

junior tech challenge

The practical
side of
science and
tech

Student Handbook Intensive ESL Cycle 3

Name:

Partner:

Name of gripping tool:

Get a Grip!

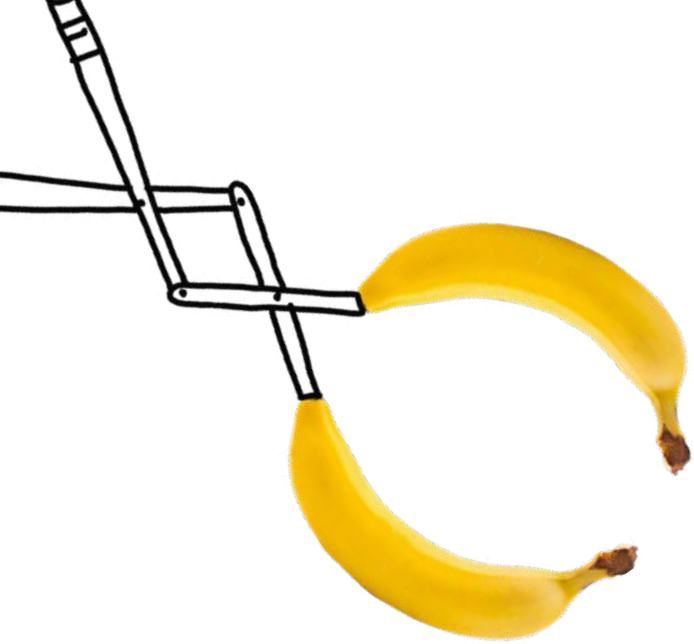
2019-2020 EDITION



Illustrations : Élise Gravel

A program of





The Challenge

To design a gripping tool that can be used to pick up and move items of various sizes and masses.

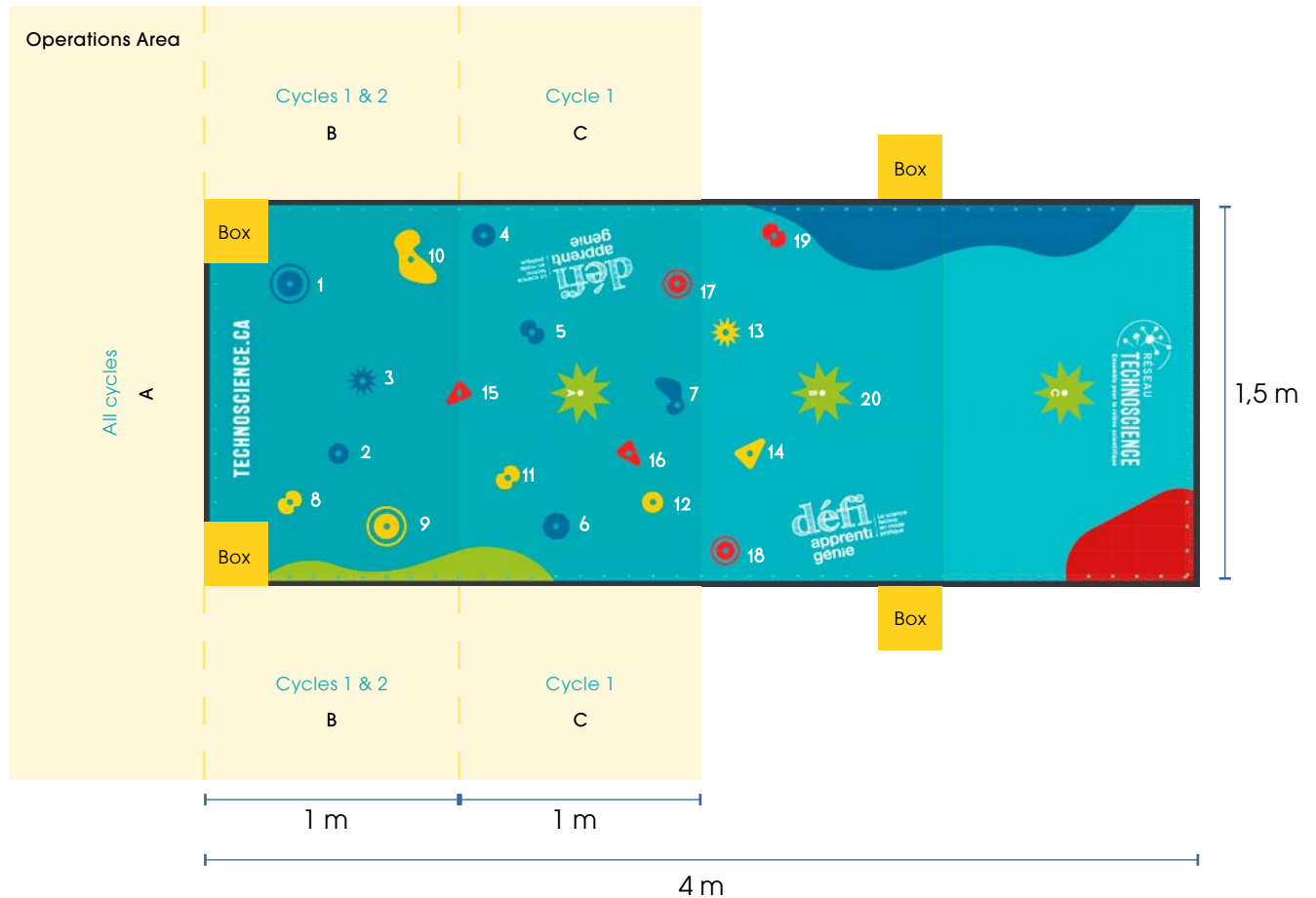
**You have 60 seconds to
accumulate 200 points.**

cycle 3

You have access to Operations Area A.



Competition Area



Examples of objects to be picked up:



GENERAL LEARNING PROCESS IN SCIENCE AND TECHNOLOGY

(ACTIVE DISCOVERY PROCESS) IN PRIMARY SCHOOL

Context related to everyday life



- Situation problem or
- Discovery question or
- Need to be fulfilled
- Question related to the operation of an object (how does it work?)



Initial ideas and hypothesis

My initial ideas:

- I share my own ideas.

My hypothesis:

- I predict that... I think that because...
- I imagine my prototype.
- I think it works like this...

Planning and carrying out



My equipment:

- I observe and handle the equipment.
- How could this equipment be useful to me?
- I choose my equipment and my materials.

Carrying out my process:

- What will the steps be?
- What precautions should I take?

My actions:

- I carry out the steps of my protocol.
- I note or draw what I observe, what I do and what I discover.

My results:

- What is my answer to the problem, question or need?

Outcome



My outcome:

- Do my results confirm my hypothesis or not?
- Are my results similar to those of the other teams?
- Can the other teams' results help me to find answers to my problem, my question or my initial need?

- What could I communicate concerning my discoveries?

What I learned:

- What do I retain from this activity?
- What could I communicate concerning my results or my discoveries?

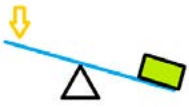

New question?

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

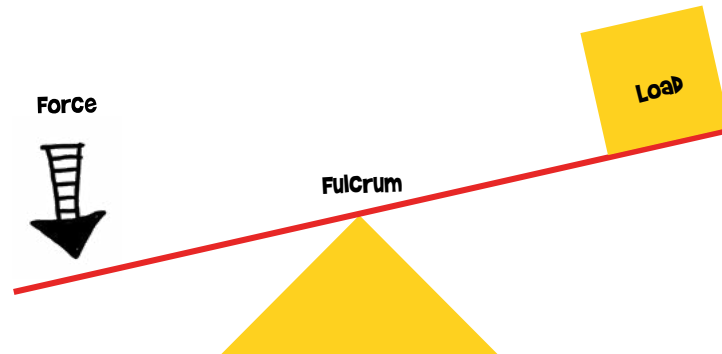
What is a simple machine?

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.

 <p>Inclined plane</p>	 <p>Example: Ramp in a moving truck</p>
 <p>Lever</p>	
 <p>Pulley</p>	
 <p>Wheel</p>	

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

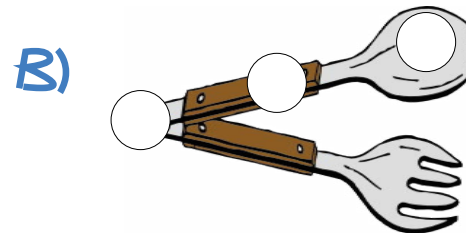
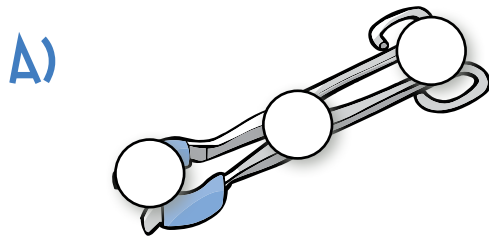
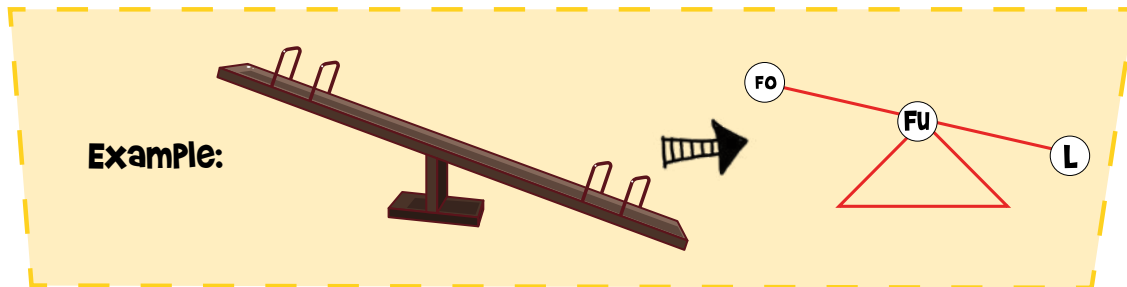
A fixed point around which a lever rotates.

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.

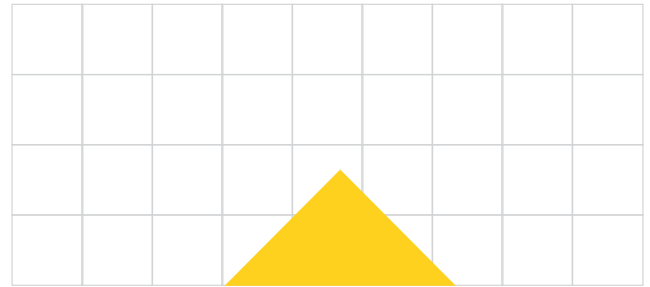
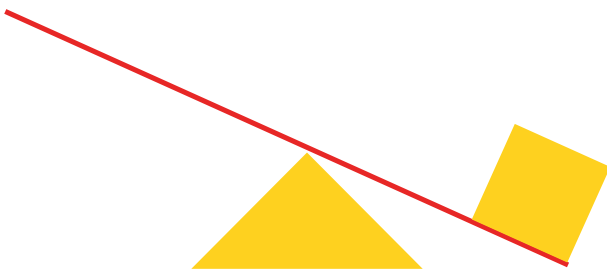
EXAMPLE	USE

3. In the examples below, place the lever parts in the right place.

FO Force
 L Load
 FU Fulcrum

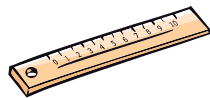


1. What would you do to balance the lever below?
Draw your solution.



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

Materials



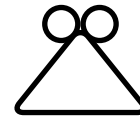
Lever (hard ruler)



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		

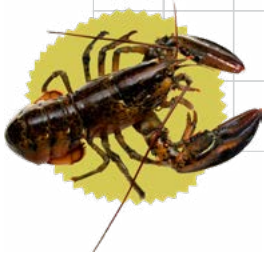
What do you observe?

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?

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?

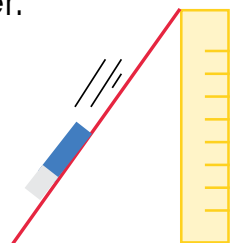
- 1) _____ 2) _____
3) _____ 4) _____

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						

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



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!

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				

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?	<input type="checkbox"/>	<input type="checkbox"/>
hard to handle? Can you make it easier to use?	<input type="checkbox"/>	<input type="checkbox"/>
strong? Can you use other materials? Can you attach the parts of your gripping tool in a different way?	<input type="checkbox"/>	<input type="checkbox"/>
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?	<input type="checkbox"/>	<input type="checkbox"/>
Does your gripping tool allow you to easily grasp all objects? Can you modify the contact surface?	<input type="checkbox"/>	<input type="checkbox"/>
Is the fulcrum in the right place? Can you move it to change the force?	<input type="checkbox"/>	<input type="checkbox"/>

Other : _____

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

POINTS

Results-Round 1

Results-Round 2

Final Result

<div></div>	+	<div></div>	=	<div></div>
-------------	---	-------------	---	-------------

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.

