junior tech challenge

The practical side of science and tech

Teacher's Guide

Intensive English

Get a Grip!

2019-2020 EDITION

Illustrations : Élise Gravel

A program of

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General Information

The Junior Tech Challenge: a unique learning situation!

Every year in Quebec, the Junior Tech Challenge allows all elementary school students to learn about science and technology in a creative and fun way. The Junior Tech Challenge represents an original and hands-on classroom project that is also a learning and evaluation situation (LES).

Five challenges are presented cyclically, one per year. For each, educational tools are offered to meet the challenge of the current year. With each new edition, the rules and educational tools are improved upon to ensure that they best meet teachers' expectations. The pedagogical content can be adapted according to the intended pedagogical objectives.

The Return of Get a Grip!

The Get a Grip! Challenge is back for students to enjoy! For the first time, this edition of Get a Grip! is available to Cycle 1 students, and Intensive ESL students (Cycle 3). The level of difficulty of the challenge is adapted for each cycle.

Teaching tools available

You will find all the necessary tools at http://www.technoscience.ca, the IESL Community (intensive-esl.quebec) and ESL Blogs (eslcommunity.learnquebec.ca).

- Presentation and Rules Handbook
- Teacher's Guide (Intensive English)
- Student Handbook (Intensive English)
- Slide Presentation
- Junior Tech Challenge Diploma
- Excel spreadsheet
- Software to record points

Preparatory Activities

The preparatory activities aim to help students acquire scientific concepts related to the challenge. They also develop strategies that support students in the development of science-specific competencies. Although the activities can be carried out independently, they can lose their meaning if they are not developed in a meaningful context in which students can reinvest their knowledge in an authentic production.

They allow the teacher to collect traces of the following skills:

- Competency 1: To propose explanations for or solutions to scientific or technological problems.
- Competency 2: To make the most of scientific and technological tools, objects and procedures.
- Competency 3: To communicate in the languages used in science and technology.

All activities allow students to establish concrete links with scientific concepts anchored in the Progression of Learning and the Mathematic, Technology and Science Program.

http://www.education.gouv.qc.ca/fileadmin/site_web/documents/education/jeunes/pfeq/PFEQ_science-technologie-primaire_EN.pdf.

For Intensive English Teachers

This document is intended to support Intensive English teachers who wish to experience the Junior Tech Challenge with their students in English. All documents have been translated into English and are available at http://www.technoscience.ca, the IESL Community (intensive-esl.quebec) and ESL Blogs (eslcommunity.learnquebec.ca).

Teachers of Intensive English can use this challenge to develop Competency 1, To interact orally in English, while the students participate in hands-on activities that are motivating and challenging. The challenge can be experienced in the following ways: in the classroom only, in the school board's annual science competition, or in the regional finals. Many teachers from the same school may also participate, so the best teams may be selected to join the finals.

The students will have the opportunity to:

- Develop Competency 1 (interact orally in English) through challenging hands-on activities.
- Review and consolidate science knowledge in an English-language context.
- Participate in a school-wide competition or a regional event.

A C1 evaluation tool, a functional language guide, and more ideas can be found in the ESL Extras section at the end of this document.

From a LES for the Classroom to the Regional Finals

The Junior Tech challenge is an opportunity for students to experience a science and technology design process in the classroom and to experience something unique by participating in one of the many levels of competition-with the ultimate experience of participating at the Regional Finals!

Here are the different levels of finals:

Class Finals	Finals organized in class that determine the winners of each class.
School Finals	Finals per cycle to determine the representatives who will go to the school board finals - or directly to the regional finals if there are no finals in your school board.
School Board Finals	Finals per cycle organized by the school board - alone, or in collaboration with Réseau Technoscience. If your school board organizes finals, you will first be invited to register your students to these finals.
Regional Finals	Finals per cycle bringing together students from their region - 11 regional finals organized by Réseau Technoscience. The finals take place in May, as part of l'Odyssée des sciences, where science fair projects and activities of the Club des Débrouillards will also be presented. Consult the calendar for the date of your Regional Finals. To register teams, you must use the online registration form that is found on technoscience.ca.

Note: During the regional finals, the challenge can be presented in a different format to that presented in the school board finals. The students will be required to change their strategy on site to adapt to this new format. No advanced preparation is needed, but extra time will be given to students, if required, to make the necessary changes.

Progression of Learning for Science and Technology

This learning and evaluation situation is intended to help develop students' skills, particularly those associated with technological design. Many skills used during the design process are described in the activities proposed in the Teacher's Guide. The details of the concepts targeted in each of the activities and the links with the Progression of Learning are also presented below.

Knowledge activated in the LES

The following knowledge from the Progression of Knowledge for Science and Technology can be activated by this learning situation:

A. Matter	**1**	**2**	**3**	**4**	**5**	**6**
1. Properties and characteristics of matter						
6. Effects of a force on the direction of an object						
a. Identifies situations involving the force of friction (pushing on an object, sliding an object, rolling an object)	→	★				
b. Identifies examples of a force (e.g. pulling, pushing, throwing, squeezing, stretching)			→	★		
c. Describes the effects of a force on an object (e.g. Sets it in motion, changes its motion, stops it)			→	★		
D. Systems and interaction	**1**	**2**	**3**	**4**	**5**	**6**
1. Everyday technical objects						
a. Describes the parts and mechanisms that make up an object	→	★				
b. Identifies the needs that an object was originally designed to meet	→	★				
2. Simple machines						
a. **Recognizes simple machines (lever, inclined plane, screw, pulley,** winch, wheel) **used in an object** (e.g. lever in seesaw, inclined plane for an access ramp)			→	★		
b. **Describes the uses of certain simple machines** (to adjust the force required)			→	★		

E. Techniques and instrumentation	1	2	3	4	5	6
1. Use of simple measuring instruments						
a. **Appropriately uses simple measuring instruments (rulers, dropper, graduated cylinder, balance, thermometer, chronometer)**			→	→	→	★
2. Use of simple machines						
a. **Appropriately uses simple machines (lever, inclined plane, screw, pulley,** winch, wheel)			→	→	→	★
3. Use of tools						
a. **Appropriately and safely uses tools (e.g. pliers, screwdriver, hammer, wrench, simple template)**			→	→	→	★
4. Design and manufacture of instruments, tools, machines, structures (e.g. bridges, towers), devices (e.g. water filtration device), models (e.g. glider) and simple circuits						
a. **Knows the symbols associated with types of motion, electrical components and mechanical parts**			→	→	→	★
b. **Interprets a diagram or a plan containing symbols**			→	→	→	★
c. Uses symbols associated with mechanical parts and electrical components in a diagram or drawing			→	→	→	★
d. **Draws and cuts parts out of various materials using appropriate tools**			→	→	→	★
e. **Uses appropriate assembling methods** (e.g. screws, glue, nails, tacks, nuts)			→	→	→	★
F. Appropriate language	**1**	**2**	**3**	**4**	**5**	**6**
1. Terminology related to an understanding of the material world						
a. Appropriately uses terminology related to the material world	→	→	→	→	→	★
b. Distinguishes between the meaning of a term used in a scientific or technological context and its meaning in everyday language (e.g. source, matter, body, energy, machine)	→	→	→	→	→	★
2. Conventions and types of representations specific to the concepts studied						
a. Communicates using appropriate types of representations that reflect the rules and conventions of science and technology (e.g. symbols, graphs, tables, drawings, sketches, norms and standardization)			→	→	→	★

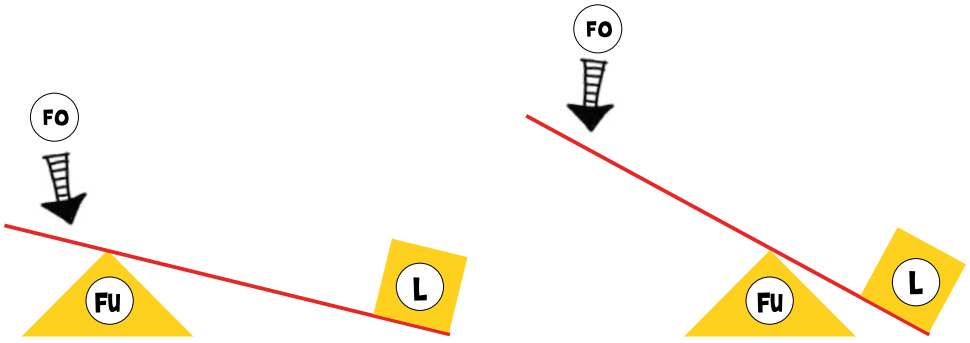
Scientific and Technological Concepts

Here are some definitions of the scientific concepts addressed in this challenge:

FRICTION : Friction is an interaction between two objects in contact that prevents these objects from sliding against each other. Friction results from various factors, including microscopic interactions between objects in contact.

SIMPLE MACHINE : A simple machine allows us to perform a task with less effort. The lever, the inclined plane, the screw and the pulley are examples of simple machines.

SINGLE LEVER : A lever is made of a long rod that rotates around a support point. The force applied at one end of the rod is used to lift a load at the other end of the rod, as shown below.



The closer the fulcrum (FU) is to the load to be lifted (L), the lower the force required (FO) will be needed to lift this load.

DOUBLE LEVER : Machine composed of two levers connected together by a fulcrum. A force must be applied to each of these levers to grip an object. A nutcracker is an example of a double lever machine.

The closer the fulcrum (FU) is to the object to be gripped, the greater the gripping force if the same force (FO) is applied.

GRIPPING TOOL : A tool with two or more arms that is used to grip an object, i. e. to clamp, to grasp, or hold it. There are different types of gripping tools including round nose pliers, articulated pliers, cutting pliers, stripping pliers, multi-socket pliers or universal pliers.

*A vocabulary table for students can be found in the ESL Extras at the end of the guide.

Description	Time	Materials Needed
Preparation		
Presenting the Challenge The teacher presents the challenge to the students, but does not give them all the details. The rules will be presented at a later event.	15 min.	- Student Handbook p. 2-4 - Presentation slides 1-3
Activity 1: A Machine? Students are introduced to the mechanical advantage of simple machines such as the lever found in a gripping tool. They must identify examples of simple machines in their environment.	30 min.	- Student Handbook p. 5 - Presentation slides 4-5
Activity 2: Levers and Co. Students familiarize themselves with the terminology related to levers (fulcrum, load, force). They identify these parts on different models of gripping tools.	45 min.	- Student Handbook p. 6-7 - Presentation slides 6-13
Activity 3: Exploring Levers! Students conduct experiments to understand the importance of the position of the fulcrum in the displacement of a load.	45 min.	- Student Handbook p. 8 - Presentation slides 14-16 - Ruler, nuts, containers, and binder clip.
Activity 4: Grips at Work! Students test and analyze different models of gripping tools, then select the best features of each.	45 min.	- Student Handbook p. 9 - Various gripping tools brought from home - Objects to grip
Activity 5: Erasers on the Move Students experiment to determine which materials reduce or increase friction.	45 min.	- Student Handbook p. 10 - Cardboard, eraser, ruler - Various objects
Carrying out the Task		
The teacher presents the rules of the competition. Students work on building the prototype of their gripping tool. They plan, build, test and improve it.	120 min.	- Materials authorized for the design of the gripping tool - Presentation and Rules p. 5 - Student Handbook p. 11-14
The Competition		
Setting up the competition area.	15 min.	- Presentation and Rules p. 6-8 - Student Handbook p. 15
Integration		
The teacher and the students review the design and the construction of their gripping tool, and the strategies used to carry out the task.	15 min.	Student Handbook p. 13-15

Presenting the Challenge

Pedagogical Intentions

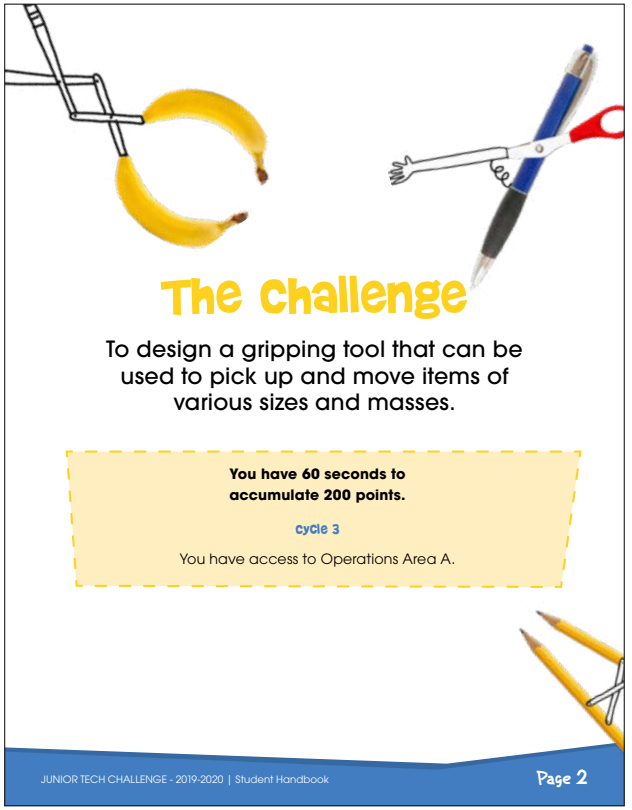
- Present the learning and evaluation situation and the challenge.
- Generate student interest in the challenge.

Materials

- Student Handbook p. 2-4
- Presentation slides 1-3

Procedure

- Use the slideshow or the student handbook to present the challenge to the students.
- Specify that not all items to be picked up have the same point value, and that 200 points must be attained in Cycle 3.
- To generate interest, distribute the student handbook.



Activity 1

A Machine?

Pedagogical Intentions

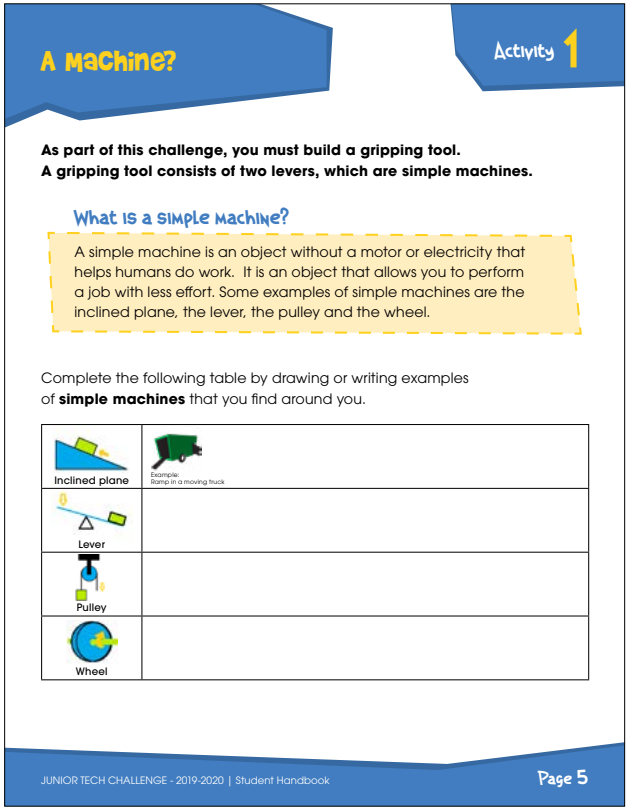
- Present the mechanical advantages of simple machines such as pliers and levers.

Materials

- Student Handbook p. 5
- Presentation slides 4-5

Procedure

- Ask students to try to crack a nut. Then, present them with a nutcracker. How does this tool make this task easier for us?
  - √ Alternative scenario: Ask students to try to open a paint can with and without a screwdriver or use another equivalent example with a lever or other simple machine.
- Point out that the nutcracker, like the gripping tool they will have to build, is a simple machine. Together, read the definition of a simple machine in the student handbook.
- Ask students to name other objects around them that are simple machines. Once the brainstorming is done, ask students to complete the table by writing one or two examples of simple machines from their everyday lives.
  - √ Alternative scenario: Ask students to identify simple machines in a photo or illustration (e.g., a kitchen photo).
- You can also watch the video suggested in the presentation slides, and use the student booklet to present the challenge to the students.



A Machine?

Activity 1

As part of this challenge, you must build a gripping tool.
A gripping tool consists of two levers, which are simple machines.

What is a simple machine?

A simple machine is an object without a motor or electricity that helps humans do work. It is an object that allows you to perform a job with less effort. Some examples of simple machines are the inclined plane, the lever, the pulley and the wheel.

Complete the following table by drawing or writing examples of **simple machines** that you find around you.

Inclined plane	Example: Ramps in a moving truck
Lever	
Pulley	
Wheel	

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Activity 2

Levers and Co.

Pedagogical Intentions:

- Identify the functions of the different parts of a lever.
- Become familiar with the vocabulary related to the levers.

Materials

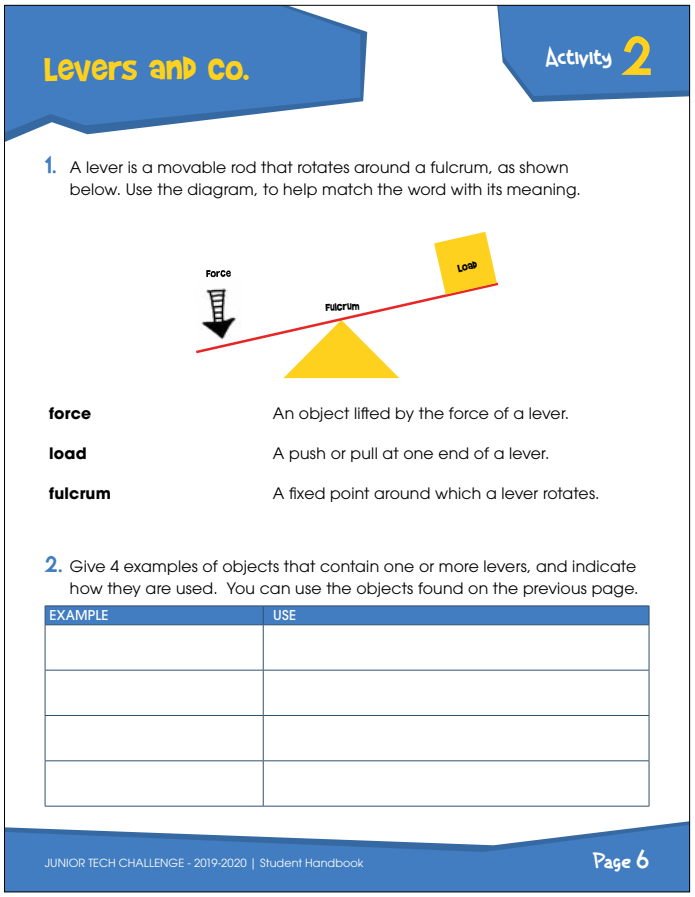
- Student Handbook p. 6-7
- Presentation slides 6-13

Procedure

- As a group, review the examples of levers given by the students in the previous activity. Ask students to identify common characteristics between them (example: they all have a rod that rotates around a fulcrum).
- Then, using the slide show or diagram in the student handbook, ask students to identify the different parts of the levers and discuss their respective functions.
- Ask students to connect each part of a lever with its function.
- Next, invite students to make a list of 4 objects that contain one or more levers (they can use the examples that were found in the previous activity), and to describe how they are used. They can be asked to limit themselves to objects found in the kitchen, classroom or garage.

Examples of levers:

- Hockey stick
- Scale
- Scissors
- Nutcracker
- Salad tongs
- Hole punch
- Spade or shovel
- Faucet
- Crowbar
- Tweezers
- Drawbridge
- Tennis or badminton rackets
- Screwdriver used for opening a paint can



Levers and co.

Activity 2

1. A lever is a movable rod that rotates around a fulcrum, as shown below. Use the diagram, to help match the word with its meaning.

force	An object lifted by the force of a lever.
load	A push or pull at one end of a lever.
fulcrum	A fixed point around which a lever rotates.

2. Give 4 examples of objects that contain one or more levers, and indicate how they are used. You can use the objects found on the previous page.

EXAMPLE	USE

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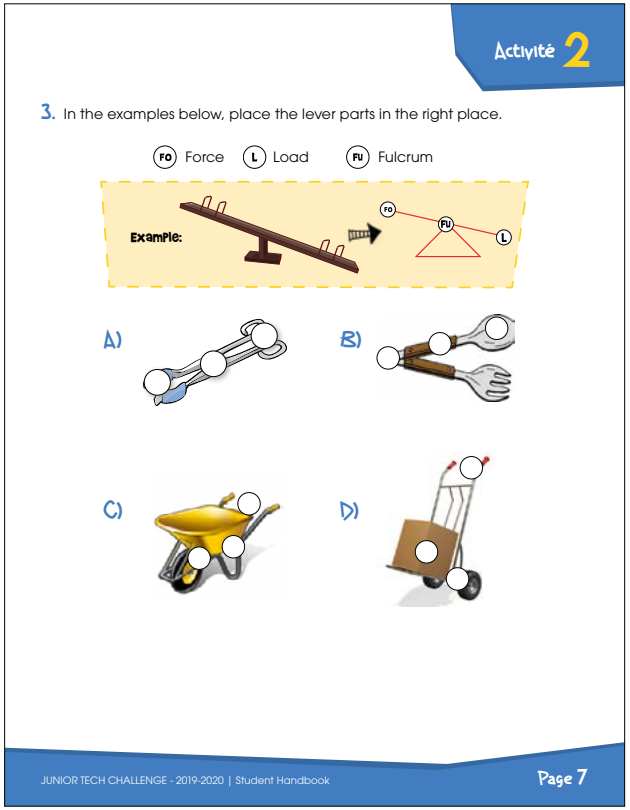
Levers and Co. (continued)

- On page 7 of the student booklet, students can review the new scientific terms learned by locating the different parts of the levers on common objects. To do this, they first must identify:
  a. The fulcrum of the levers presented (FU)
  b. The location where the force is applied to the levers (FO)
  c. The location where the load is applied (L)

Note: It may be interesting to bring some of these objects (or similar objects) into the classroom.

Optional Activity

Ask students to take pictures of the simple machines around them to share with their classmates.



Activity 3

Exploring Levers !

Pedagogical Intentions

- Explore the importance of the position of the fulcrum in moving a load.

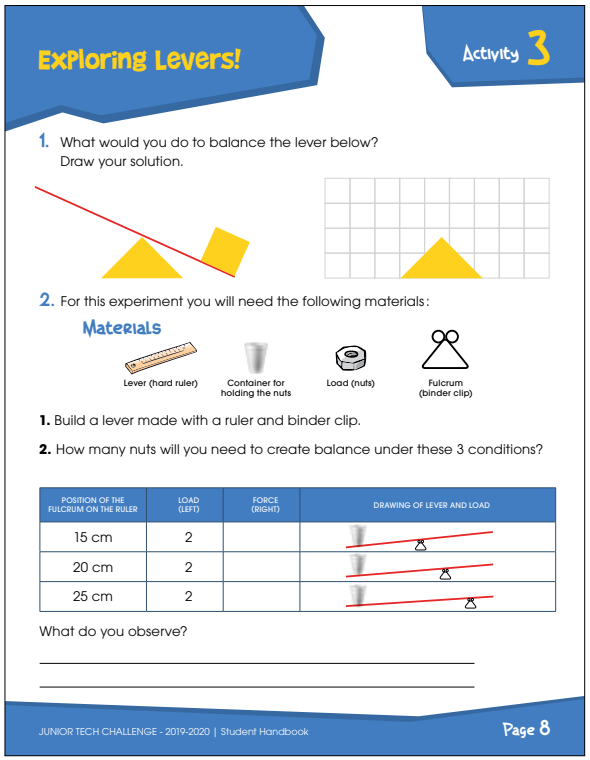
Materials

- Student Handbook p. 8
- Presentation slides 14-16
- Levers (rulers)
- Loads (nuts) and fulcrums (paper clips)
- Sticky tack

Procedure

Ask students to answer Question #1 in the student handbook.

- With the proposed materials, students perform an experiment in which they must be able to balance a lever under different conditions (fulcrum in different places). To do this, they place a nut in a container and must measure how many nuts will be needed on the other side to achieve balance.
- Students record their results in table on page 8 of their student handbook.
- Ask students the following questions:
  - √ To move a very large load, where would you place the fulcrum? Why?
    Answer: Closest to the load so that it is easier to lift.
    (Point out to students that the closer the fulcrum is to the load, the less force is needed to lift it.)
  - √ In your opinion, how do you think certain levers make life easier for people?
    Answer: They help us to lift heavy loads with less effort.



Exploring Levers! Activity 3

1. What would you do to balance the lever below?
Draw your solution.

2. For this experiment you will need the following materials:

Materials

Lever (hard ruler) | Container for holding the nuts | Load (nuts) | Fulcrum (binder clip)

1. Build a lever made with a ruler and binder clip.

2. How many nuts will you need to create balance under these 3 conditions?

POSITION OF THE FULCRUM ON THE RULER	LOAD (LEFT)	FORCE (RIGHT)	DRAWING OF LEVER AND LOAD
15 cm	2		
20 cm	2		
25 cm	2		

What do you observe?

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VIDEOS

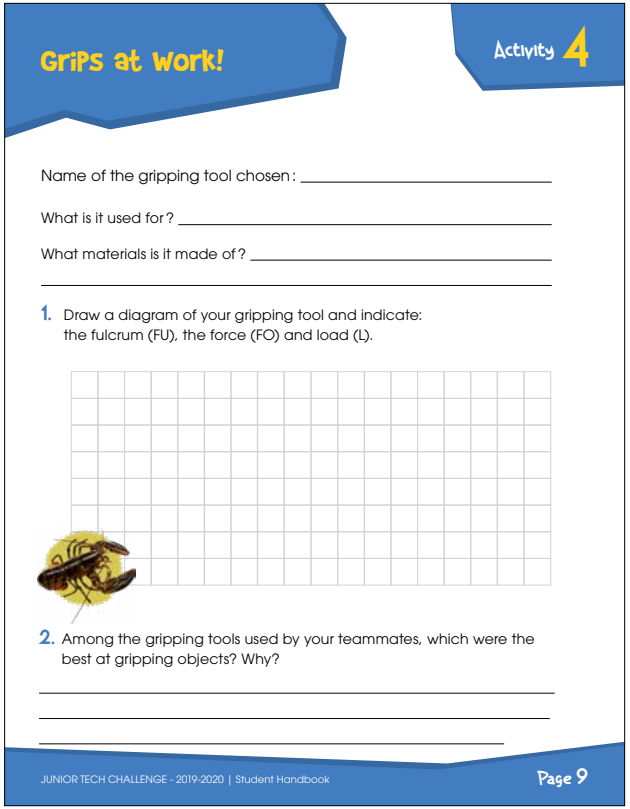
- Eureka levers: https://www.youtube.com/watch?v=I-1LI2tWtNg
- ONF NFB: Operation Lever https://www.nfb.ca/film/operation_lever/

ONLINE GAMES

- Edumedia: Types of Levers https://junior.edumedia-sciences.com/en/media/751-types-of-levers
- Edumedia : Levers Quiz https://junior.edumedia-sciences.com/en/media/500-quiz-leve

Activity 4

Grips at Work !


Grips at Work!

Activity 4

Name of the gripping tool chosen : _____

What is it used for ? _____

What materials is it made of ? _____

_____

1. Draw a diagram of your gripping tool and indicate: the fulcrum (FU), the force (FO) and load (L).

2. Among the gripping tools used by your teammates, which were the best at gripping objects? Why?

_____

_____

_____

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Pedagogical Intentions

- To analyse a gripping tool.
- To discover how the gripping tool works.

Materials

- Student Handbook page 9
- Different kinds of gripping tools brought by the students.
- Objects to be lifted (e.g. eraser, pencil, paper clip)

Background

Gripping tools can be found in many places in our daily lives. Whether in the bathroom, kitchen or garage, they make life easier for us.

Procedure

- Ask students to bring a gripping tool from home (e.g. tweezers, lobster cracker, BBQ tongs, universal clamp).
- Together, brainstorm hypotheses about which tool would be best to grip the most objects of different sizes and masses in 60 seconds. Invite students to justify their choice using scientific arguments.
- Students are asked to analyse their chosen gripping tool (function and materials), to draw this tool, and to identify the different parts of a lever by indicating (FU) fulcrum, (FO) force, and load (L).
- Invite students to test the different gripping tools by lifting objects of various sizes placed in different areas of the classroom.
- Discuss the properties of the higher/lower performing gripping tools. Then students write their conclusions.

Activity 5

Erasers on the Move

Pedagogical Intentions

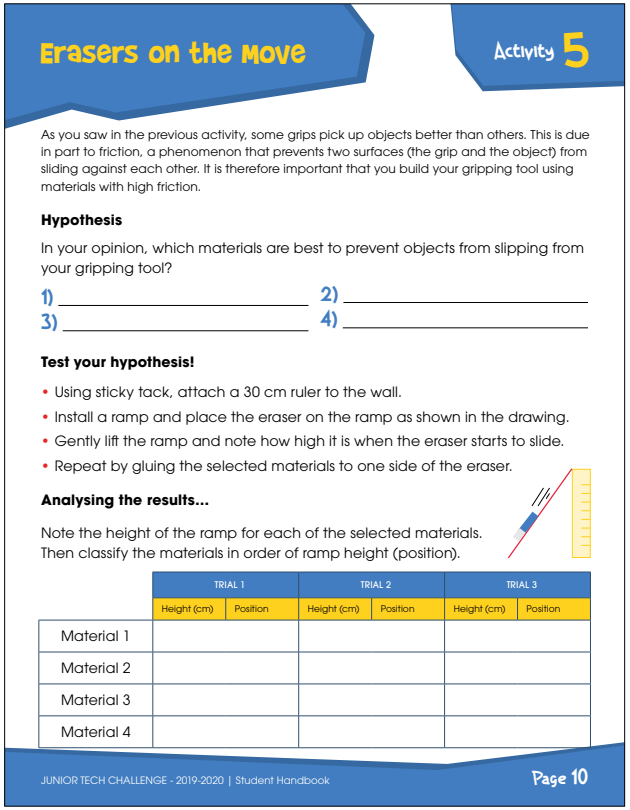
- Explore the importance of friction while gripping an object.

Materials

- Student Handbook p. 10
- Ruler, ramp (rigid surface about 30 cm long - cardboard, Coroplast, wood, etc.), an eraser or a small box, sticky tack or tape.
- Different materials that will be glued on one side of the eraser or small box (to increase or reduce friction).
- e.g. plastic wrap, sandpaper, balloons, carpet, aluminum foil, thin sponge, etc.

Procedure

- With their team, ask students to attach the ruler to the wall with sticky tack or tape, making sure that it is placed 0 cm from the ground.
- Invite students to install their ramp on the ground touching the ruler, and place the eraser on the ramp nearest to the ruler.
- Ask students to gently lift the ramp until the eraser begins to slide. It is important that the top of the ramp slides on the ruler (see illustration). Students should look at the ruler and note how high the ramp is when the eraser starts to slide.
- After the students have completed one trial, discuss the results:
  - √ Did the results vary from one team to another? Why?
  - √ Did all students use the same material for their ramps?
  - √ Did everyone use the same side of the eraser?



Erasers on the Move

Activity 5

As you saw in the previous activity, some grips pick up objects better than others. This is due in part to friction, a phenomenon that prevents two surfaces (the grip and the object) from sliding against each other. It is therefore important that you build your gripping tool using materials with high friction.

Hypothesis

In your opinion, which materials are best to prevent objects from slipping from your gripping tool?

1) _____ 2) _____

3) _____ 4) _____

Test your hypothesis!

- Using sticky tack, attach a 30 cm ruler to the wall.
- Install a ramp and place the eraser on the ramp as shown in the drawing.
- Gently lift the ramp and note how high it is when the eraser starts to slide.
- Repeat by gluing the selected materials to one side of the eraser.

Analysing the results...

Note the height of the ramp for each of the selected materials. Then classify the materials in order of ramp height (position).

	TRIAL 1		TRIAL 2		TRIAL 3	
	Height (cm)	Position	Height (cm)	Position	Height (cm)	Position
Material 1						
Material 2						
Material 3						
Material 4						

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Erasers on the Move (continued)

- It is beneficial to discuss the importance of controlling experimental parameters by varying only one element at a time. Students must therefore use a ramp of the same length, install the eraser on the same side, and not push it. The only element that differs from one test to another is the type of material used (under the eraser). In addition, it is important to conduct several trials to ensure the validity of the results obtained.
- After taking these factors into account, ask the students to repeat the experiment by gluing different materials under the eraser, and record the results in the table.
- After these trials, ask the following questions:
  - √ What are the different textures of the materials (smooth, rough…)?
  - √ Which materials reduced the distance travelled by the block the most?
  - √ What do you think happened? (Answer: increase in friction)
  - √ Based on this experiment, which materials would be considered the best for the challenge? Be careful, you have to make sure your choice is practical!
- The teacher can suggest that the students collectively make a bar graph to illustrate the influence of the surface used on the height of the inclined plane.

Carrying out the Task

Pedagogical Intentions

- Consolidate the learning of the design process of the gripping tool.

Materials

- Presentation and Rules handbook
- Student Handbook p. 11-13
- Presentation slide 3
- Materials required to design the gripping tool

Setting the stage

During the Junior Tech Challenge, students will be asked to grip different objects with their gripping tools. Which gripping tool will be the most effective?

Procedure

- Present the rules of the challenge and stress the importance of following these rules during the competition. Using the slide presentation, show different situations and ask students how many points the team would get. (e.g. If your team successfully grasps and carries the container, the pencil and the Lego figurine, how many points would your team accumulate?)
- Organize the competition area.
- In class, review the hypotheses developed at the end of the previous activities.
- Ask the following questions:
  - √ Which materials are the most effective?
  - √ How can the shape and length (large, small, long, short) of the gripping tool, or the position of the support point, influence its performance?


Carrying Out the Task

Before you design your gripping tool, take the time to review the rules of the challenge.

Then design a prototype based on the conclusions drawn from the previous activities.

Your plan

List the equipment and tools needed to make your gripping tool.

Material

Write (H) next to the material you will bring from home and (S) next to the material made available to you at school.

Prohibited Materials

- NO telescopic system not made by the participant (cane, pool pole, umbrella)
- NO gripping tool that can cause injuries
- NO form of electricity, magnets or welded material
- NO ready-made gripping tool (salad tongs or any other tongs available on the market)
- NO standing gripping tool

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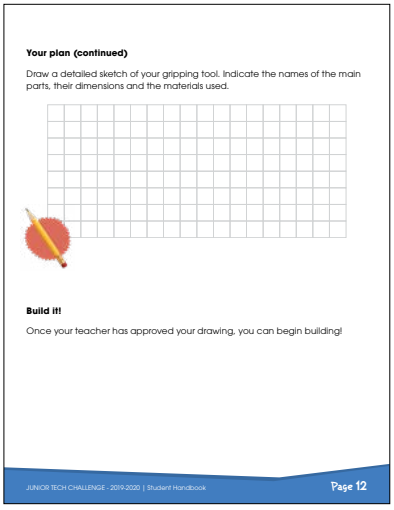
Your plan (continued)

Draw a detailed sketch of your gripping tool. Indicate the names of the main parts, their dimensions and the materials used.

Build it!

Once your teacher has approved your drawing, you can begin building!

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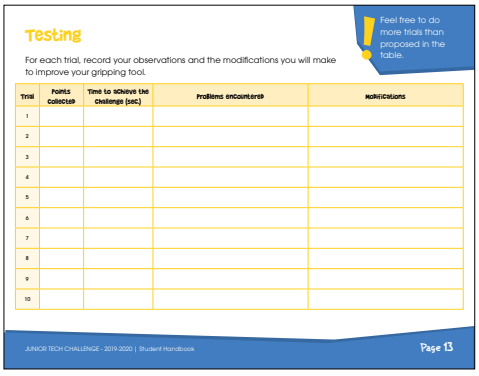
Testing

For each trial, record your observations and the modifications you will make to improve your gripping tool.

Feel free to do more trials than proposed in the table.

Trial	Points Collected	Time to achieve the challenge (sec)	Problems encountered	Modifications
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

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Carrying out the Task (continued)

Students build a prototype, then test and improve it
Student Handbook p. 11-13

- Form teams of 2-3 students.
- Before building their prototype, teams must:
  - √ Choose the material they want to use.
  - √ Draw a sketch of their prototype in the student handbook. (Here, the teacher who wishes to reinvest the science concepts of Activity 4 could ask the students to indicate the arrows of force and movement on their sketch).
- Each team builds their prototype.
- Their prototype must then be tested for the first time on the competition area.
  The students note the performance in the table on page 13 of their student handbook.
- Subsequently, the students can make one or more modifications to their initial prototype.
  When the team is satisfied with the changes made, they can test their prototype again and record the results.
- During the testing, the teacher supports the students by questioning, encouraging and guiding them while they make modifications to their prototype.

After testing (analysing your gripping tool)
Student Handbook p.14

- Students compare their results and determine which performance was their best.
  They then identify the criteria for success.
- The teacher initiates a group discussion on the properties of the most effective prototypes and the improvements to be made. Students determine which criteria will help them meet the challenge best.

In class or at school

You will find all the necessary information for how to organize the competition in the classroom in Presentation and Rules pages 6 to 8. Here are also some details to help guide you plan the finals:

- You can place the objects differently than what is proposed in Presentation and Rules. However, make sure that all students in the same cycle complete the challenge under the same conditions.
- If there are many teams, it is possible to create more than one competition area. In this case, it is necessary to ensure that there are enough judges.
- Once the competition is over, students are invited to write their scores in their student handbook p. 15.

Let's Review!

Review the results with the students and invite them to complete the last page of their student handbook page 15.

Frequently Asked Questions

Frequently Asked Questions are updated weekly on the Réseau Technoscience website. Visit https://technoscience.ca (Foire aux questions) and feel free to ask your question if the information you are looking for is not there.

Integration

Pedagogical Intention

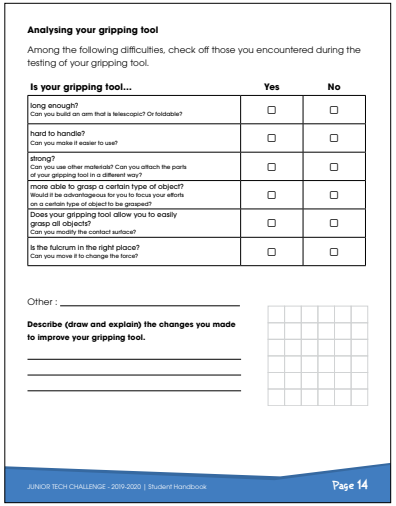
- Consolidate learning.
- Provide feedback to the students on the design and construction of their clamps, as well as on the strategies used to carry out the challenge.

Materials

- Gripping tools designed by the students used for the competition
- Student Handbook p. 14-15

Procedure

- Ask students to present their gripping tools, the modifications made during the trials, and their final results.
- Compare the different characteristics of the gripping tools created by the teams in the class and ask the following questions:
  - √ Why were some gripping tools more efficient than others?
  - √ Did the position of the support point on the gripping tool influence performance?
  - √ Did the materials that make up the gripping tool help or hinder performance?
  - √ Do some gripping tools allow a better speed of execution?
- Question students about the strategies that were used by the teams. Which ones were more effective than others?
- Invite students to analyze their performance using the student handbook.
- Ask students what they have learned from this project, especially about simple machines.



Analysing your gripping tool

Among the following difficulties, check off those you encountered during the testing of your gripping tool.

Is your gripping tool...	Yes	No
long enough? Can you build an arm that is telescopic? Or foldable?	☐	☐
hard to handle? Can you make it easier to use?	☐	☐
strong? Can you use other materials? Can you attach the parts of your gripping tool in a different way?	☐	☐
more able to grasp a certain type of object? Would it be advantageous for you to focus your efforts on a certain type of object to be grasped?	☐	☐
Does your gripping tool allow you to easily grasp all objects? Can you modify the contact surface?	☐	☐
Is the fulcrum in the right place? Can you move it to change the force?	☐	☐

Other : _____

Describe (draw and explain) the changes you made to improve your gripping tool.

_____

_____

_____

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POINTS

Results-Round 1 + Results-Round 2 = Final Result

LET'S REVIEW!

1. What was your best idea during the planning or creating of your gripping tool ?

My best idea:

_____

Explain.

_____

_____

2. Which modification will you make to make your gripping tool work better?

My modification:

_____

_____

Explain.

_____

_____

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References

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- Eureka : les machines simples
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SITES INTERNET

- Les machines simples - La cité des sciences
  http://www.cite-sciences.fr/ressources-en-ligne/juniors/machines-simples/experiences-ludiques/
- Jeu en ligne
  http://www.universcience.fr/juniors/machines-simples/experiences-ludiques/
- Animation Types de leviers sur Edumedia
  http://www.edumedia-sciences.com/fr/a857-types-de-levier
- Quiz levier sur Edumedia
  http://www.edumedia-sciences.com/fr/a862-quiz-levier

Intensive ESL Extras

You will find

- √ Activity Suggestions
- √ Vocabulary to Explore
- √ Functional Language Suggestions
- √ C1 rubric to evaluate your students' oral interaction while doing the different activities
- √ C3 I Write Texts Checklist
- √ C3 Generic Evaluation Tool

Activity Suggestions

1. Competency 1: To interact orally in English

Use the evaluation to observe and evaluate students as they are performing the various tasks. Use the functional language poster as support, and ask students to add t it by brainstorming other possible phrases to practice.

2. Competency 3: To Write Texts

- Have the students write a procedure for Competition Day to make sure they can succeed in the challenge (a step-by-step preparation).
- See I Write Texts Checklist

Example:

- √ First, we must…
- √ Then, we must not forget to…
- √ Assemble the… on the… is very important…

3. Consolidating and Reflecting

Consider these questions during a group reflection, or have the students complete a reflection sheet or a journal entry.

- Describe how knowledge of science concepts can be useful in every day life.
- What was your favourite part of the challenge? Explain.
- What did you find the most difficult part of the challenge? Explain.
- Name something you learned about teamwork while completing this challenge.

Collaborative Journaling

- Ask students to journal their experience everyday, either on a collaborative platform or in a personal journal, to share with their classmates.

Vocabulary to Explore

Students can illustrate or write the definitions, and can add more vocabulary to the table.

FORCE	PULLEY	
FRICTION	WHEEL	
FULCRUM		
INCLINED PLANE		
LEVER		
LOAD		

Functional Language Suggestions

- What do you think? Why?
- Do you agree? I agree / I disagree
- I think that ...because...
- I don't think...because...

- Where should we place the fulcrum?
- Let's try placing it closer to the middle.
- Where should we place the load?
- Let's place it far from the fulcrum.
- Let's place it closer to the fulcrum

- Where should we place the fulcrum?
- Let's try placing it closer to the middle.
- Where should we place the load?
- Let's place it far from the fulcrum.
- Let's place it closer to the fulcrum

ELEMENTARY CYCLE THREE ESL GENERIC EVALUATION TOOL

Competency 1, *To interact orally in English*

Class : _____

Evaluation criteria : Participation in exchanges and Use of functional language				Student names		
	Participation in exchanges	**20**	Speaks throughout, contributing substantial content, AND uses techniques to create true interaction (e.g. asks partner questions, reacts to and builds on partner's ideas)			
		16	Speaks throughout, contributing substantial content.			
		12	Speaks throughout, contributing limited content.			
		8	Speaks sporadically.			
		4	Speaks rarely.			
	Use of vocabulary and useful expressions	**15**	Quickly accesses a variety of vocabulary and expressions.			
		12	Uses a variety of vocabulary and expressions.			
		9	Uses basic vocabulary and expressions.			
		5	Lacks vocabulary.			
	Comprehension of messages by an anglophone	**15**	Messages are easily understood despite errors, if any.			
		12	Messages are understood with **some** interpretation.			
		9	Messages are understood with **considerable** interpretation.			
		6	Some messages are not understood despite interpretation.			
		3	Messages are understood; however, they are brief, very simple and/or very few.			
			Total : /50			
			Challenges (see list below)			

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Special cases :

- If a student does not participate or does not speak in English, allot 0/50.
- If most or all messages cannot be understood, allot 0/50.

Challenges	
1. Using English words 2. Pronouncing keywords clearly 3. Using a variety of words 4. Expressing more ideas 5. Elaborating on ideas (giving examples, details, etc.) 6. Expressing a personalized messages 7. Asking questions to maintain interaction, ask for details, ask for clarification, etc.	8. Building on what partner says 9. Reacting to what partner says 10. Initiating an exchange 11. Using vocabulary from available resources 12. Using a specific language convention : _____ 13. Using the strategy : _____ 14. _____

To write texts

I Write Texts

1. I prepare to write.

- I think of the instructions.
- I take out the resources I need
  (my books, my dictionary, my bank of expressions . . .)
- I look at the model.
- I write down ideas in English.
- I put them in order.

2. I write a draft.

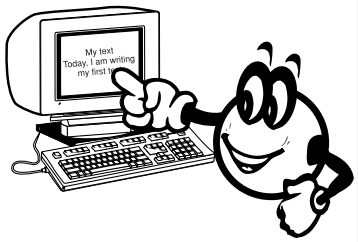
- I look at the model again.
- I follow the instructions.
- I use my ideas.
- I write short sentences in English. (Subject / Verb / Object)
- I use the vocabulary and expressions I know.
- If I have a problem:
  - I ask for help, I use my bank of words . . .

3. I revise my text.

- Did I follow the instructions?
- Did I follow the model?
- Are my ideas original?
- I check the spelling, the word order and punctuation with the resources I have.
- I ask a friend to revise my text.
- I correct my text.

4. I write my final text.

- Is it OK?
- Is it neat?
- Is it easy to read?



Elementary Cycle Three Generic[1] Evaluation Tool for Competency 3, *To write texts*

Name of student: _____ **Class:** _____

Evaluation criteria: Characteristics of the written text and Application of targeted language conventions

For marks and feedback purposes	For feedback purposes + = good job | – = to work on	
	Content	**Form**
› *Comprehension of the text by an anglophone* 10 The text is easily understood despite errors, if any. 8 The text is understood with **some** interpretation. 6 The text is understood with **considerable** interpretation. One or two sentences may not be understood. 4 Parts of the text are not understood despite interpretation.	+ – clarity + – detail + – flow + – paragraphing + – pertinence + – other: _____	+ – articles + – capitalization and/or punctuation + – prepositions + – pronouns / possessive adjectives / possessive forms + – sentence structure (e.g. word order) + – singular/plural + – spelling + – verbs (e.g. tense, agreement) + – vocabulary + – other: _____
› *Introduction or introductory sentence* 1 Effective 0 Ineffective 0 Missing	+ appropriate + catchy + original + useful + other: _____	– does not make sense – inappropriate or not pertinent to the task or context – incomplete – unclear – other: _____
› *Body of the text* 3 Effective 2 Mostly effective 1 Mostly ineffective 0 Ineffective	+ accurate + complete (all necessary information) + easy to follow + pertinent + well developed + well organized + other: _____	– essential information missing – inaccuracies – insufficient detail or development – lack of logic – lack of organization – poor paragraphing – repetition – some content that does not make sense, is confusing or is not understood – some content that is inappropriate or not pertinent to the task – task requirements missing – other: _____
› *Conclusion or closing* 1 Effective 0 Ineffective 0 Missing	+ appropriate + original + useful + other: _____	– does not make sense – inappropriate or not pertinent to the task or context – incomplete – repetitive – unclear – other: _____
› *Adaptation of the text to purpose and audience (task)* 5 Entirely 3 Mostly 1 Somewhat 0 Not at all	+ well-selected content + well-adapted content + well-selected language + other: _____	– some inappropriate content – some poorly adapted content – some inappropriate language – other: _____
Total mark for Competency 3	**/20**	

Main challenges

Special cases

If you are unable to fairly evaluate the text using the tool, select one of the following descriptors and allot 6/20.

- Most or all of the text cannot be understood, despite interpretation.
- The text is incomplete or too short.
- The text is off task.

[1] If this evaluation tool is used along with a Competency 2 tool, do not evaluate "Body of the text" or "Adaptation of the text to purpose and audience," in order to avoid an overlap in evaluation, as these two elements will be addressed in the Competency 2 tool.

Using the Evaluation Tool

This generic evaluation tool is suitable for most writing tasks. It may be used with Elementary 5 or 6 students. You may adjust the level of difficulty through task choice, design, requirements and expectations.

This tool was designed for two purposes:

1) to allow teachers to collect marks on students' writing skills for the report card
2) to help teachers support student learning by providing specific feedback

The left-hand column is used to assess the texts and provide marks. In the right-hand column, you may provide specific feedback that will allow students to have a better idea of what they are doing well (+ sign) and what they still need to work on (– sign), and enable you to base your assessment on observable elements.

For each section of the evaluation tool, first determine which descriptor best represents the student's text, and circle the corresponding mark. Next, in the right-hand column, circle the elements that were particularly strong and those that were the most problematic. The goal is to identify which elements stood out and which should be tended to, not to catch each mistake or weakness. Finally, add up the marks in the left-hand column to obtain the final result for the task.

Notes on the Descriptors

› *Comprehension of the text by an anglophone*

You must read the text in its entirety as if you were an anglophone with little or no knowledge of French or the task.

Easily understood – You do not have to infer to understand the text.

Despite errors, if any – Errors, if any, do not affect the comprehension of the text.

Some interpretation – You must infer to understand parts of the text but most of the text requires no interpretation.

Considerable interpretation – You must make a substantial effort to understand several parts, or a significant portion of, the text.

Parts of the text are not understood despite interpretation – Even though you try to infer meaning, part of the text remains unclear.

› *Introduction or introductory sentence*

Depending on the form of text that students are required to write, the introduction may simply consist of an introductory sentence (e.g. *I'm writing to propose a new activity for the school* or *Once upon a time there lived a little girl*).

Do not use this section (and adjust the total marks) if:

- the text does not call for any introduction or introductory sentence (e.g. poster)
- students merely reproduce an introduction from a model provided to them

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› *Body of the text*

No matter what form of text students are required to write, the body of the text must meet certain requirements: the content must be relevant to the task and sufficiently developed; ideas must be clear and grouped in a logical manner so the reader can easily follow them; information must be accurate, etc. To determine the degree of effectiveness, refer to the task and the set requirements. Refer to the sidebar if the task involves Competency 2.

Note about integrated tasks

If the task that students carry out involves Competency 2, *To reinvest understanding of written and oral texts*, two sections of the tool will not be used in order to avoid an overlap in evaluation: "Body of the text" and "Purpose and audience." These sections will be addressed in the Competency 2 tool.

› *Conclusion or closing*

Depending on the form of text that students are required to write, the conclusion may simply consist of a brief sentence that appropriately brings the text to a close (e.g. *I hope this information will be useful* or *They lived happily ever after*).

Do not use this section (and adjust the total marks) if:

- the text does not call for any conclusion or closing (e.g. poster)
- students merely reproduce a conclusion or a closing from a model provided to them

› *Adaptation of the text to purpose and audience*

All texts are written for a purpose and a target audience. The purpose can be basic (e.g. to remind someone of an upcoming event) or more complex (e.g. to convince someone to do something). The target audience can be a single person, a group or the public at large.

You can determine whether or not a text was written in light of the purpose and audience by asking yourself a few questions. For example:

- Does the text accomplish what it was supposed to accomplish? For example, if the student was meant to explain a concept, was the concept explained well so that the reader will easily understand?
- Is the language used appropriate to the purpose and audience? For example, are words too technical for the target audience? Is slang used in a formal text?
- Is necessary background provided (if applicable)? For example, does the audience need to know certain facts about the topic to understand the text?
- Is there too much irrelevant or extraneous information, thus confusing the reader?
- Is information detailed enough for the audience to understand? For example, if a decision is presented in the text, is it explained? Are opinions supported?
- Is the information too specialized or technical for the reader, hindering his or her comprehension?
- Is the information organized in a way that the reader can easily follow and understand?