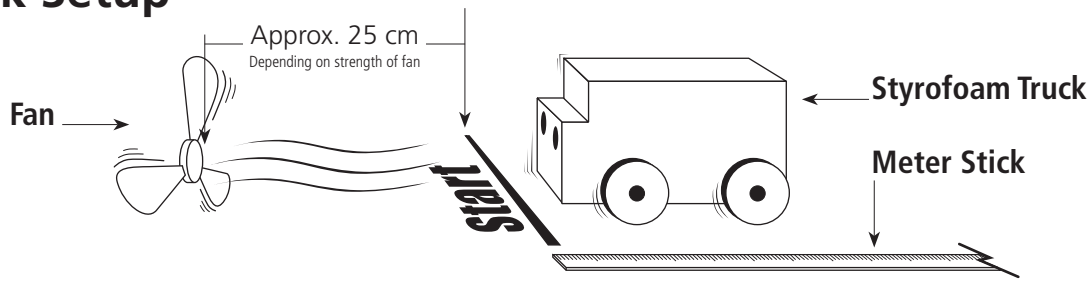
The Challenge

As the world population increases, we are relying more and more on transport trucks to move food, clothing, and other human needs from place to place. Trucks burn large amounts of fossil fuel, which affect the environment. In this activity you will design a truck that reduces air friction and creates as little drag as possible.

The Rules

You will be given a truck with a flat front that would cause the maximum amount of wind resistance or drag. With the materials provided, you must design and build a cab for the front of the truck that effectively reduces air friction, thus reducing drag. The cab you build cannot be longer than half the length of the rear section of the truck you started with—really long cabs would not make it around city street corners. Use the track for testing your design. This will also be used for the scoring at the end of the activity. As you make your cab, you may test your design on the track. You may redesign and rebuild your truck within the given time limit. Test your design to see how well it reduces air friction. The distance that your truck is pushed backwards is measured. This measurement (in cm) will become your team's score. The team with the shortest recorded distance, lowest score, wins. The shorter the distance your truck is pushed backwards, the better it is at reducing air friction, resulting in lower fuel consumption.

Track Setup



Materials

- 5 sheets of construction paper
- craft sticks
- fan
- metre stick
- scissors
- standardized toy truck
- tape

Scoring

The shortest distance the truck moves backwards wins. The front of the cab must start on the zero line of the test track. When the truck stops moving backwards, the location of the front of the cab will be measured from the zero line.

Eco-Friendly Trucking

TEACHER INFORMATION

30 MINUTES
Time Limit

The Challenge

As the world population increases, we are relying more and more on transport trucks to move food, clothing, and other human needs from place to place. In this activity teams will design a truck that reduces air friction and creates as little drag as possible.

The Rules

You will be given a truck with a flat front that would cause the maximum amount of wind resistance or drag. With the materials provided, students must design and build a cab for the front of the truck that effectively reduces air friction, thus reducing drag. The cab students build cannot be longer than half the length of the rear section of the truck they started with—really long cabs would not make it around city street corners. Students can use the track for testing their design. This will also be used for the scoring at the end of the activity. As they build the cab, they may test their design on the track. Students may redesign and rebuild their truck within the given time limit. When completed, the truck will be placed on the starting line of the test track, a fan will be turned on, and the distance the truck moves backwards away from the starting line will be measured (in cm) and recorded. The team with the shortest recorded distance, lowest score, wins. The shorter the distance the truck is pushed backwards, the better it is at reducing air friction, resulting in lower fuel consumption.

Suggestions

- A test track should be set up for students to test their trucks on. The fan should be kept in the same location about 25 cm or so from the Start Line. The distance may need to be tweaked depending on the strength of the fan and the mass of the trucks being used.
- Trucks could be made from a 2 L milk carton with the flat bottom end being the front and attaching standardized wheels and axles. Another alternative for truck bodies could be blocks of Styrofoam. Lighter trucks will react better with the fan than heavier ones.
- Trucks are best prepared beforehand so as to maintain control and ensure each group has a fair chance. Dollar store plastic toy trucks may be used for wheel and axle parts.

over

Outcomes

Materials	Scoring
Each team will be provided with the following materials • 5 sheets of construction paper • craft sticks • fan • metre stick • scissors • standardized toy truck • tape	The shortest distance the truck moves backwards wins. The front of the cab must start on the zero line of the test track. When the truck stops moving backwards, the location of the front of the cab will be measured from the zero line.

Science 5: Forces and Simple Machines

Students will be expected to

- investigate and compare the effect of friction on the movement of objects over a variety of surfaces (204-1, 204-5, 303-15)
- demonstrate the use of rollers, wheels, and axles in moving objects (303-16)

Egg Crash

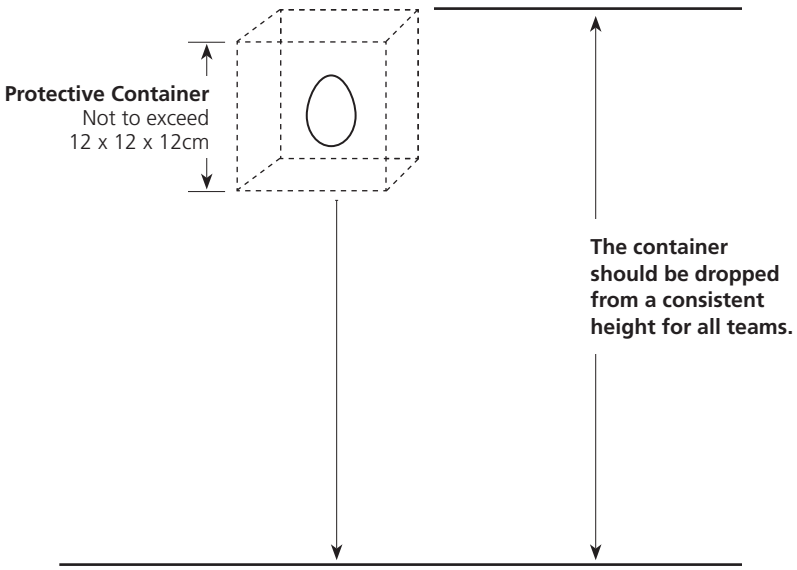
30 MINUTES
Time Limit

The Challenge

Your team will construct a container that is capable of hitting the ground without injury to its passenger, one egg. Your team will use the materials given to construct the container. The team whose container hits the ground without the passenger (egg) being broken is successful. If more than one team is successful on the first drop, the drop height can be made higher and the containers tested again to determine a winner.

The Rules

- When constructing your container, your team may use as much or as little of the material as you find necessary.
- It must be built using only the materials provided.
- The passenger cannot be glued into the container and must be clearly visible when opened.
- The container will be dropped from an elevated height.
- Your container cannot exceed 12 cm × 12 cm × 12 cm. Cracks in the egg are okay, but if a break occurs, your team will be eliminated. If liquid leaks from the egg, it is considered broken.



Materials

- 1 pair of scissors
- 1 roll of masking tape
- 1 glue stick
- 1 egg
- cardboard
- newspaper or paper scraps
- any other materials that your teacher provides

Scoring

The team whose egg survives the highest drop receives the highest score and is the winner of the challenge.

Egg Crash

TEACHER INFORMATION

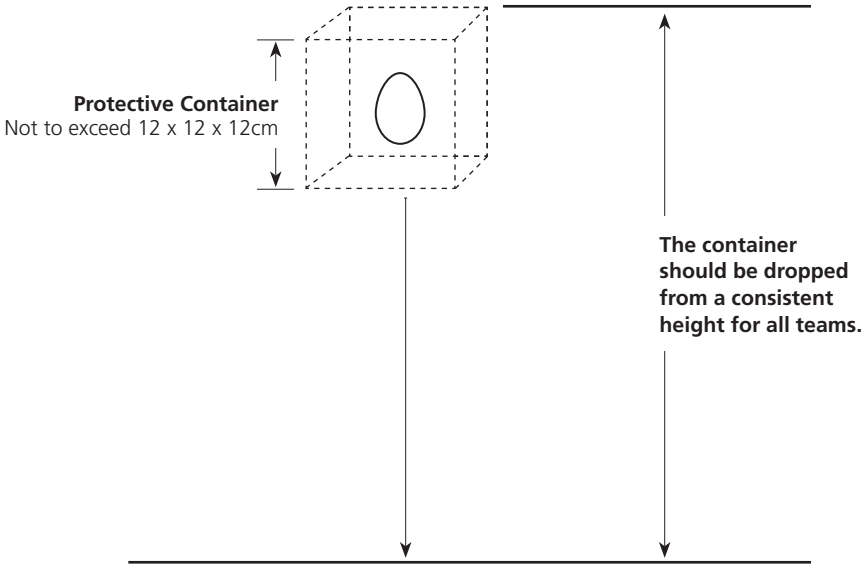
30 MINUTES
Time Limit

The Challenge

Students will construct a container that is capable of hitting the ground without injury to its passenger, one egg. Students will use the materials given to construct the container. The team whose container hits the ground without the passenger (egg) being broken is successful. If more than one team is successful on the first drop, the drop height can be made higher and the containers tested again to determine a winner.

The Rules

- When constructing the container, students may use as much or as little of the material as they find necessary.
- It must be built using only the materials provided.
- The passenger cannot be glued into the container and must be clearly visible when opened.
- The container will be dropped from an elevated height or out of a window.
- The container cannot exceed 12 cm × 12 cm × 12 cm. Cracks in the egg are okay but if a break occurs, that team will be eliminated. If liquid leaks from the egg, it is considered broken.



over

Materials		Scoring
• 1 pair of scissors • 1 roll of masking tape • 1 glue stick • 1 egg	• cardboard • newspaper or paper scraps • any other materials that you provide (Styrofoam peanuts, cotton balls, batting, etc.)	The team whose egg survives the highest drop receives the highest score and is the winner of the challenge.

Outcomes

Science 5: Forces and Simple Machines

Students will be expected to

- observe, investigate, and describe how forces can act directly (contact) or from a distance (non-contact) to move or hold objects in place (303-12, 303-13)

Glider

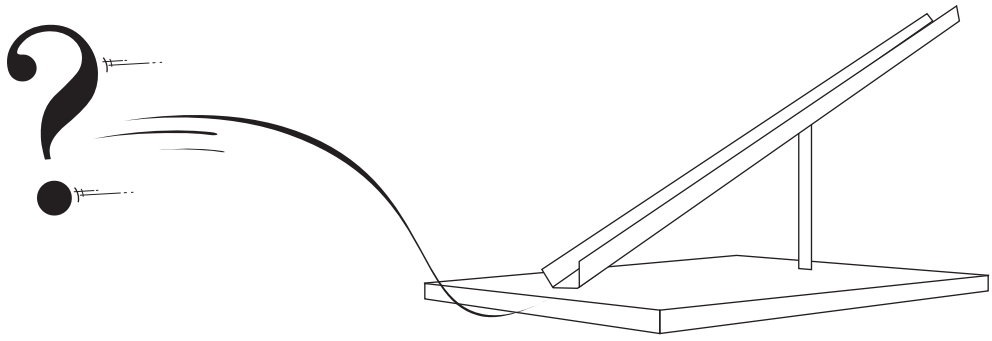
30 MINUTES
Time Limit

The Challenge

Your group will build a gliding aircraft, which, when launched from a track, will travel the greatest horizontal distance, measured from the base of the launch structure. The launch track will be elevated on a table. You will have one opportunity to send your glider down the track. The distance it travels from the end of the launch ramp will be measured. The glider that travels the furthest distance is the winner.

The Rules

- Only the materials provided may be used.
- You may use as much or as little of the materials as you find necessary.
- Wheel assembly structures should be a consistent size to fit the launch track.
- Gliders may be tested in turn during the design and testing phase by taking your craft to the judge at the launch pad area.



Materials

- 1 large recycling bag
- 6 plastic straws
- 2 pieces of Bristol board
- 1 roll of masking tape
- 1 K'nex Kit (or other construction kit containing wheels)
- scissors

Scoring

- The winning glider will be the one that travels the greatest horizontal distance from the base of the launch ramp.
- The distance will be measured (in cm) from the end of the launch ramp to the point where the wing assembly comes to a stop.
- Points will be awarded according to the order of finish, with the team whose glider travels the furthest receiving the top score.

Glider

TEACHER INFORMATION

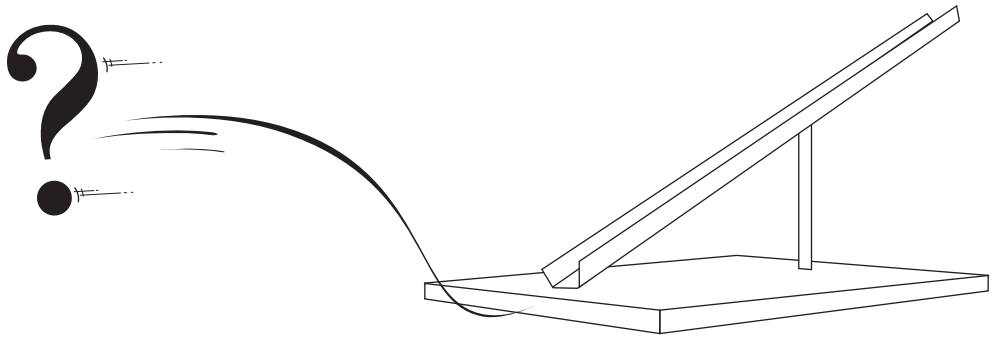
30 MINUTES
Time Limit

The Challenge

Students will build a gliding aircraft, which, when launched from a track, will travel the greatest horizontal distance, measured from the base of the launch structure. The launch track will be elevated on a table. Students will have one opportunity to send their glider down the track. The distance it travels from the end of the launch ramp is to be measured. The glider that travels the furthest distance is the winner.

The Rules

- Only the materials provided may be used.
- Students may use as much or as little of the materials as they find necessary.
- Wheel assembly structures should be a consistent size to fit the launch track.
- Gliders may be tested in turn during the design and testing phase by taking their craft to the judge at the launch pad area.



Materials

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- 1 K'nex Kit (or other construction kit containing wheels)
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Scoring

- The winning glider will be the one that travels the greatest horizontal distance from the base of the launch ramp.
- The distance will be measured (in cm) from the end of the launch ramp to the point where the wing assembly comes to a stop.
- Points will be awarded according to the order of finish, with the team whose glider travels the furthest receiving the top score.

Outcomes

Science 5: Forces and Simple Machines

Students will be expected to

- demonstrate the use of rollers, wheels, and axles in moving objects (303-16)
- observe, investigate, and describe how forces can act directly (contact) or from a distance (non-contact) to move or hold objects in place (303-12, 303-13)

Present Arms!

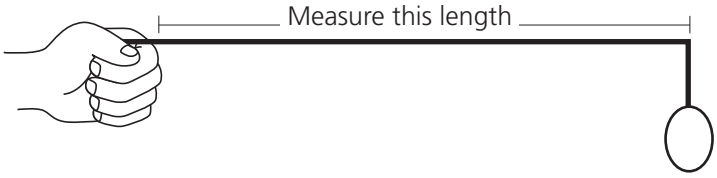
30 MINUTES
Time Limit

The Challenge

Your group will build a mechanical arm in order to lift a 100 g mass as far away from you as possible.

The Rules

- You may use only the materials provided to construct your arm.
- One team member must hold one end of the arm.
- The 100 g mass must hang from the opposite end.
- The arm must support the mass without bending or collapsing.
- The distance from the person's hand to the point the mass is attached to the arm will be measured. The longest arm will be the winner.



Materials

Each workstation will require

- 25 plastic straws
- 25 straight pins
- 100 g mass for testing

Scoring

The distance from the operator's hand to the point the mass is attached will be measured. This measurement (in cm) will become your team's score.

Present Arms!

TEACHER INFORMATION

30 MINUTES
Time Limit

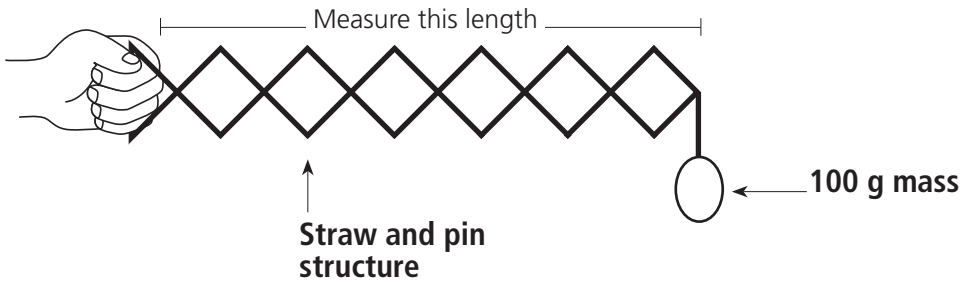
The Challenge

Each group will build a mechanical arm in order to lift a 100 g mass as far away from the operator as possible.

The Rules

- Use the materials provided to construct the arm.
- One team member must hold one end of the arm.
- The 100 g mass must hang from the opposite end.
- The arm must support the mass without bending or collapsing.
- The distance from the person's hand to the point the mass is attached to the arm will be measured. The longest arm will be the winner.

Here is a sample diagram of one possible construction, with measuring details:



Materials

Each workstation will require

- 25 plastic straws
- 25 straight pins
- 100 g mass for testing

Scoring

The distance from the operator's hand to the point the mass is attached will be measured. This measurement (in cm) will become the team's score. It is important to ensure that the measurements are done consistently. You may wish to create a "start line" for your measurements, in order to be sure that all teams are measured from the same point.

over

Outcomes

Science 5: Forces and Simple Machines

Students will be expected to

- observe, investigate, and describe how forces can act directly (contact) or from a distance (non-contact) to move or hold objects in place (303-12, 303-13)
- demonstrate and describe the effect of increasing and decreasing the amount of force applied to an object (303-14)
- perform experiments to describe the force needed to lift of pull a given load in standard and non-standard units (205-4, 205-5, 205-6)

Grade 5 Mathematics

Students will be expected to

- predict and construct figures made by combining two triangles (E5)
- make generalizations about the diagonal properties of squares and rectangles and apply these properties (E8)

Possible Extension

- Ask students to find the maximum load their design can support.

Technology Connection

- Use digital video cameras and software to create a video record of the contest.

Pull!

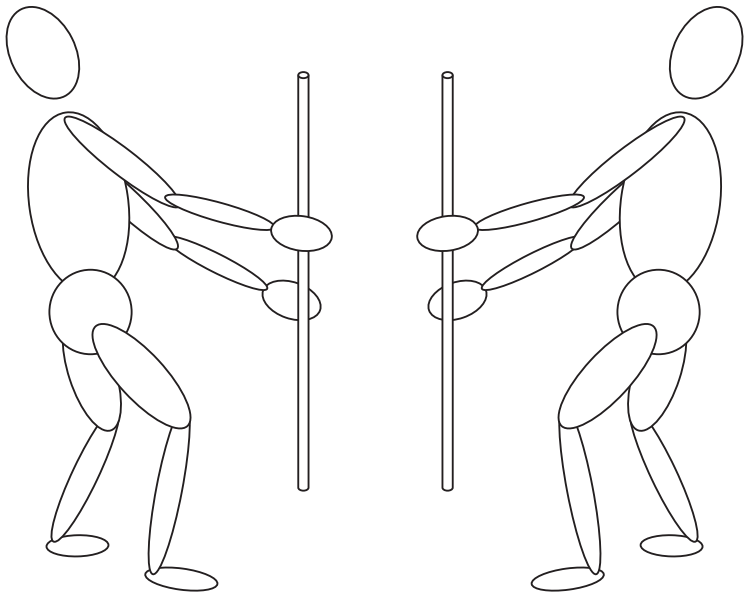
30 MINUTES
Time Limit

The Challenge

Your team (two people) will develop a method for pulling two sticks together, using a length of rope.

The Rules

- Two people will stand 40 cm apart, each holding a stick (such as a broom handle) vertically.
- The team will use a rope (approximately 3 m) to try to pull the two sticks together.
- The rope should be tied tightly, close to the bottom of one stick.
- When pulling, only the rope can touch the sticks.
- Scoring will be done when the sticks have been brought as close as possible.



Materials

- 2 sticks (e.g., broom handles, hockey sticks)
- long piece of rope (approximately 3 m)

Scoring

- The distance between the two sticks will be measured. This measurement (in cm) will become your team's score.
- **The lowest score is the best.**

Pull!

TEACHER INFORMATION

30 MINUTES
Time Limit

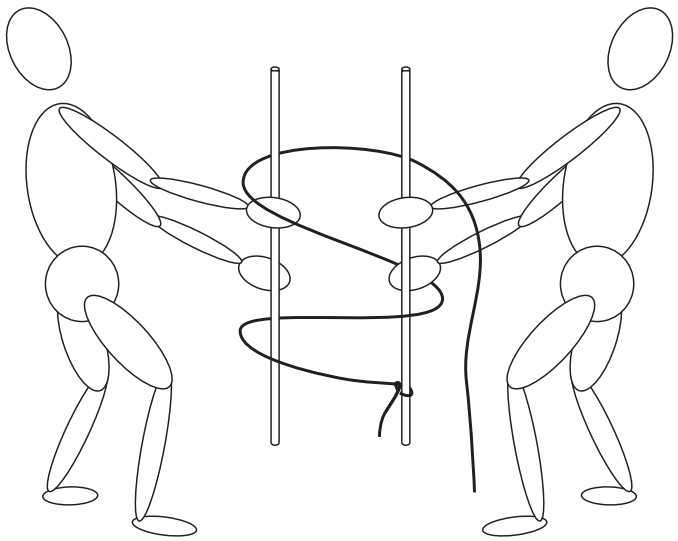
The Challenge

Teachers should select two people to be the stick holders, preferably from another class. For consistency, it would be best to have the same people holding the sticks for each test if possible. Organize your students into teams. Each team will develop a method for pulling two sticks together, using a length of rope. The tests may have to be done in a separate room, since later teams will quickly see the best method for performing the task.

The Rules

- Two people will stand 40 cm apart, each holding a stick (such as a broom handle) vertically.
- The team will use a rope (approximately 3 m) to try to pull the two sticks together.
- The rope should be tied tightly, close to the bottom of one stick.
- When pulling, only the rope can touch the sticks.
- Scoring will be done when the sticks have been brought as close as possible.

This task is based on the principles students learn in the unit "Forces and Simple Machines." The broom handles act as a type of pulley. The rope should be tied tightly to one stick, and looped several times around the two sticks. Every loop acts as an additional pulley, making it easier to pull the sticks close together. Here is a sample diagram of the best type of solution.



Materials

- 2 sticks (e.g., broom handles, hockey sticks)
- long piece of rope (approximately 3 m)

Scoring

- The distance between the two sticks will be measured. This measurement (in cm) will become your team's score.
- **The lowest score is the best.**

over

Outcomes

Science 5: Forces and Simple Machines

Students will be expected to

- use simple machines to identify the effort and load required to move objects (205-2, 206-9, 303-17)
- compare and record the force needed to lift and load an object by using a single pulley system with that needed to lift it by using a multiple pulley system, and predict the effect of adding another pulley on load-lifting capacity (303-20, 204-3)

Technology Connection:

Digital video or still photographs of the tests could be used to record the various attempts.

Ramp Splash

NOVA SCOTIA Science OLYMPICS

30 MINUTES
Time Limit

The Challenge

Your group is to use the materials provided to design, construct, and test a paper ramp. The ramp is to be free standing and self-supporting so that a marble going down it will gain enough momentum to fly into a container. You are to see what the furthest distance the container can be from the ramp and still have the marble land in it. Choose the ramp that you will use to show the judges. The distance measured during the judges' scoring will be the one that counts.

The Rules

- You may do three trials, each with a different colour of paper. Pick the one you wish to show the judges.
- Your group has 30 minutes to design, construct, and test your paper ramp.
- Record your data on the results page provided.
- Use paper and glue, in any way you wish, to construct the ramp.
- The ramp must be self-supporting.
- Use the metre sticks to measure the height of the ramp, the length of the ramp, and the distance the container is from the end of the ramp.

Materials

- 3 sets of 3 different coloured sheets of letter-size paper
- 1 bottle of glue
- 1 metre stick
- 1 marble, mass 15 g
- 1 container of water

Scoring Chart

Task	Possible Points	Points Given
Self-supporting ramp	4	
Marble is able to land in the container	1	
Distance the marble travels from the ramp to the container. Scale: 2 cm = 1 point	10	
Data table filled in	6	
Questions	4	

over

Our Results

Data Table

RAMP SPLASH			
Trial	**Height (cm)**	**Length (cm)**	**Distance (cm)**
1			
2			
3			

Choose the ramp that you will use for your demonstration to the judges. The distance measured during the judges' scoring will be the one that counts.

Questions

1. Explain how the speed of the marble is changed by height of the ramp.

2. Does the amount of energy in the marble affect the way the marble hits the liquid in the container?

3. Which ramp has the most energy? _____
   What type(s) of energy are used in this challenge?

   ❑ wind
   ❑ water
   ❑ kinetic
   ❑ potential
   ❑ solar
   ❑ nuclear
   ❑ chemical
   ❑ other _____

4. Give an example of a ramp that you have seen or used. Tell why this ramp is useful in this situation.

Ramp Splash

TEACHER INFORMATION

Nova Scotia Science Olympics

30 minutes
Time Limit

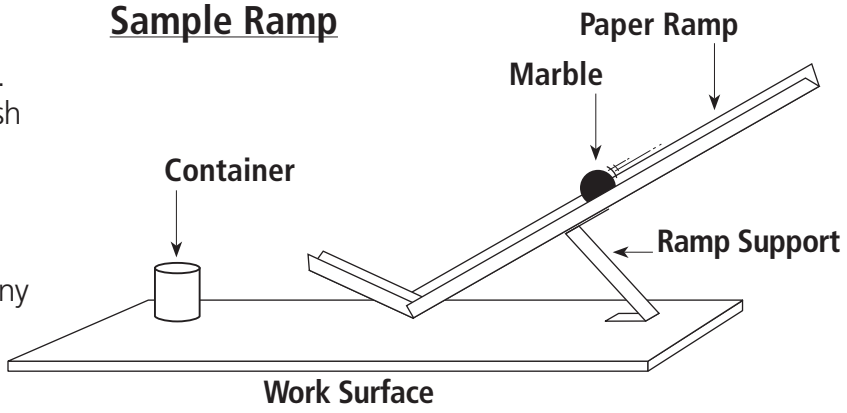
The Challenge

Each group is to use the materials provided to design, construct, and test its paper ramp. The ramp is to be free standing and self-supporting so that a marble going down it will gain enough momentum to fly into a container with water. Students are to see what the furthest distance the container can be from the ramp and still have the marble land in it.

The Rules

- Students may do these three trials, each with a different colour of paper. Students are to pick the one they wish to show the judges.
- A results page is supplied. This is included in the scoring.
- Students can use paper and glue in any way they wish to construct the ramp.
- Ramp must be self-supporting.
- Use the metre stick to measure the height of the ramp, the length of the ramp, and the distance the container is from the end of the ramp.

Sample Ramp



Materials

- 3 sets of 3 different coloured sheets of letter-size paper
- 1 bottle of glue
- 1 metre stick
- 1 marble, mass 15 g
- 1 container of water

Scoring Chart

Task	Possible Points	Points Given
Self-supporting ramp	4	
Marble is able to land in the container	1	
Distance the marble travels from the ramp to the container. Scale: 2 cm = 1 point	10	
Data table filled in	6	
Questions	4	

over

Outcomes

Science 5

Students will be expected to

- use simple machines to identify the effort and load required to move objects (205-2, 206-9, 303-17)
- observe, investigate and describe how forces can act directly (contact) or from a distance (non-contact) to move or hold objects in place (303-12, 303-13)
- demonstrate and describe the effect of increasing and decreasing the amount of force applied to an object (303-14)

Mathematics 4

Students will be expected to

- estimate and measure in millimetres, centimetres, decimetres, metres, and kilometres (D8)