

Science on tour[®]!

31ST
EDITION

PRESENTED BY



AN ASSOCIATED PROJECT OF



YOUR — 2024 — CHALLENGE :

TUG OF WAR

OVER
\$20,000
IN PRIZES
TO BE WON!

INTERCOLLEGIATE SCIENTIFIC COMPETITION





PROVINCIAL FINALS MAY 3 & 4, 2024

 CÉGEP DE
SAINT-HYACINTHE





TEAM MEMBERS

- No more than three members are allowed per team.
- All members of your team must be registered with the same educational institution, as you will represent this institution if you make it to the provincials.
- No student may be part of more than one team or present more than one device.
- A team's members cannot change between the locals and provincials.
- Teams must give their device an original name that is not trademarked. Device names cannot be changed between the locals and provincials.

TWO CATEGORIES OF PARTICIPANT

Professional category

This category is open to all public and private college students in Quebec. Participants can be youth or adults enrolled in full or part-time classes in regular or continuing education in any program. To participate in the

National Finals in May, students must be registered for the preceding winter session. For example: for the National Finals in May 2024, the student must be registered for the Winter 2024 session, whether full-time or part-time.

Amateur category

This category is open to all employees of public and private colleges in Quebec.



LOCAL & PROVINCIAL FINALES

There are two sets of finals. To make it to the provincials, you will first need to excel at your college's locals!

Locals will be held from February 12 to April 5, 2024. Each institution will organize its own locals, where teams will compete in their respective categories. It is up to each college to determine

the prize that will be awarded to winners at their locals. The winning teams from each institution will receive an invitation to the provincials (one team per category per college).

The provincials will be hosted on May 3 and 4, 2024 by Cégep de Saint-Hyacinthe.

At this event, the winning teams from colleges' *Professional* and *Amateur* categories will face off. The provincials will be open to public viewing.

USEFUL RESOURCES

Each college will make a reference person available to answer any questions you may have regarding the challenge or Science, on tourne! in general. Contact your college's Student Services to get in touch or visit the website: scienceontourne.com.

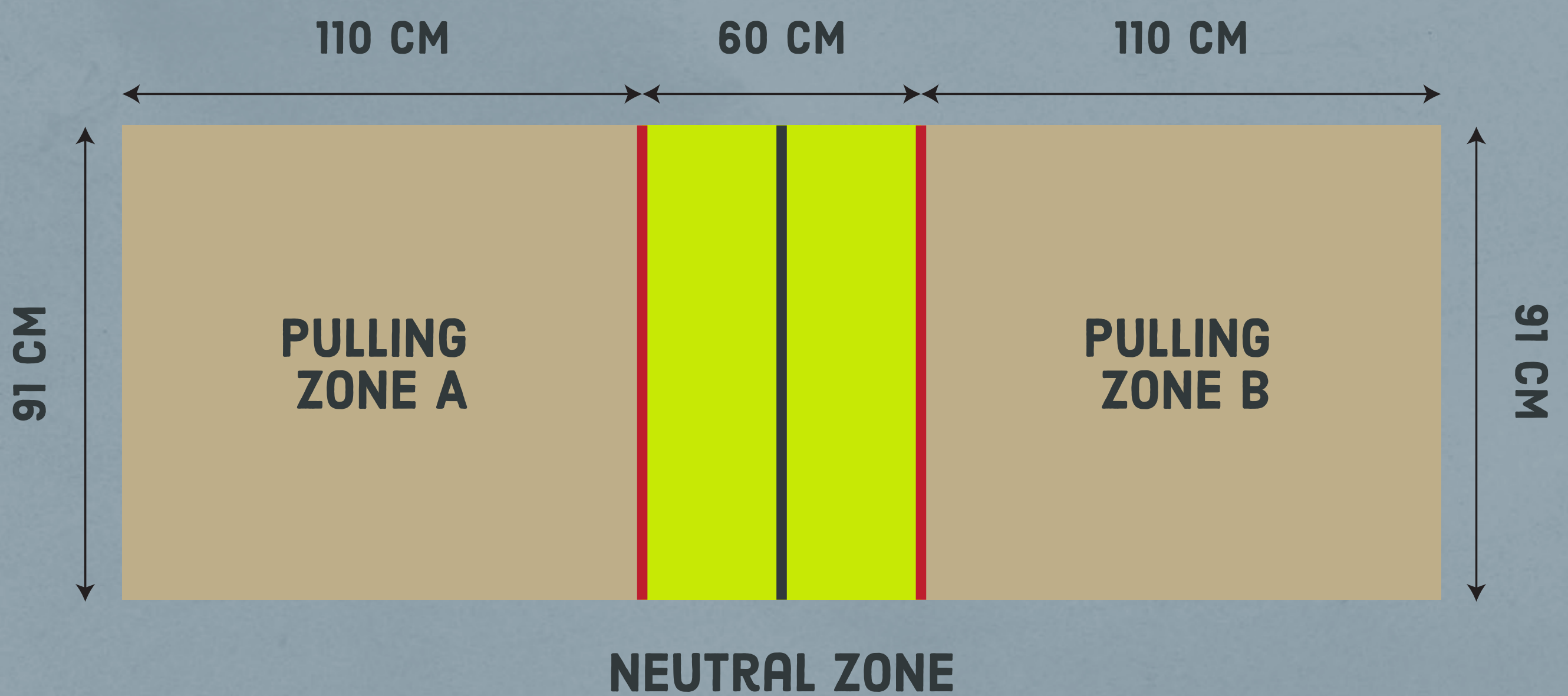
You may also consult our online FAQ.



1. CHALLENGE

To build a device that can compete against another device in a tug-of-war duel while only relying on gravitational potential energy

2. TRACK



The track consists of three (3) zones: pulling zone A and pulling zone B as well as the neutral zone.

2.1. The track is of rectangular shape and measures 91 cm by 280 cm. For the national finals, the surface will be made of grooved industrial carpet (see section 8: useful information). It is considered part of the challenge to adapt to different types of surfaces. Please note that the space provided outside the track is unknown.

2.2. The neutral zone measures 91 cm by 60 cm and is marked by starting line A and starting line B. A central line divides the track in the middle of the neutral zone.

2.3. The starting line and the central line are drawn on the track using a chalk line and white chalk.

2.4. The track has a clearance height of 150 cm.



3. DEFINITIONS

3.1. Device: a standalone mechanical object designed to compete in the tug-of-war challenge.

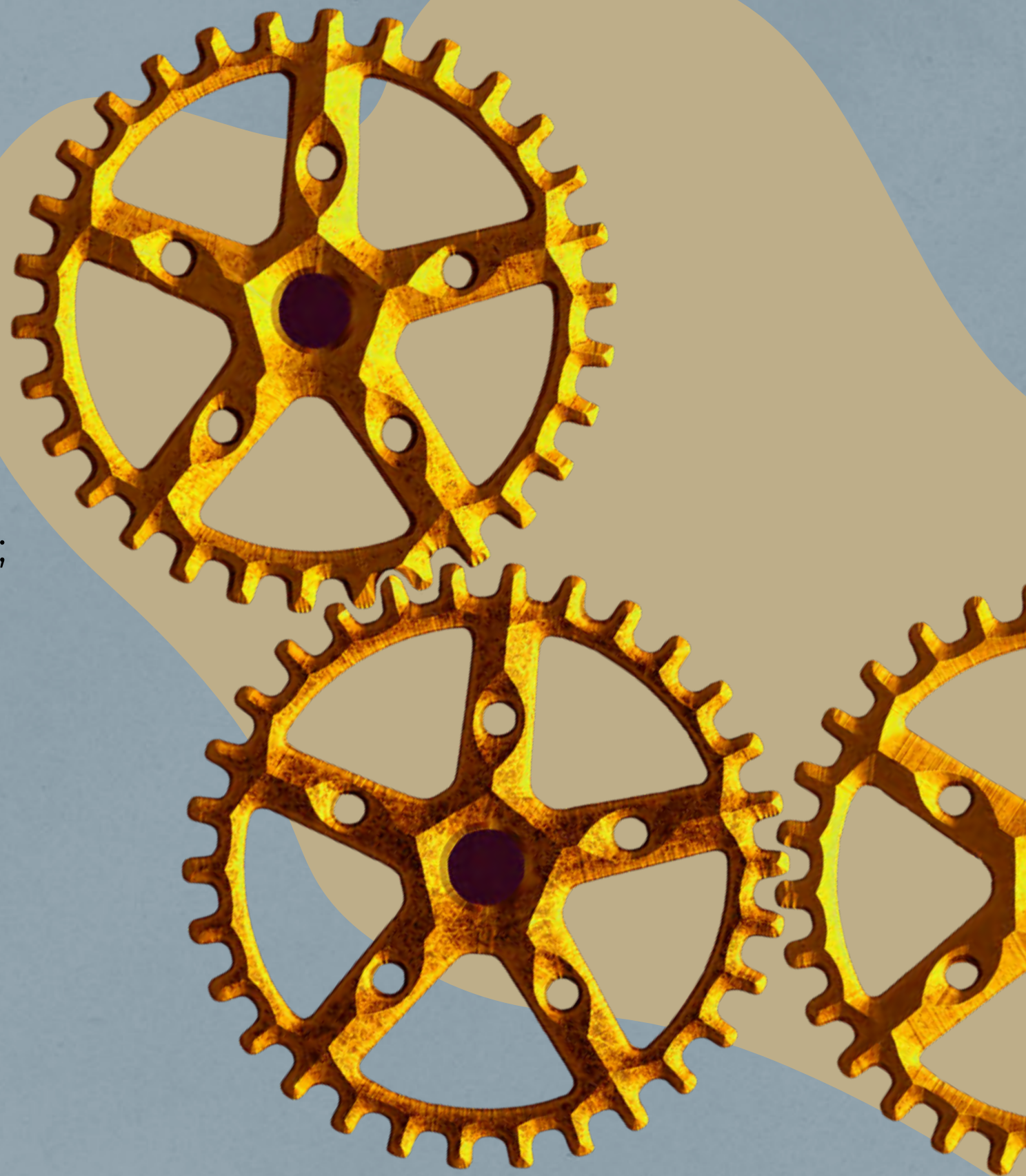
3.2. Cord: the connector between the two devices competing against one another. It is made of non-extensible material and is 100 cm in length. It has a closed ring at each extremity (see section 8: useful information). It has a red coloured mark at its centre.

3.3. Switching on tool: the tool used for switching on the device. It can be:

1. Held in hand and outside the track;
2. On the track and stationary in order to hold the device.

The use of a switching on tool is facultative.

3.4. Duel: the competition between two devices. At the end of a duel, one of the devices is declared the winner and the other, the loser.



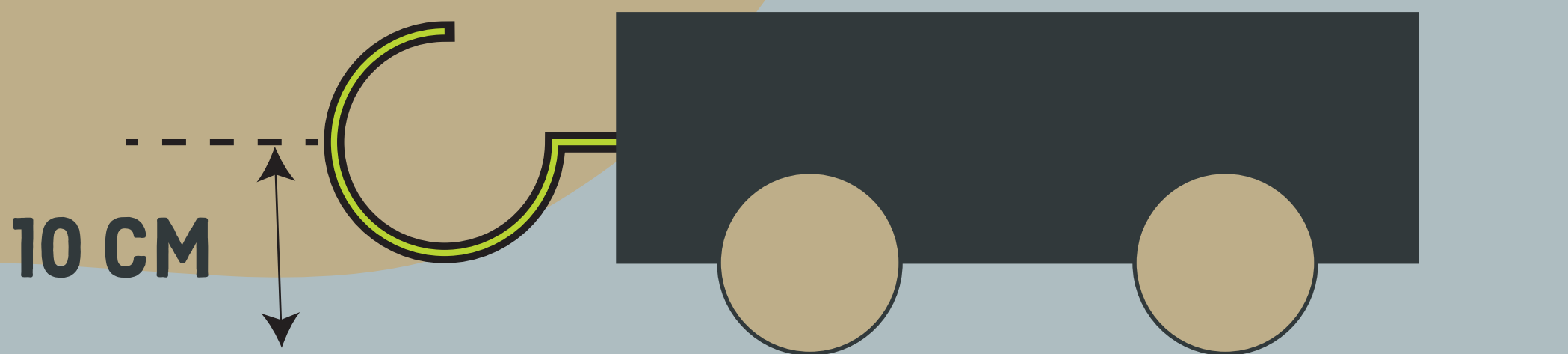
4. RULES

A team can be disqualified if it violates one of the following rules:

REGARDING THE DEVICE

4.1. The device, the tools and the other technical materials must fit in one or two boxes made to hold 5,000 sheets of 8.5 x 11 in (21.6 cm x 27.9 cm) paper. The boxes must close to meet their original dimensions.

4.2. The devices' weight must not exceed $4,50 \pm 0,01$ kg.



4.3. The device must have a hook in which one of the rings on the cord will be inserted. The hook must be able to connect to a ring with an internal diameter of 25 mm (see *section 8: useful information*), its opening must face upwards and its external extremity must be 10 cm from the ground so that the ring, once the cord is taut, is also 10 cm from the ground. The device must be designed so that the ring remains at the height of 10 cm during the entire duel.

4.4. It must be clear that the device's bearings, which hold it up on the track, move by as much as the ring on the cord.

4.5. Once the device is switched on, it must be autonomous.

4.6. All the device's bearing points which are in contact with the track must remain within the boundaries of the track during the entire length of the duel.

4.7. A device cannot anchor its bearings at any point during a duel in the opposite side's neutral zone, nor enter in the opponents' pulling zone.

4.8. The device cannot split into several pieces during a duel. The hook must remain attached to the device during the entire duration of a duel.

4.9. The device must not have any dangerous components nor risk damaging the track, the cord or the competition grounds.

REGARDING THE POWER SOURCE

4.10. Only gravitational potential energy can be used to move the device. However, this energy may be converted into another type of energy (mechanical, electric, gravitational, etc.) before being used for moving the device.

4.11. Other energy sources may be used for the device's auxiliary functions. However, these sources must not provide the energy required for moving the device.

4.12. For security reasons, combustion is forbidden.

REGARDING THE SWITCHING ON OF THE DEVICE

4.13. Before the beginning of a duel, the device must be entirely inside its own pulling zone (except for the hook) and it must be stationary. The hook must be placed so that the ring on the hook hovers over the starting line of its respective pulling zone. All the team members must be outside the track. It is forbidden to touch the device in order to stabilize it or to hold it up.

4.14. The switching on of the device must be carried out by one single action and by one hand only. The use of a tool for switching on the device is permitted. The action of switching on the device must not provide any energy to the device.

5. PROCEEDINGS

The competition will proceed in the exact same manner whether it is the *Amateur* competition or the *Professional* one.

VERIFICATION OF THE DEVICES

5.1. Before the *Professional* and *Amateur* competitions, each participating team must have the conformity of their device verified and explain its functioning to the arbitration committee.

5.2. The order of appearance for the duels will be determined at random.

5.3. When a team is called to prepare for a duel, it will dispose of five (5) minutes on the sidelines to assemble and prepare their device. A table and an electrical outlet will be made available.

5.4. Each team will alternately (following the randomly determined order) present their device to the public. They will have two (2) minutes to do so. Following this, they will place their device and the switching on tool on the stage and wait for the referee's signal. Each team will present their device only one time, during their first duel.

5.5. At the referee's signal, the two teams will have two (2) minutes to:

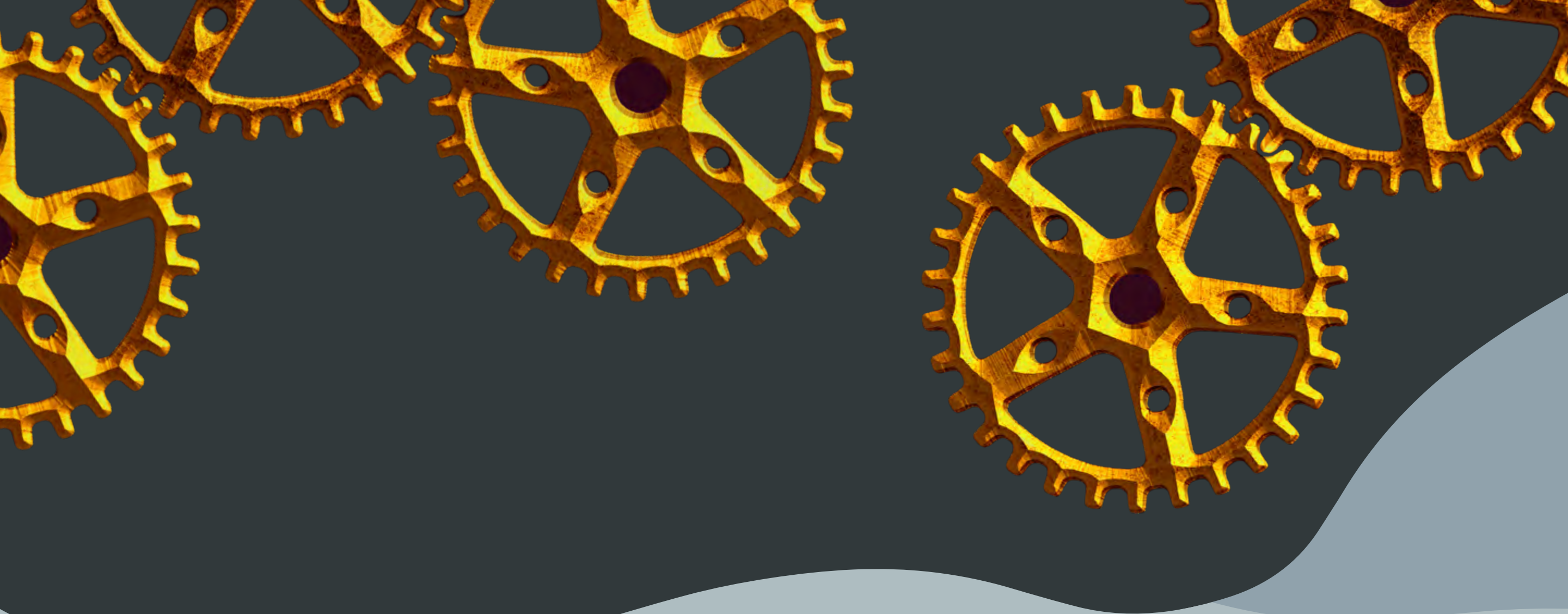
1. Prepare the device;
2. Perform some tests;
3. Position their device in their own pulling zone with the hook positioned above their own starting line.

5.6. When a team is ready, they must signal to the referee by saying "**ready**". After this, it is forbidden to touch the device.

5.7. If, after two (2) minutes:

1. One team is ready and another is not, the team which is ready will be declared the winner;
2. The two teams are not ready, the team whose device's mass is lower will be declared the winner;
3. The two teams are ready, the duel will take place.





5.8. The referee says “**Attention!**” and verifies that the two devices comply with the rules. The referee places the rings of the cord on each hook, verifies that each hook is above its respective starting line, places the red mark on the cord over the central line and begins the official countdown (**5, 4, 3, 2, 1...Go!**).

5.9. At “**Go**”, the teams start their devices and the duel chronometer begins (1 minute). The starting of the device must be done immediately at the referee’s signal and must have been carried out two (2) seconds after the signal. A team who fails to execute the starting of their device in the allotted time cannot start over: the duel will continue without further intervention.

5.10. The first team to succeed in pulling the red mark on the cord into its own pulling zone will be declared the winner. The duel chronometer will then immediately stop.

5.11. If the time allocated for the duel runs out without any team being eliminated or if the referee decides that nothing more can happen, the end of the duel will be signaled by the referee blowing a whistle. At this moment, a precise measurement will be taken of the distance between the ring and the starting line for each team. This distance is considered positive if the ring has advanced towards the rear, the teams’ own zone boundary, and negative if the ring has moved forward, towards the opposite teams’ boundary. The following criteria will apply:

1. The team with the longest measured distance will be declared the winner;
2. In the case that the two teams’ distance is equal, the team whose device’s mass is lower will be declared the winner.

5.12. The *Professional* competition will have standard double elimination rules. This implies that a team will be eliminated when it loses a duel for the second time (*see tournament examples in section 8: useful information*). The *Amateur* competitions’ form will vary according to the number of competitors.

FINALS

5.13. The finals will happen when there remain only two teams. During the finals, standard double elimination rules will be in practice. In other words, if a team reaches the finals without having lost a single duel and then loses a duel, another final match will be held.

5.14. At the end of the final dual, one team is eliminated and another is declared the winner of the tournament and will win the tournament prize.



6. SECURITY

The use of protection equipment such as safety glasses and gloves are recommended during the building of the devices and during the local and national competition finals.



PRIZES

THE FOLLOWING PRIZES WILL BE AWARDED TO THE WINNERS OF THE PROFESSIONAL CATEGORY AT THE PROVINCIALS.

CHALLENGE PRIZE

\$1,000 awarded to each member of the team with the highest score.

Provided by the Ministère de l'Économie, de l'Innovation et de l'Énergie.

Free registration to the Forum international Sciences Société for each member of the winning team, as well as reimbursement (up to \$100) of travel expenses. **Provided by Acfas.**

A visit to a CRIAQ member company facility for each member of the winning team, as well as reimbursement of travel and accommodation expenses.

Provided by Consortium de recherche et d'innovation en aérospatiale au Québec (CRIAQ).

A 3D modelization of the team's device..
Provided by Creaform.

INGENUITY PRIZE

\$1,000 awarded to the team whose original device really pushes the envelope without breaking any rules.

Provided by the Ordre des technologues professionnels du Québec (OTPQ).

DESIGN PRIZE

\$1,000 awarded to the team that created a functional device with the most attractive design

Provided by École de technologie supérieure (ÉTS).

A 3D modelization of the team's device.
Provided by Creaform.

ENVIRONMENTAL RESPONSIBILITY PRIZE

\$1,000 awarded to the team that best applied ecodesign principles to minimize their device's environmental footprint.

Provided by Université du Québec à Montréal.

COMMUNICATION PRIZE

A \$1,500 mobility grant or a science trip to France for the Fête de la science in October 2024. Awarded to each member of the team with exceptional communications (written and spoken).

Provided by Les Offices jeunesse internationaux du Québec (LOJIQ).

MERIT PRIZE

\$2,000 awarded to the team that excelled in all five categories: device performance, ingenuity, design, environmental responsibility and communications.

Provided by the Fédération des cégeps and the Faculté de génie de l'Université de Sherbrooke.

WOMAN IN SCIENCE PRIZE

\$1,000 awarded to a woman whose passion for science stood out through her ideas set out in a short written form and her attitude at the provincial finals.

Provided by the Fonds de recherche du Québec – Nature et technologies (FRQNT).

JURY SELECTION PRIZE

\$1,000 awarded to the team designated the winner by the jury. Evaluation criteria for this prize are up to the members of the jury. **Provided by Polytechnique Montréal.**



AUDIENCE CHOICE PRIZE

\$1,000 awarded to the team designated the winner by a public vote.

Provided by the Consortium de recherche et d'innovation en aérospatiale au Québec (CRIAQ).

MURPHY PRIZE

A symbolic prize awarded to a team whose device did not work as it was intended to. **Provided by the Cégep de Saint-Hyacinthe.**

WOMEN'S PARTICIPATION PRIZE

\$500 awarded to a student drawn at random from competitors in the locals in the *Professional* category.

Provided by the Ministère de l'Enseignement supérieur.

MEN'S PARTICIPATION PRIZE

\$500 awarded to a student drawn at random from competitors in the locals in the *Professional* category.

Provided by the Ministère de l'Enseignement supérieur.



SCHOLARSHIPS

A **\$2,000 scholarship** provided by the **Consortium de recherche et d'innovation en aérospatiale au Québec (CRIAQ)**.

A **\$1,500 scholarship** applicable to tuition fees provided by **École de technologie supérieure (ÉTS)**.

A **\$1,500 scholarship** applicable to tuition fees provided by **Polytechnique Montréal**.

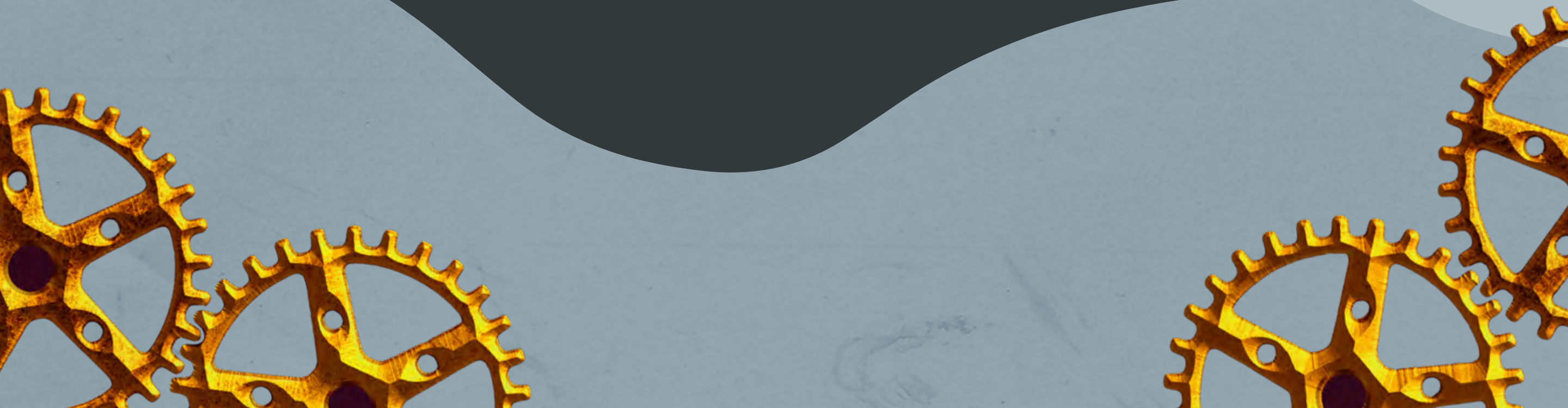
A **\$1,500 scholarship** applicable to tuition fees provided by **Université du Québec à Chicoutimi**.



YVON-FORTIN PRIZE

Symbolic prize awarded to the team that excelled in the *Amateur* category. **Provided by the Cégep de Saint-Hyacinthe**.

A \$500 gift card to a bookstore or coop awarded to the winning team in the *Amateur* category. **Provided by École de technologie supérieure (ÉTS)**.



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