junior tech **challenge** | The practical side of science and tech

MISSION: LAUNCH!

A technology **challenge** for all elementary students!
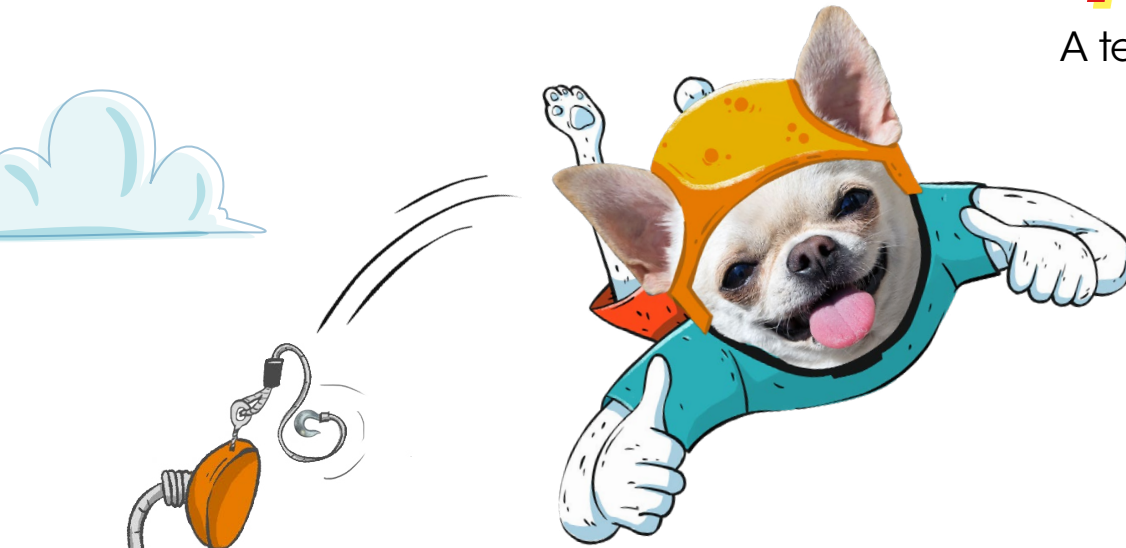
Regional finals within **ODYSSÉE DES SCIENCES**

A program of
RÉSEAU TECHNOSCIENCE
Together for a new scientific generation

Premier partner
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INTRODUCTION

A LES FOR THE CLASS…AND MUCH MORE!

The Junior Tech Challenge « **Mission: Launch!** » is a LES for the classroom, but it is also a competition that can be experienced at different levels. Teams can be registered directly to the regional finals, or students and staff can collaborate by organizing a school final in order to select the teams that will participate at the next level. In some regions, school service centers organize a final where teams must participate before registering to the regional final.

The Réseau Technoscience, through its regional organizations, arranges regional finals throughout Quebec. These finals are held in May, as part of the Rassemblement scientifiques, and feature projects from the primary level of the Expo-sciences Hydro-Québec and scientific experiences from Les Débrouillards. The Rassemblement scientifiques is presented as part of l'Odyssée des sciences, a Canada-wide event, that is held in May.

In this document, you will find the rules for the 2022-2023 Junior Tech Challenge, and practical information to successfully complete the challenge within your class or your school.

A CHALLENGE AT EVERY LEVEL!

During the regional finals or in-school competitions, the challenges can be presented in different formats. The goal in doing this is to allow the students who participate at different levels of the competition to experience it in different ways. Everything will be put in place so that students can review the notions learned in class while continuing to have fun! For example, in higher levels, the targets could be at a different distance or location, the projectiles could vary, the way the points are scored could be modified, etc.

YOUR MISSION

The water level near your home is rising and you are worried about your friends who live on the islands nearby. How will you get to them if all the roads between the city and the islands will soon be submerged?

To prevent the water from reaching your friends' homes, you are thinking of building a prototype that will allow you to propel sandbags onto the islands. Your friends will be able to receive them and install them to block the rising water from reaching their homes.

Do you have all the materials you need to build the prototype you have in mind? Will the projectiles be able to reach the farthest island?

PEDAGOGICAL TOOLS

The following pedagogical tools are free and designed to provide teachers with a step-by-step guide to implementing the « Mission: Launch! » challenge in class. Many of these tools are available at technoscience.ca :

- Teacher's Guide
- Student Handbook
- Slideshow
- Certificate of Participation
- Frequently Asked Questions (FAQ)

For questions or support, contact a member of the Réseau Technoscience in your area.
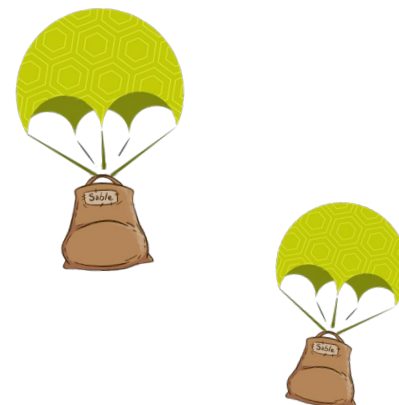
THE CHALLENGE

To build a prototype that launches sugar packets at multiple targets.

SPECIFIC RULES

1.1. The Junior Tech Challenge is a program of Réseau Technoscience. Réseau Technoscience and its regional organizations are responsible for publishing the rules, enforcing them during the regional finals, and organizing these regional finals throughout Quebec.

1.2. The Junior Tech Challenge is open to all elementary students.
Note: it is possible for kindergarten students to participate in the challenge by using the rules that apply to Cycle 1.

1.3. Each team is comprised of one to three participants. Any team with students from two different cycles must complete the challenge from the higher cycle.

1.4. The prototype must be designed and built by students.

1.5. Failure to follow the rules, or any other breach from the organizing committee's directives, may result in the disqualification of the students.

1.6. The answers published in the Frequently Asked Questions serve as a reference for the interpretation of the Rules.

FREQUENTLY ASKED QUESTIONS

The Frequently Asked Questions section is where you and your students will find more details about the rules of the challenge: TECHNOSCIENCE.CA

CONSTRUCTION OF THE PROTOTYPE

2.1. Only the materials authorized on the list below can be used when building the prototype.

Note: It is not required to use all the materials from the list, but all materials used must be from the list.

- Paper fasteners
- Elastic bands
- Wooden skewers
- Wooden coffee stir sticks
- Cardboard boxes ♻
- Empty tin cans (*edges must not be sharp*) ♻
- Lids of any kind ♻
- Milk or juice cartons ♻
- Egg cartons ♻

- White liquid glue (*washable and non-toxic*)
- Hot glue (*in the Finals the use of a glue gun will not be permitted*)
- Pencils
- Plastic spoons ♻
- Pipe-cleaners
- Clothes pins
- String
- Bulldog clips

- Plastic containers ♻
- Tape of any kind
- Paper clips
- Used pen tubes ♻
- Cardboard cups ♻

> ♻ Ask students to bring in materials from their recycling bins at home!

2.2. Items not permitted :
- Any item that can cause injury (*sharp ends, sharp edges, etc.*);
- Any item that can alter the competition area.

2.3. The prototype must be able to fit into a closed cardboard box designed to hold 5,000 letter-sized sheets.

2.4. The prototype must be able to stand on its own without anything securing it to the ground or to the inclined plane (*see Appendix page 10, Inclined Plane Construction*).

2.5. The projectile is a sugar packet of approximately 42 mm x 64 mm weighing between 3-4 g. The pack can be folded in half and taped together. It cannot be attached to the prototype.

A MISSION FOR ALL LEVELS!

2.6. **Cycle 3 :** The sugar packet must be launched by a **mechanical trigger.** This mechanical trigger must be something other than the participant's hand: a button, a pin, the cutting of a string, etc. The prototype must therefore be able to remain armed before being triggered.

Although it is not necessary, you can decide to use a mechanical trigger even if you are in cycle 1 or cycle 2!

SCHEDULE OF EVENTS

3.1. Each team is required to have their prototype verified to ensure that all the rules are followed. The cardboard box is used at this time to verify the size of the prototype (*see 2.3.*).

3.2. After the verification, the teams have 45 minutes to perform their trials.

3.3. The competition consists of two identical rounds. The scores of both rounds are added together and retained for ranking purposes.

3.4. Each team receives 10 packets of sugar, and has a maximum of two minutes to accumulate the most points by hitting the targets (*see page 7, Competition Area*).

3.5. The prototype must be installed on the ground or on the inclined plane at the starting line of the appropriate cycle (*see page 7, Competition Area*).

3.6. Within the two-minute time limit, the team can adjust or reposition the prototype and/or the inclined plane.

3.7. The prototype and the inclined plane must remain behind the starting line (*see page 7, Competition Area*).

3.8. Participants can take turns operating the prototype, or can designate one person to be the operator. The rest of the team can remain within the Competition Area, without going beyond the starting line. They can offer support, or help place the sugar packets into the prototype.

3.9. The team's turn ends if either of the following occurs:

- The two minutes are up;
- The 10 packets of sugar have been launched.

THE COMPETITION AREA

Starting line for Cycles 2 and 3

Starting line for Cycle 1
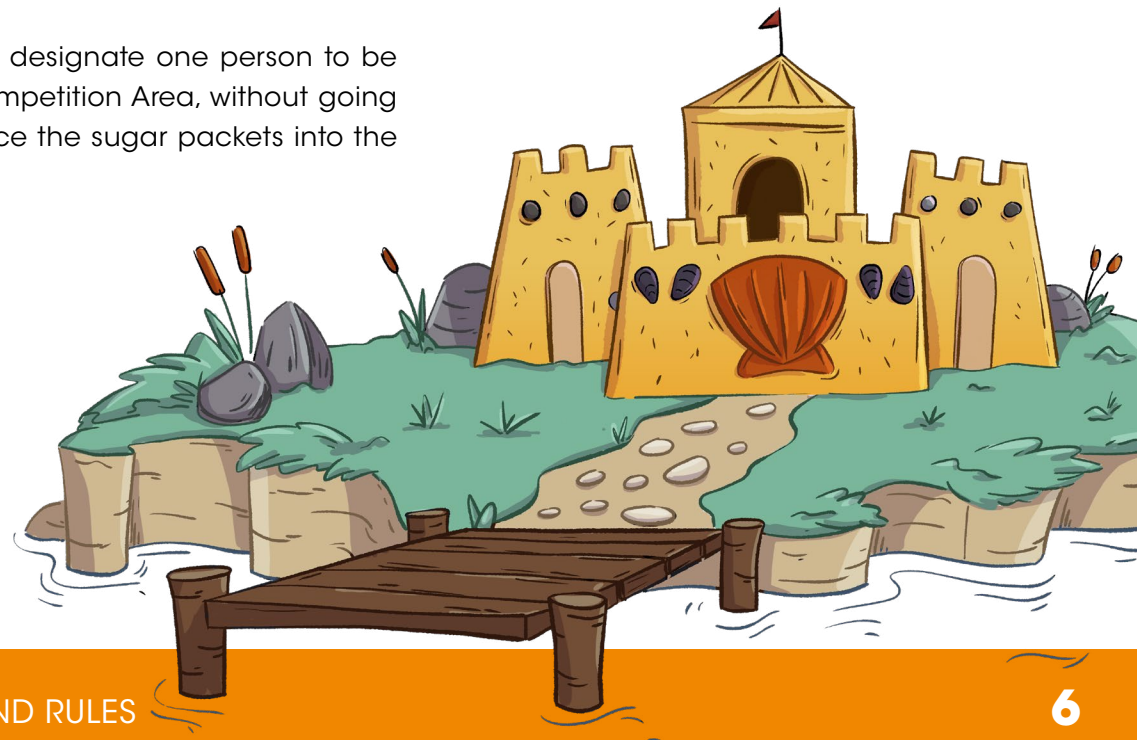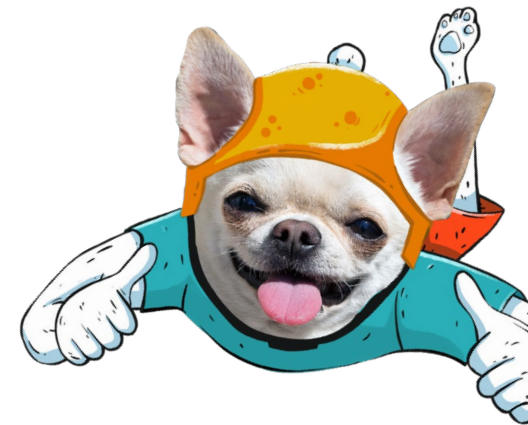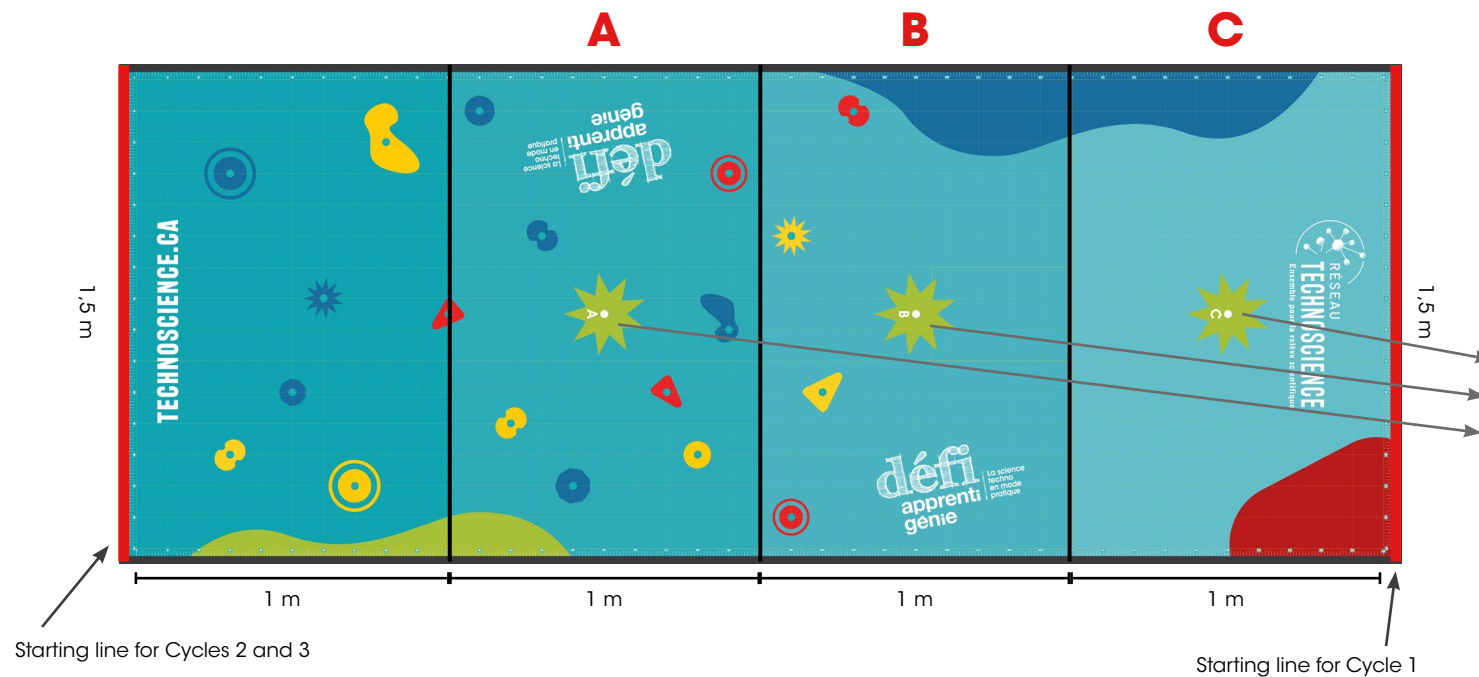
ZONES

The competition area is divided into 3 scoring zones represented by the letters **A, B** and **C**. The score for each launch is based on the value of the zone where the sugar packet **lands.** If a sugar packet lands on two zones, the points associated to the zone with the higher value are counted.

TARGETS

A small aluminum tray (*about 19 cm x 14 cm x 5 cm*) is attached in the center of Zones **A, B** and **C** (*see image above*). Two larger aluminum trays (*about 22.2 cm x 15.9 cm x 5.5 cm*) are attached to the right and to the left of each smaller tray, with the edges of the trays touching. When a sugar packet **lands inside** one of these targets, it is assigned target points according to the scoring grid (*see next page*). If a sugar packet touches a target, but lands outside the target, the team can only be awarded the points associated to the zone.

SCORING

The points awarded for each sugar packet launched are added at the end of each round. The score of both rounds is added up for each team. The winning team is the one with the most points per cycle.

In the event of a tie for the top three spots, teams will have one minute to shoot at the targets of their choice to accumulate the most points possible. In this case, there is no limit to the number of sugar packets launched.

POINTS PER SUGAR PACKET – CYCLE 1

Zones	Points per zone	Targets	Target points
A	30	Left/Right	240
A	30	Center	350
B	20	Left/Right	140
B	20	Center	250
C	10	Left/Right	40
C	10	Center	150

POINTS PER SUGAR PACKET – CYCLES 2 AND 3

Zones	Points per zone	Targets	Target points
A	10	Left/Right	40
A	10	Center	150
B	20	Left/Right	140
B	20	Center	250
C	30	Left/Right	240
C	30	Center	350

Final scores = Total points from Round 1 + Total points from Round 2
(Zone points and Target points)   *(Zone points and Target points)*
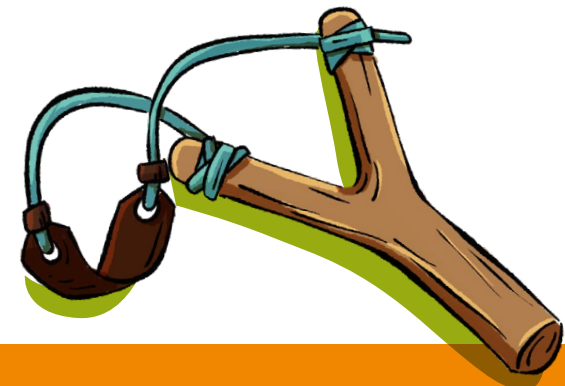
HOW TO REGISTER

To register your teams to the regional final, you can either contact the regional coordinator of the Junior Tech Challenge, or register directly online.

Note: If your school board or school service center is holding a final, you must register your team with the individual responsible for organizing the event.

CONTACT US
for details about costs, registration, scheduling, etc.

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ACKNOWLEDGEMENTS

APPENDIX: CONSTRUCTION OF THE INCLINED PLANE

(To be built by an adult)

The inclined plane used in the regional finals is made of two plywood surfaces connected by two hinges and a wooden stick for support. However, it is possible to use different materials for the classroom finals *(e.g. board games or corrugated polypropylene connected with tape).*

MATERIALS:

- Plywood (3/8 inch): 2 surfaces of 23 x 30 cm
- Wooden stick measuring 1 x 1 cm x 23 cm
- Wood glue and clamps
- 2 narrow hinges 2.5 x 2.5 cm (1 x 1 inch)

For the angle of the inclined plane: Books, textbooks, etc.

MEASURING THE ANGLE OF THE INCLINED PLANE:

- Non-conventional measurement: The number of books under the plane, ruler
- Conventional measurement: protractor or ruler

STEPS:

1 - Place the two plywood boards one next to the other, using the smaller sides of each.
2 - Connect the two plywood boards by screwing two hinges between them.
3 - Apply glue along the wooden stick.
4 - Glue the wooden stick horizontally on to one of the plywood boards (*see picture*).
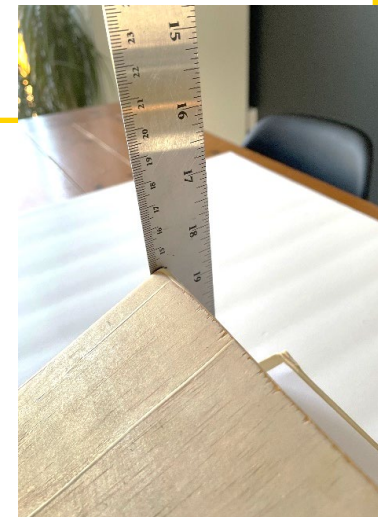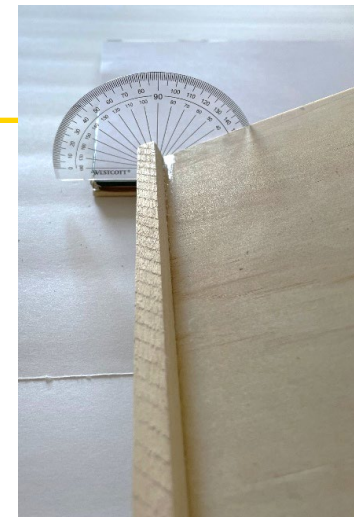**5 -** Let dry.

1-2

Plywood (3/8 inch)
2 surfaces of 23 x 30 cm
2 narrow hinges 2,5 x 2,5 cm

3-4

Wooden stick
(1 x 1 inch)

Books to vary the angle of
the inclined plane

Measurement of the angle with a protractor or a ruler