

27<sup>th</sup> edition

# Science on tour<sup>®</sup>!

 scienceontourne.com

BY THE  
**QUARTER**  
*turn*

*National Final*  
May 3<sup>rd</sup> and 4<sup>th</sup>, 2019  
Cégep de Chicoutimi



Intercollegiate  
Science Competition

An event of



CENTRE DE  
DÉMONSTRATION EN  
SCIENCES PHYSIQUES

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## Participate in *Science, on tourne!*

### *Professional* category

This category is open to any student – youth or adult – enrolled at a public or private college in Québec in a full-time or part-time program in any discipline, regardless of whether the program is offered through regular or continuing education.

### *Amateur* category

This category is open to anybody employed at any public or private college in Québec.

### How to *sign up?*

- Create your team (no more than 3 participants per team) at your own college. All members of your team must be enrolled at the same college since you will represent it should you move on to the national final. An individual student cannot belong to more than one team or submit more than one machine.
- The team members must be the same for the local and national final.
- Contact the student services office to get the name of the person in charge of the contest at your college. Complete the registration form and return it to the person in charge, who will forward it to the *Science, on tourne!* team.
- Each participating team must give its vehicle an original name. The same name has to be used for both the local and national finals. Trademarks and registered marks may not be used.





## *The challenge*

Build an autonomous machine capable of completing rotations of circle using gravitational potential energy.

### *Local* finals

JANUARY 15<sup>th</sup> TO APRIL 13<sup>th</sup>, 2019

Each institution organises its own local final during which teams compete in their respective categories (*Professional* or *Amateur*). Each college is responsible for forming the jury that will evaluate the performance of the teams competing in the local contest.

It is up to each participating college to decide what prizes will be awarded to the winners of its local final.

The winning team of each college will be invited to participate in the national final (one team per college per category).

### *National* final

MAY 3<sup>rd</sup> AND 4<sup>th</sup>, 2019  
AT THE CÉGEP DE CHICOUTIMI

The national final brings together the winners in the *Professional* and *Amateur* category from each college. The public is invited to attend the event.

### savoir. média

Canal Savoir will be present at the national final to bring you the highlights of this year's edition. Stay connected to see the broadcasting schedule.





# BY THE QUARTER *turn*

## The *Challenge*

1. Build an autonomous machine capable of completing rotations of a circle using gravitational potential energy.

## Calculation of *score*

$$P = 1000 \times \frac{N}{t}$$

Where:

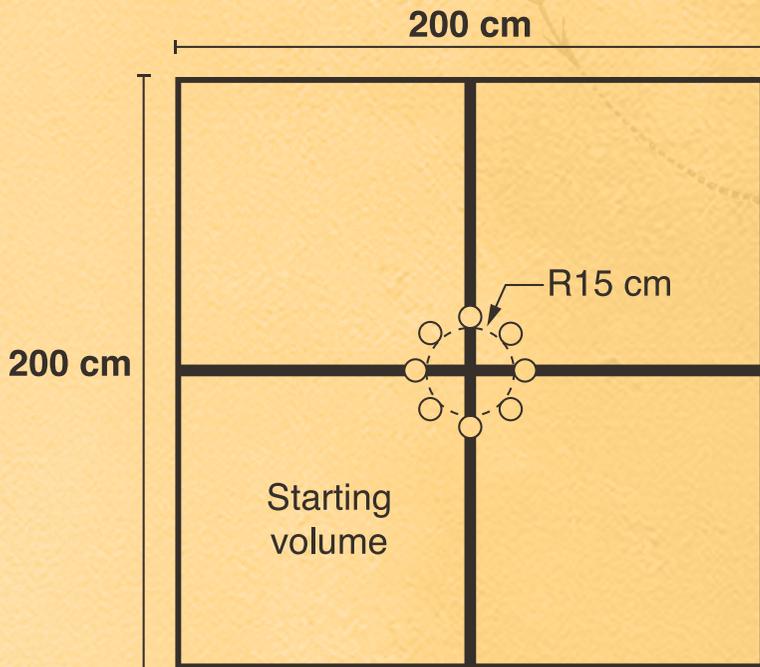
- 2.1.  $N$  is the number of quarter turns. A quarter turned is valid for the score once your machine enters the area of the subsequent quadrant. The machine will follow a clockwise direction.
- 2.2.  $t$  is the time that it takes the machine to complete the first complete rotation, at a height of 1.2 cm above the start line. Time will be measured in seconds and will be accurate to within 0.1 s. If the machine completes less than one complete rotation,  $t = 1000$  s.
- 2.3. There will be a maximum of two official attempts. The best result of the two will be used for purposes of the standings.
- 2.4. In case of two teams having the same final score,  $P$ , the mass of the machines will be used as the tie-breaker. The lower mass will be declared the winner.



# Game Field

The game field consists of a track divided into four quadrants and a circle.

- 3.1. The game is played inside a cubic volume with each side measuring 200 cm long. The exterior of the cube is marked on the ground with a white adhesive tape. At the national final, the surface of the playing field will be covered with a floating floor. Part of the challenge of this competition is to be able to adapt to the floor surface at the national finals.
- 3.2. The quadrants are volumes measuring 100 cm wide, 100 cm long, and 200 cm high, marked on the exterior of the floor with white adhesive tape. One of the quadrants will serve as the starting volume.
- 3.3. The circle has a radius of 15 cm and is surrounded by 8 hockey pucks. The hockey pucks, each having a diameter of 3 inches (7.6 cm) and a height of 1 inch (2.5 cm), are painted white and are attached to the ground with two-sided adhesive tape.



# Rules

**A team could be disqualified, forfeit one of their attempts, or have one of their official attempts be declared invalid by the referee if they break one of the following rules:**

- 4.1. Potential gravitational energy is to be the only permitted source of energy to move the machine. The potential energy could be converted to other forms of energy (i.e: mechanical, electrical...) before being used to move the machine.
- 4.2. Other sources of energy are permissible if they are used for purposes other than to move the machine.
- 4.3. The use of combustion as an energy source is prohibited.
- 4.4. The total mass of the machine will not exceed  $4,50 \pm 0,01$  kg.
- 4.5. The machine must be entirely within the start zone in order to begin an official attempt. At this time only the machine and whatever tool is required to activate the machine is permitted in the start zone.
- 4.6. The machine cannot occupy the space of two adjacent quadrants simultaneously. It cannot be separated into several pieces. It must entirely exit from the starting quadrant for a result, **P**, to be awarded for the trial in progress.
- 4.7. It is not permitted for the machine to come into contact with the circle delimited by the pucks.
- 4.8. The machine may touch the hockey pucks but may not move them.
- 4.9. The machine must be activated by a single action, using a single hand. The use of a tool to activate the machine is permitted.
- 4.10. The energy generated by the activation of the machine cannot be used to move the machine.
- 4.11. Once activated the machine must be completely autonomous.
- 4.12. The machine cannot entirely leave the course.
- 4.13. The functioning of the machine must present no danger, nor risk damaging the surface, or any other part linked to the competition.
- 4.14. The machine, along with all of the required components including tools, must be contained in one or two (2) different boxes of paper of 5 000 pages of  $8 \frac{1}{2} \times 11$  in ( $21.6 \times 27.9$  cm). It must be possible to properly secure the lid on the box.

The organizers of the local finals can adapt the official rules. However, it is recommended that the rules above be respected as much as possible, since these are the rules that will be applied at the finals. The *Science on Tourne!* Steering committee will not be responsible for any changes that are made to the rules.

# Sequence of events

## BEFORE THE COMPETITION

- 5.1. The evening before the official competition each participating team, whether as an *amateur* or a *professional*, will have their machine inspected to ensure that it conforms to the rules.

## DURING THE COMPETITION

- 5.2. The participation order of the teams will be randomly selected.
- 5.3. Each team will be granted five (5) minutes to prepare their machine for the competition. A table and an electrical outlet will be provided.
- 5.4. Once invited onto the stage, the team will place its machine in the starting zone of the course. The team will then have two (2) minutes to make an oral presentation introducing their machine. It is recommended, if possible, for this presentation to be made in French.
- 5.5. Team participants will then be granted five (5) minutes to:
  - 5.5.1. Place and prepare the machine.
  - 5.5.2. If desired, proceed run through some non-official attempts.
  - 5.5.3. Complete a maximum of two (2) official attempts.
- 5.6. The team representative will be responsible for informing the referee when they are ready for their first official attempt and the rest of the team will retreat from the scene with any extra materials that were brought on stage. At this time, the machine must be located in the start zone and entirely contained in the starting volume. The team must not interact with the machine until the referee grants the team leader permission to activate the machine.
- 5.7. The referee will ensure that the machine and the playing field conform to the rules.
- 5.8. A whistle blast will announce the start of the official attempt.
- 5.9. The team leader will activate the machine.
- 5.10. After the activation of the machine the team can end their official attempt by advising the referee, or by touching the machine. In the case that the five (5) minutes expires the attempt is considered to be completed.



- 5.11. The score will be calculated once the attempt is finished. The clock will be stopped while the score is calculated.
- 5.12. Should there be remaining time for the team's attempt they will be permitted to complete a second official attempt. The official attempt will begin from point 5.5.1, but only the remaining time will be used to complete the second official attempt.
- 5.13. If the team does manage to complete a second official attempt with the remaining time then the greater of the two scores, **P**, will be considered for purposes of the official team rankings.
- 5.14. The teams with the five (5) best scores will move on to the final round.

## THE FINAL

- 6.1. The order of the teams will be in the reverse order of the qualification rounds (i.e: the lowest score will go first, and the team with the highest score from the qualification round will go last).
- 6.2. For the final the radius of the hockey pucks will be 7 cm.
- 6.3. The official attempt during the final round will begin with point 5.3 as described above, with the exception of the oral presentation (5.4).
- 6.4. The winning team will be determined by the best result obtained in the two official attempts of the final round.

## Safety First

The wearing of safety equipment, such as protective eye wear and/or gloves is strongly recommended in the construction of your machine.

During the national final, any answers published on our website in the Frequently asked questions section could be used to make sure a competitor's machine meets the rules. After having read this document, if you still have questions, please feel free to ask them via the competition website [www.scienceontourne.com](http://www.scienceontourne.com).





Participate in *Science, on tourne!*  
Many valuable prizes!

**Good luck, everyone!**

## Awards

At the national finals, these prizes will be awarded to the winners in the *Professional* category only. Visit the website for more details about the criteria.

### Challenge Award

A **\$1,000** prize will be presented to each member of the team that gets the highest score.

**Offered by the Ministère de l'Économie, de la Science et de l'Innovation.**

### Free registration for the Science and Society Forum

Each member of the challenge's winning team will receive **free registration for the International Science and Society Forum** and up to \$100 in travel expenses.

**Offered by ACFAS.**

### Women's Participation Award

A **\$500** award will be presented to a female student whose name is drawn randomly from amongst those of all female participants in the **Professional** category in the local finals.

**Offered by the Ministère de l'Éducation et de l'Enseignement supérieur.**

### Men's Participation Award

A **\$500** award will be presented to a male student whose name is drawn randomly from amongst those of all male participants in the *Professional* category in the local finals.

**Offered by the Ministère de l'Éducation et de l'Enseignement supérieur.**

### Ingenuity Award

A **\$1,000** award will be presented to the team whose machine is outstanding for its ingenious concept, reliability and details.

**Offered by the Ordre des technologues professionnels du Québec.**

### Design Award

A **\$1,000** award will be presented to the team whose machine is outstanding for its visually pleasing appearance, the quality of its workmanship and ease of operation.

**Offered by Centre de démonstration en sciences physiques (CDSP).**

### Eco-responsibility Award

A **\$1,000** award will be presented to the team that has best implemented the 3 Rs (reduce, re-use and recycle), and used energy and materials most responsibly.

**Offered by Hydro-Québec.**

For information about the evaluation criteria used to designate award winners, please visit the Prizes section of our website.



### Award of Merit

A **\$1,000** award will be presented to the team that earned distinction in the following five categories: performance of their machine, ingenuity, design, eco-responsibility and communication (oral and written).

**Offered by the Fédération des cégeps.**

### Jury's Choice Award

A **\$1,000** award will be presented to a team designated by the jury during the national final.

The selection criteria for this prize are chosen by the members of the jury.

**Offered by the CAE.**

## Bursaries

One **\$1,500** tuition fee bursary

**Offered by the École Polytechnique de Montréal.**

One **\$1,500** tuition fee bursary

**Offered by the École de technologie supérieure.**

One **\$2,500** tuition fee bursary

**Offered by Université Québec à Trois Rivières.**

### People's Choice Award

A **\$1,000** award will be presented to the winning team chosen by public vote during the national final.

**Offered by the Trottier Family Foundation.**

### Communication Award

**Mobility bursary** to participate in a thematic scientific trip, in 2019, in France.

**Offered by the Offices jeunesse internationaux du Québec (LOJIQ).**

## Participation prizes

**Two trips for two people** to James Bay in 2019.

**Offered by Hydro-Québec.**

Each participant in the *Professional* category at the national finals will receive a **one-year subscription to the magazine, Québec Science.**

## Major partners



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## Gold partners



## Silver partners

QUÉBEC SCIENCE



## Bronze partners



THANK YOU TO  
*all our partners!*