OCTE 2012 – Elementary Conference Workshops

GRADE 3 | UNDERSTANDING MATTER AND ENERGY FORCES CAUSING MOVEMENT

PROPELLER CAR DESIGN CHALLENGE

OVERALL EXPECTATIONS
By the end of Grade 3, students will:
2. investigate devices that use forces to create controlled movement.

SPECIFIC EXPECTATIONS
2. Developing Investigation and Communication Skills
By the end of Grade 3, students will:

2.1 follow established safety procedures during science and technology investigations (e.g., use eye protection when twisting, bending, compressing, or stretching materials)
2.4 use technological problem-solving skills (see page 16), and knowledge acquired from previous investigations, to design and build devices that use forces to create controlled movement (e.g., an airplane propelled by hand or by an elastic band; a boat that holds paper clips and moves through water using magnets; a crane that lifts a load; a timed marble run) Sample guiding questions: What is the purpose of your device? What force(s) are being used? How does your device move? How do the force(s) control the movement? How might your device be improved?
2.5 use appropriate science and technology vocabulary, including push, pull, load, distance, and speed, in oral and written communication
2.6 use a variety of forms (e.g., oral, written, graphic, multimedia) to communicate with different audiences and for a variety of purposes (e.g., give a demonstration to show how a device was constructed and how it performs; use a drawing to illustrate the design alterations needed to improve a device; describe with pictures and/or in writing the steps required to build a device).

Learning Goals

1. Students will follow established safety procedures during science and technology investigations (e.g., use eye protection when twisting, bending, compressing, or stretching materials).
2. Students will design and build devices that use forces to create controlled movement (e.g., a toy car that driven by the force created by a rubber band powered propeller).
3. Students will use appropriate science and technology vocabulary, including push, pull, load, distance, and speed.
4. Students will use a variety of forms (e.g., oral, written, graphic, multimedia) to communicate with different audiences and for a variety of purposes (e.g., give a demonstration to show how a device was constructed and how it performs; use a drawing to illustrate the design alterations needed to improve a device; describe with pictures and/or in writing the steps required to build a device).

Assessment and Evaluation

For Assessment and Evaluation support, please see Appendix G.

Check items you wish to evaluate during the completion of this unit. Skip items that do not apply to your current program needs.
You may differentiate your assessment by offering your students a variety of these items as "choices", while making other items mandatory.

- Please see Appendix B for this unit's assessment rubric (assessment of learning).
- Please see Appendix C for this unit's Grade Sheet (assessment of learning).
- Please see Appendix D for the Continuum for Technological Problem Solving rubric (assessment for/as learning).
- Please see Appendix E for the Assessment As Learning, Student Self-Assessment Log" (assessment as learning).
- Please see Appendix F for the Teacher's Record, Assessment For Learning sheet.

Success Criteria

Knowledge and Understanding (K&U), please see "Appendix B" for corresponding evaluation items:

○ the student acquired a knowledge of facts and terminology related to forces causing movement, as well as, used tools and materials safely and appropriately in building and using a propeller car (K&U, 1);

○ the student understands content (e.g., concepts, ideas, and processes) that address her/his propeller car (K&U, 2);

Thinking and Investigation (T&I), please see "Appendix B" for corresponding evaluation items:

○ the student developed ideas, regarding potential solutions to his/her design challenge, and developed a suitable plan for solving it (T&I, 3);

○ the student used processing skills and strategies (e.g., performing and recording, gathering evidence and data, observing, manipulating materials and using equipment safely, ... proving) to design and fabricate a propeller car (T&I, 4);

○ the student used critical/creative thinking processes, skills, and strategies to test her/his propeller car, and determine if her/his prototype met the design challenge requirements (T&I, 5).

Communication (Com.), please see "Appendix B" for corresponding evaluation items:

○ the student completed an oral, visual, or written report that was organized in a clear, logical manner, and included diagrams, models, and media where appropriate (Com. 6);

○ the student's report accurately described the steps taken to solve the design challenge, as well as, the learning that he/she acquired from the unit; the student used an appropriate oral, written and/or media form for the selected audience e.g., teacher, or teacher and classmates (Com. 7);

○ the student included the correct use of scientific vocabulary and terminology (e.g., including push, pull, load, distance, and speed) in his/her report (Com. 8);

Application (App.), please "Appendix B" for corresponding evaluation items:

○ the student followed established safety practices for using tools, and materials (App. 9);

○ the student listed beneficial aspects of his/her design regarding people, other living things, and the environment (App. 10);

○ the student proposed courses of practical action that involved the use of her/his propeller car (e.g., address problems in technology [design] by sharing knowledge about propeller lengths and clearances required, or the promotion of rubber band powered cars made with mostly renewable and decomposable components to encourage ecofriendly toy choices) (App. 11).

Curriculum Connections and Additional Assessment Opportunities

Language:

- Oral Communication, Overall Expectation 2 (select from specific expectations 2.3, 2.4, and 2.7);
- Writing, Overall Expectations 2, and 3 (select from specific expectations 2.1, 2.4, and 3.3)
- Media Literacy, Overall Expectation 3 (specific expectation 3.4).

Materials and Tools List

Tools:

- CSA approved safety glasses/goggles, one pair per person (parent volunteers included);
- an approved eyewash station; this can be two eyewash bottles containing approved eyewash fluid that has not reached its expiry time limit after decanting, or an installed system (an actual eyewash station, or approved faucet attachment);
- a first aid kit (please see your Board's Health and Safety Regulations if one is being purchased for your classroom);
- basic hacksaws (junior saws), or coping saws, minimum one for every 3 projects (local hardware stores, www.kidder.ca or www.busybeetools.com);
- bench hooks, minimum one for every 3 projects (www.kidder.ca);
- 3" C-clamps, minimum one for every 3 projects (local hardware stores, www.kidder.ca or www.busybeetools.com);
- a ruler, one per project:
- scissors, if students are cutting their own gussets, one pair for every project (students may supply their own);
- hammer one for every 5 projects, if using a nail to hold the elastic in place at the end of the wood strip;
  - long nose or needle nose pliers (one pair for each teacher/helper); **these are needed for "bargain" store wheel designs only;**
    - they are used to pull the nail (axle) out, if the wheel is pinched against the wood strip too tightly;
    - they can also be used to bend the axle in the required direction if the car does not travel in a reasonably straight line;
- corrugated cardboard strips with a split in the end; this is used to hold finishing nails at a safe distance from little fingers (you can purchase manufactured nail guides at http://www.busybeetools.com/products/NAILS-GUIDE.html).

Materials:

- 2 basswood strips 24" x 1/2" x 1/2" (12mm x 12mm x 61cm) per project (http://kidder.ca/);

- 1 basswood building strip 4 mm x 9 mm, some sanding may be needed to accommodate the propeller assembly (http://kidder.ca/); PLEASE NOTE a third 1/2" x 1/2" strip may be substituted, but some cutting will be needed to fit the propeller assembly on the end;
- 1 propeller, 152 mm and includes plastic nose and bearing shaft, per project (http://kidder.ca/);
- 1 paper clip, small finishing nail, or screw eye per project (to hold the elastic in place at the back end of the propeller assembly); please note that popsicle stick fins or wooden post can also be used to anchor the elastic at the tail end of the wood strip;
- 1 drive band (long elastic) per project (http://kidder.ca/);
- wheels and axles, here are two options,
  - Option 1,
    - 4mm dowel rods, 6" (15 cm) per axle (http://kidder.ca/);
    - MDF wheels, 54 mm with 4mm hole (http://kidder.ca/):
    - "art straw" pieces, two per axle, one straw should be enough for 2 1/2 projects (http://kidder.ca/);
  - Option 2,
    - "bargain" store wheels, 4 per project (e.g., from toy cars, motorcycles, etc.);
    - common nails, use as axles, select a diameter that fits the holes, 4 per project (these are smooth rather than spiral and wider head than finishing nails),
- cardstock gussets (triangles to glue over wood joints for added strength), 12-16 per project (cut your own from cereal boxes, or order from www.kidder.ca);
- glue, about 500 ml for the class;
- sand paper, medium to fine grit, 1 sheet for every 5 projects;
- centimetre grid paper, (optional) to trace out parts and determine if there is enough wood for the lengths required;
- pennies, to create a measurable testing load (optional).

Internet Resources to Get You Started (always stay on the main page)

- a great introductory video and good instructions on how to make a simple version of the propeller car http://www.instructables.com/id/Propeller-Powered-Car/?ALLSTEPS
- a good low tech version that uses common materials to create a similar product http://www.usd116.org/ums/projects/sciencenet/projects/pcarshints.html

Background Knowledge

Please see "Internet Resources" listed above.

The propellers from the list of materials must be mounted at the front of the vehicle to operate properly; however, propellers that are fixed to a center pin can be mounted at either end successfully. In this case, students will have to experiment with winding directions to generate the desired movement.

During research activities, students will find many examples of a propeller and elastic system that is mounted on an angle. If this design is chosen the elastic must be in line with the propeller shaft. Students should avoid a system where the elastic drops on an angle from a horizontal propeller shaft.

Be sure to locate your Board's safety policy and documentation procedures. Train your students in the use of the saws, clamps, and bench hooks, (following your Board's requirements) and document this instruction accordingly.

See "Appendix H: Samples" for an example of student work.

Students will tend to ignore the use of gussets to join pieces of wood. Encourage them to use this strengthening technique, to fabricate a stronger propeller car. A card stock (or cereal box) triangle should be placed on both sides of the joint where possible.

Activity Description

Design Challenge:
Using the materials provided, students will design, build and test a propeller car that uses forces to create controlled movement. The car must include a rolling platform that supports a rubber band powered propeller. To be successful the propeller and rubber band system must drive the car forward a minimum of three metres. Optional activity, use pennies to the maximum load a student's car can carry for the distance of three metres.

Using appropriate science and technology vocabulary including push, pull, load, distance, and speed. Students will complete a report (oral, written, graphic, or multimedia) that addresses a task (or tasks) the teacher has selected from the following list:

- give a demonstration to show how a device was constructed and how it performs;
- use a drawing to illustrate the design alterations needed to improve a device;
- describe with pictures and/or in writing the steps required to build a device.

Minds On/Hands On

1. Whole class, project or hand out copies of Appendix A: Propeller Cars, and hand out Appendix E: Assessment As Learning, Student Assessment Log.
2. Briefly review the terms push, pull, load, distance, and speed.
3. Have students turn and talk about the pictures they see in Appendix A, and how force words (see above) are related to the propeller cars.
4. Whole class, discuss and clarify how the vocabulary applies to the movement of the cars in Appendix A.

Action

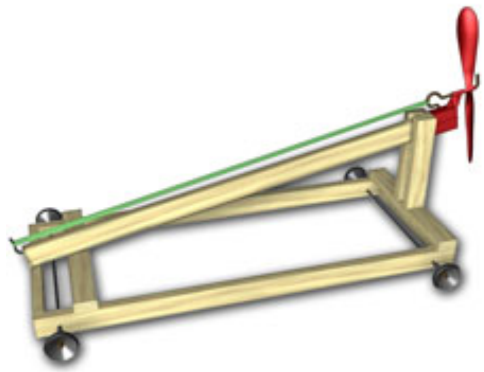
1. Teacher introduces the design challenge and has the materials and tools on display. After receiving instructions and clarification, students fill out item A on the Student Self-Assessment Log (Appendix E).
2. Small groups, students discuss the problem they have discovered, and brainstorm solutions that use the tools and materials provided. This is followed by a whole class discussion of the ideas generated, led by the teacher. Students complete item B on the Student Self-Assessment Log.
3. Teacher leads a whole class discussion of possible solutions and narrows them down to feasible choices, given the tools and materials available, and the students' capabilities. Students complete item C on the Student Self-Assessment Log.
4. Teacher reviews, or provides instruction on, Learning Skills related to this type of task (e.g., safety, problem solving, collaboration, and responsibility). This instruction or review must adhere to your Board's safety policies and documentation procedures.

5. Teacher leads discussion/brainstorming session on what makes a good propeller car (co-constructs success criteria) and records items that reflect the curriculum goals. Students complete item E on the Student Self-Assessment Log.
6. Students select one of the final solutions listed above. Students create a set of plans (labeled pictures and oral description) for making a propeller car using the tools and materials available. Teacher reviews plans for feasibility. Students with approved plans move on to the next step. Students complete item D on the Student Self-Assessment Log.
7. Students follow their plans to fabricate their propeller car. Students complete item F on the Student Self-Assessment Log.
8. Teacher reviews/discusses the vocabulary that students are to use when describing forces that movement of their propeller cars.
9. Students test their propeller card and determine if they solve the design challenge as required (may include the "penny option"). Teacher supports students as they record observations, and results during this process. Students complete items G and H on the Student Self-Assessment Log.
10. If improvements are necessary, and if time permits, students should redesign their prototype and re-test it to determine if the changes were successful.
11. Students, make note of all final observations and insights, then begin working on their reports.

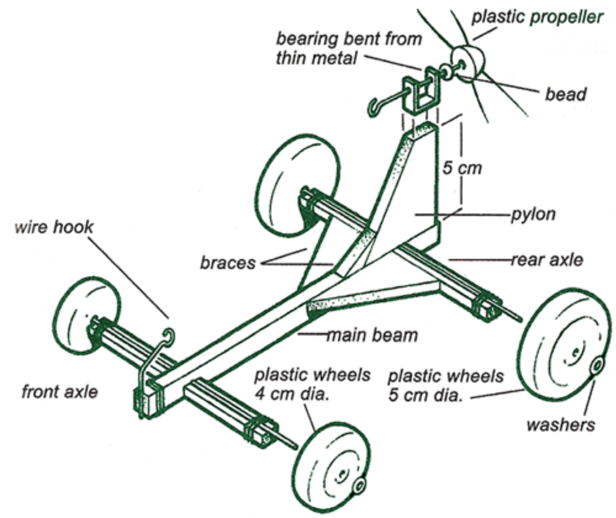
Consolidation

12. In groups, students discuss what went well with their designs and tests, what changes were made, why they were needed, and what they would do differently if given another opportunity. This material should be added to the students' reports. Students complete items I - J on the Student Self-Assessment Log.
13. In groups, students discuss/debate how their propeller cars are good for them in some ways, as well as how they might be bad for them in others. Students complete item K on the Student Self-Assessment Log.
14. Using appropriate science and technology vocabulary including push, pull, load, distance, and speed. Students create a report (oral, written, graphic, or multimedia) that addresses a task (or tasks) the teacher has selected from the following list:
    - give a demonstration to show how a device was constructed and how it performs;
    - use a drawing to illustrate the design alterations needed to improve a device;
    - describe with pictures and/or in writing the steps required to build a device.
15. Students list beneficial aspects of their design regarding people, other living things, and the environment, and include these in their report.
16. Students propose courses of practical action that involved the use of their propeller cars (e.g., address problems in technology [design] by sharing knowledge about propeller lengths and clearances required, or the promotion of rubber band powered cars made with mostly renewable and decomposable components, to encourage ecofriendly toy choices) and include these in their report.
17. Students, present/submit a report that meets the requirements selected above. Students complete item L on the Student Self-Assessment Log.

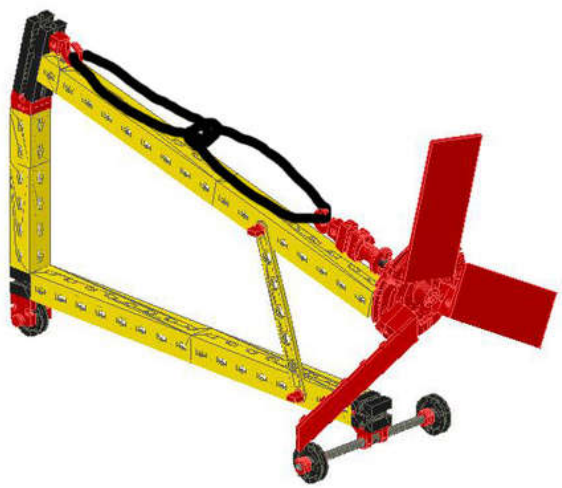
Appendix A: Propeller Vehicles



Source: http://www.docfizzix.com/products/vehicle-kits/rubber-band-powered/krbr900df.shtml



Source: http://www.madfull.com/pages/activity_rubberpoweredcar.html



Source: http://www.instructables.com/image/FP44MUGFT7PVH5S

Source: http://www.wired.com/autopia/2008/08/lotus-on-ice/

Appendix B: Assessment Rubric (Assessment **of** Learning)

This rubric was developed from the Ontario Curriculum Grades 1-8 Science and Technology, Revised 2007 document.

	Level 1	Level 2	Level 3	Level 4
Knowledge and Understanding (K&U) – Subject-specific content acquired in each grade (knowledge), and the comprehension of its meaning and significance (understanding)				
	The Student:			
1. Knowledge of content (e.g., facts and terminology related to forces that cause movement; safe use of tools and materials)	demonstrates limited knowledge of content	demonstrates some knowledge of content	demonstrates considerable knowledge of content	demonstrates thorough knowledge of content
2. Understanding of content (e.g., concepts, ideas, and processes involving forces that cause movement)	demonstrates limited understanding of content	demonstrates some understanding of content	demonstrates considerable understanding of content	demonstrates thorough understanding of content
Thinking and Investigation (T&I) – The use of critical and creative thinking skills and inquiry problem solving skills and/or processes				
	The Student:			
3. Use of initiating and planning skills and strategies (e.g. identifying the problem and developing plans)	uses initiating and planning skills and strategies with limited effectiveness	uses initiating and planning skills and strategies with some effectiveness	uses initiating and planning skills and strategies with considerable effectiveness	uses initiating and planning skills and strategies with a high degree of effectiveness
4. Use of processing skills and strategies (e.g., performing and recording, gathering evidence... data, observing, manipulating materials and using equipment safely, ... proving) to design and fabricate a propeller car	uses processing skills and strategies with limited effectiveness	uses processing skills and strategies with some effectiveness	uses processing skills and strategies with considerable effectiveness	uses processing skills and strategies with a high degree of effectiveness
5. Use of critical/creative thinking processes, skills, and strategies (e.g., analysing, interpreting, problem solving, evaluating, forming and justifying conclusions on the basis of evidence) to complete a fair test to determine if the prototype meets the design requirements for this task	uses critical/creative thinking processes, skills, and strategies with limited effectiveness	uses critical/creative thinking processes, skills, and strategies with some effectiveness	uses critical/creativ e thinking processes, skills, and strategies with considerable effectiveness	uses critical/creative thinking processes, skills, and strategies with a high degree of effectiveness
Communication (Com.) – The conveying of meaning through various forms				
	The student:			
6. Expression and organization of ideas and information in oral, visual, and/or written forms (complete a report that is organized in a clear, logical manner and includes diagrams and models where appropriate)	expresses and organizes ideas and information with limited effectiveness	expresses and organizes ideas and information with some effectiveness	expresses and organizes ideas and information with considerable effectiveness	expresses and organizes ideas and information with a high degree of effectiveness

7. Communication for different audiences and purposes in oral, visual, and/or written forms (accurately describe the learning that he/she acquired from this unit and use an appropriate form for the selected audience, e.g., teacher, or teacher and classmates)	communicates for different audiences and purposes with limited effectiveness	communicates for different audiences and purposes with some effectiveness	communicates for different audiences and purposes with considerable effectiveness	communicates for different audiences and purposes with a high degree of effectiveness
8. Use of conventions, vocabulary, and terminology (e.g., push, pull, load, distance, and speed) in oral, visual, and/or written forms	uses conventions, vocabulary, and terminology with limited effectiveness	uses conventions, vocabulary, and terminology with some effectiveness	uses conventions, vocabulary, and terminology with considerable effectiveness	uses conventions, vocabulary, and terminology with a high degree of effectiveness
Application (App.) – The use of knowledge and skills to make connections within and between various contexts				
	The student:			
9. Application of knowledge and skills (e.g., concepts and processes, use of equipment and technology, investigation skills) in familiar contexts	applies knowledge and skills in familiar contexts with limited effectiveness	applies knowledge and skills in familiar contexts with some effectiveness	applies knowledge and skills in familiar contexts with considerable effectiveness	applies knowledge and skills in familiar contexts with a high degree of effectiveness
10. Making connections between society, science, technology, and the environment regarding the design solution selected and its impacts on people, other living things, and the environment	connects science, technology, society, and the environment with limited effectiveness	connects science, technology, society, and the environment with some effectiveness	connects science, technology, society, and the environment with considerable effectiveness	connects science, technology, society, and the environment with a high degree of effectiveness
11. Proposing courses of practical action to deal with problems relating to science, technology, society, and the environment (e.g., address problems in technology [design] by sharing knowledge about propeller lengths and clearances required, or the promotion of rubber band powered cars made with mostly renewable and decomposable components, to encourage ecofriendly toy choices)	proposes courses of practical action of limited effectiveness	proposes courses of practical action of some effectiveness	proposes courses of practical action of considerable effectiveness	proposes highly effective courses of practical action

Appendix C: Assessment of Learning, Grade Sheet.

Teacher's Record: Assessment **Of** Learning Use with the Assessment Rubric	Teacher: ______________________ Class: _______ Unit: _____________________________ Date: ___/___/___										
	Knowledge and Understanding		Thinking and Investigation			Communication			Application		
Student's Name	1	2	3	4	5	6	7	8	9	10	11

Appendix D: Assessment For Learning
Continuum For Technological Problem Solving

Targets for Grades 1-3 are in the Beginning to Exploring range.

Beginning > Exploring > Emerging > Competent > Proficient			
Initiating and Planning			
The student:			
(A) recognizes a practical problem in a given context	identifies practical problems to solve in the immediate environment	identifies practical problems to solve in the local community	identifies practical problems to solve
(B) with support (e.g., as a class or in small groups), brainstorms possible solutions to a practical problem	with support (e.g., as a class or in small groups), generates a list of possible solutions to a practical problem and determines which are realistic in the classroom and/or the real world	identifies possible solutions to a practical problem and explains how each might solve the problem	identifies possible solutions to a practical problem and prioritizes them with regard to their potential for solving the problem
(C) with support (e.g., as a class or in small groups), selects one possible solution to implement	selects a possible solution to implement	selects a possible solution to implement, and provides reasons for the choice	selects a possible solution, and provides reasons for the choice that take into account considerations such as function, aesthetics, environmental impact
(D) with support (e.g., as a class or in small groups), makes a simple plan to carry out the solution	makes a simple plan (individually or in small groups), including simple drawings and/or diagrams, to carry out the solution	outlines (individually or in small groups) the steps of a plan, including labeled drawings and/or diagrams, to solve the problem	outlines in detail, including technical drawings and/or diagrams, each step of a plan to solve the problem
(E) with support (e.g., as a class or in small groups), establishes a limited number of criteria for evaluating proposed solutions to the problem	with support (e.g., as a class or in small groups), establishes a limited number of criteria for evaluating proposed solutions to the problem	contributes to establishing general criteria for evaluating objects or devices designed to solve the problem	contributes to establishing general criteria for evaluating objects or devices designed to solve
Performing and Recording			
The student:			
(F) with support (e.g., as a class or in small groups), carries out the pre-determined plan	with support (e.g., as a class or in small groups), carries out the pre-determined plan	carries out the pre-determined plan (individually or in pairs or small groups)	carries out the pre-determined plan
(G) with support, designs, builds, and tests (on the basis of pre-determined criteria) a	with support, designs, builds, and tests (on the basis of pre-	designs, builds, and tests (on the basis of pre-determined	designs, builds, and tests (on the basis of pre-determined

device or an object to solve the problem	determined criteria) a device or an object to solve the problem	criteria) a device or an object to solve the problem	criteria) a device or an object to solve the problem
(H) records results using pictures and/or tally charts	records results in a variety of ways, such as sentences, simple drawings, diagrams, and/or charts, and/or charts	records results in a variety of ways, such as sentences, drawings, labelled diagrams, graphs	records results in a variety of ways, such as sentences, technical drawings, labeled diagrams, graphs, and/or charts
Analyzing and Interpreting			
The student:			
(I) with support, identifies how well the chosen solution solved the practical problem, using the pre-determined criteria	identifies how well the chosen solution solved the practical problem, using the pre-determined criteria	explains how well the chosen solution solved the practical problem, and suggests possible changes to the criteria and the solution	explains how well the chosen solution solved the practical problem, using qualitative and/or quantitative data, and suggests possible changes to the criteria and the solution
(J) with support, suggests something that might be changed about the solution to the problem identifies some things that could be done differently to improve the solution to the problem	identifies and explains what changes could be made to the plan and how to improve the solution to the problem, and gives reasons for the changes	identifies and explains what changes could be made to the plan and the testing process, and how to improve the solution to the problem, and gives reasons for the changes	identifies and explains what changes could be made to the plan and the testing process, and how to improve the solution to the problem, and gives reasons for the changes
(K)	identifies some possible beneficial and non-beneficial impacts of the chosen solution for himself/herself or others	identifies the effects of the chosen solution on himself/herself, others, and/or the environment, considering things such as cost, materials, time, and/or space	identifies the effects of the chosen solution on himself/herself, others, and/or the environment, considering things such as cost, materials, time, and/or space, and suggests ways in which undesirable effects could be lessened or eliminated
Communicating			
The student:			
(L) describes orally, and/or using drawings, pictures, and/or simple sentences, the problem and how he or she solved it	describes orally, and/or using drawings, pictures, and/or simple sentences, the problem and how he or she solved it	describes orally, and using labelled drawings and diagrams, charts, graphs, and/or written descriptions, the problem and how he or she solved it	describes orally, and using labelled drawings and diagrams, charts, graphs, and/or written descriptions, the problem and how he or she solved it
(M) uses grade-appropriate science and technology vocabulary correctly	uses grade-appropriate science and technology vocabulary correctly	uses grade-appropriate science and technology vocabulary correctly	uses grade-appropriate science and technology vocabulary correctly

Appendix E: Assessment As Learning, Student Self-Assessment Log

Name:______________________ Teacher:_____________________ Class: ______

These descriptors reflect skills that have reached the <u>Beginning/Exploring</u> levels on the "Continuum for Technological Problem-Solving Skills."

Circle the correct symbol to let your teacher know how you are doing.

I'm doing great! I'm doing okay. ? I need some help with this.

A. I know what problem I have to solve.

B. With some help, I can share ideas for propeller cars that will solve the problem.

C. With some help, I can pick a good idea for a propeller car that will solve the problem.

D. With some help, I can tell you my plan and make a drawing of the propeller car I will build.

E. With some help, I understand what will make a good propeller car.

F. With some help, I can follow my plan.

G. With some help, I can design build and test my propeller car.

H. I can use sentences and drawings to show you how my propeller car.

I. I can tell you what is good about my propeller car, and if it solved the problem.

J. I can tell you something that will make my propeller car better.

K. I can tell you some things about my propeller car that are good for me, and some things about it that may not be good for me.

L. I can tell you about the design problem and how my propeller car solved it by talking, using pictures I have drawn, media, and sentences I have written.

M. I can use the science words we have learned such as push, pull, load, distance, and speed.

Parent/Guardian's Review

1. Signed:____________________________________ Date: ________________

2. Signed:____________________________________ Date: ________________

Appendix F: Assessment For Learning, Tracking Sheet

Teacher's Record: Assessment **For** Learning, Technological Problem Solving Skills Continuum	Teacher: ______________________ Class: ___________ Unit: ___________________________ Date: ____/____/____ Suggested Assessment Codes: B - beginning, Ex - exploring, Em - emerging, C - competent, P - proficient												
	Initiating and Planning					Performing and Recording			Analysing and Interpreting			Communicating	
Student's Name	**(A)**	**(B)**	**(C)**	**(D)**	**(E)**	**(F)**	**(G)**	**(H)**	**(I)**	**(J)**	**(K)**	**(L)**	**(M)**

Appendix G: Support for Assessment and Evaluation

Assessment as/for/of Learning

It is the goal of the OCTE Elementary Committee to support their members in the development of these skills. This year the focus is on providing feedback (assessment for and as learning) using the Ministry's "Continuum for Technological Problem Solving Skills" (Science and Technology Grades 1-8, pp. 17-18) Please note that only the Ministry's "Achievement Chart -- Science and Technology, Grades 1-8" (Science and Technology Grades 1-8, pp. 26-27) is to be used for assessment of learning.

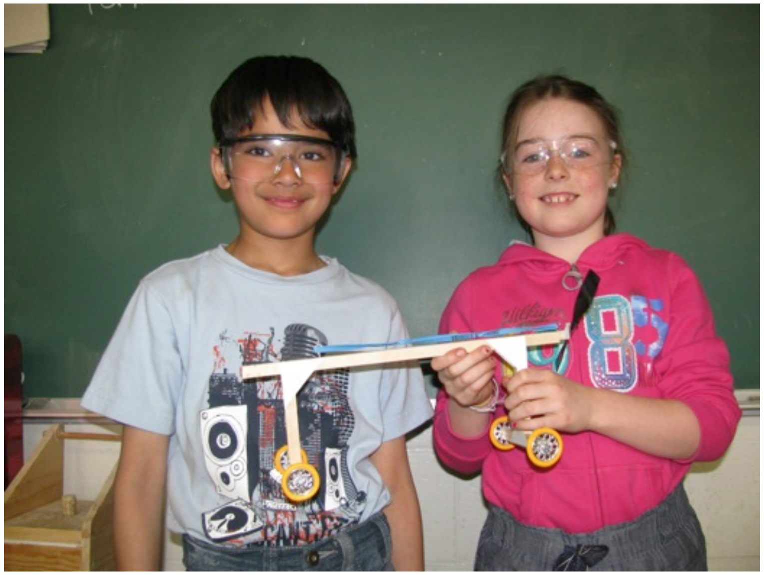
A summary of the three forms of assessment addressed in the Ministry of Education's Growing Success (2010) document is as follows:

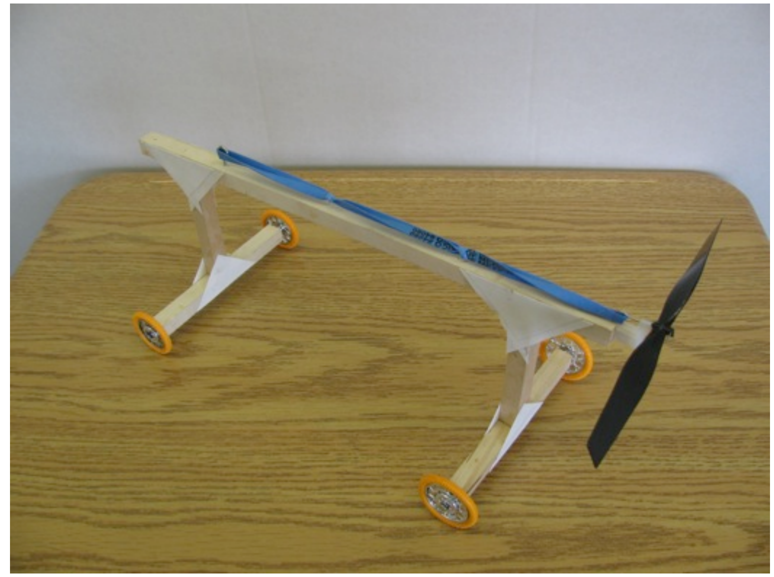
- assessment for learning involves generating feedback about your students' progress that is shared with them before assessing for report card grades;
- assessment of learning is when you generate marks/levels for your report cards;
- assessment as learning, when developed fully, is when students provide their own feedback and assessment (peer and/or self) regarding their learning; students use this information to set learning goals, and to select appropriate learning strategies for their success.

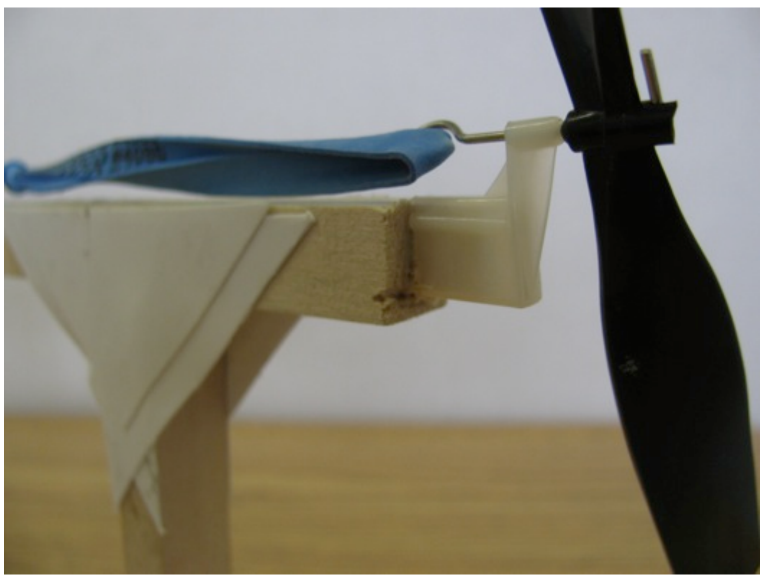
Here are some suggestions to support the implementation of "Assessment as Learning" in your program; they are as follows:

1. Provide your students with a copy of "Appendix E: Assessment as Learning, Student Self-Assessment Log" and refer to applicable statements (see statements A-M) for discussion, before each of these items are addressed.
2. Ensure that the learning goal for each item is clearly understood by your students. Use student friendly language wherever possible.
3. Provide opportunities for self/peer assessment (move from structured to student directed as your students develop this skill).
4. Discuss or refer to successful and unsuccessful work (exemplars, or student generated materials) to provide benchmarks for your students' self/peer assessments.
5. Collect and review your students' "Assessment as Learning, Student Self Assessment Log." Make note of who needs additional support. Schedule time for these students into your next lesson (or provide opportunities for extra help, if possible).
6. Use your students' self/peer assessments to determine if a task requires modification to support successful learning.
7. Refer to pp. 27-36 in the Growing Success document for complete details. Reference: Ontario. Ministry of Education. (2010). *Growing Success: Assessment, Evaluation, and Reporting in Ontario Schools, First Edition, Covering Grades 1-12.* Toronto: Author. ISBN 978-1-4435-2284-7 (Print), ISBN 978-1-4435-2285-4 (PDF) (Rev.), ISBN 978-1-4435-2286-1 (TXT), © Queen's Printer for Ontario.

Appendix H: Samples







Photographs by: Darren Foy