

24th edition

Science
on tour! 
scienceontourne.com 

intercollegiate
science contest

Switch BACK

National final
April 30, 2016

Cégep de Trois-Rivières



An event of



CENTRE DE DÉMONSTRATION
EN SCIENCES PHYSIQUES

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SAVOIR

Challenge

Build a vehicle that will perform a round trip using wind energy to travel in one direction and potential gravitational energy in the other direction.



PARTICIPATE IN SCIENCE, ON TOURNE!

Professional category

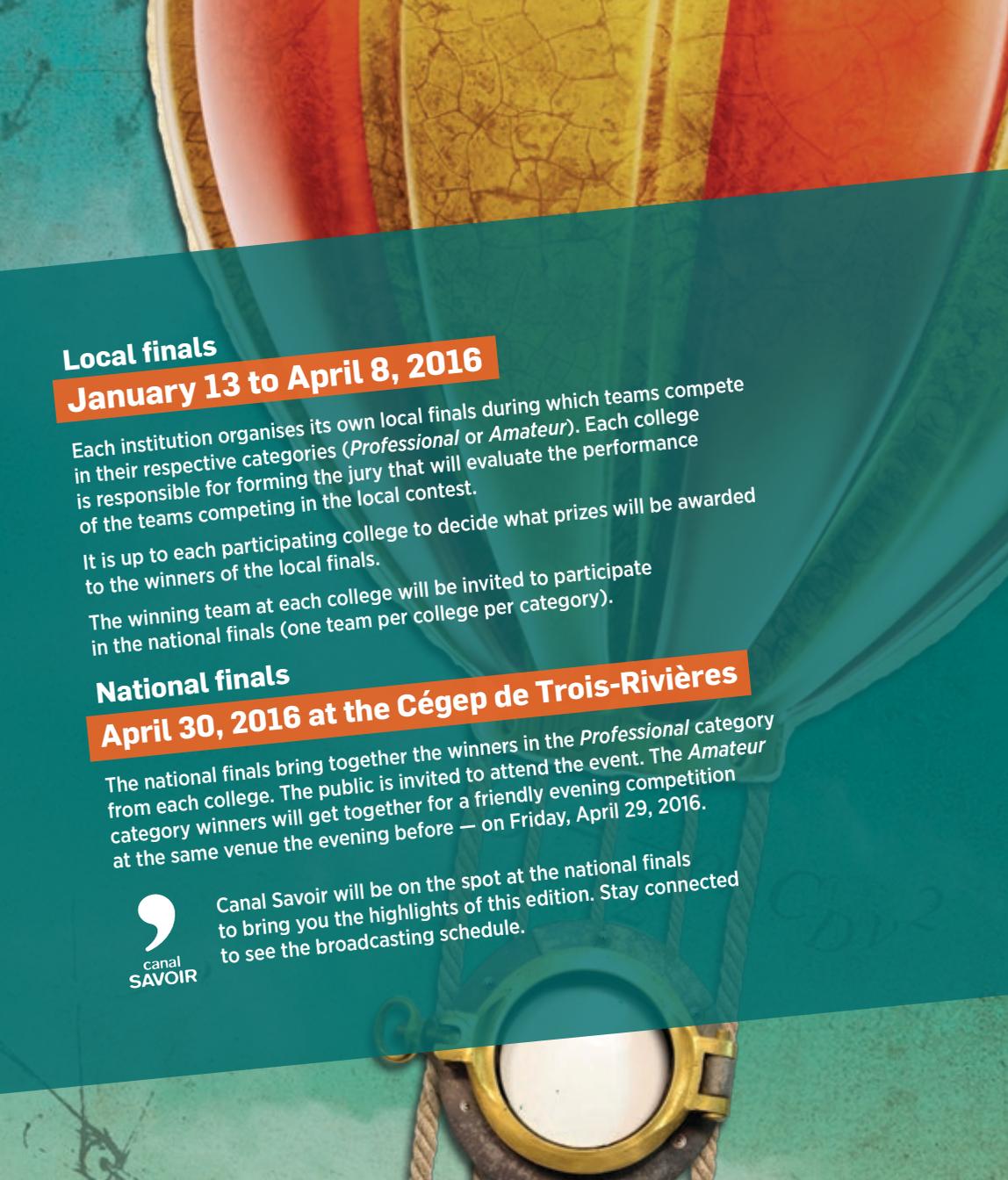
This category is open to any student – youth or adult – enrolled at a public or private college in Québec in a full-time or part-time program in any discipline regardless of whether the program is offered through regular or continuing education.

Amateur category

This category is open to any staff member 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 because you will all represent your college if it moves on to the national finals. 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 finals.
- Contact the student services office to get the name of the person in charge of the contest at your college or of your local organiser. Complete the registration form that person gives you and return it to him or her. The same person will be responsible for sending your registration form 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.



Local finals

January 13 to April 8, 2016

Each institution organises its own local finals 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 the local finals.

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

National finals

April 30, 2016 at the Cégep de Trois-Rivières

The national finals bring together the winners in the *Professional* category from each college. The public is invited to attend the event. The *Amateur* category winners will get together for a friendly evening competition at the same venue the evening before — on Friday, April 29, 2016.



Canal Savoir will be on the spot at the national finals to bring you the highlights of this edition. Stay connected to see the broadcasting schedule.



SAFETY FIRST!

We strongly recommend that contestants wear protective equipment such as safety glasses and gloves while they're making their vehicle.

Switch
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CHALLENGE

- 1.1. Build a vehicle that will perform a round trip using wind energy to travel in one direction and potential gravitational energy in the other direction.

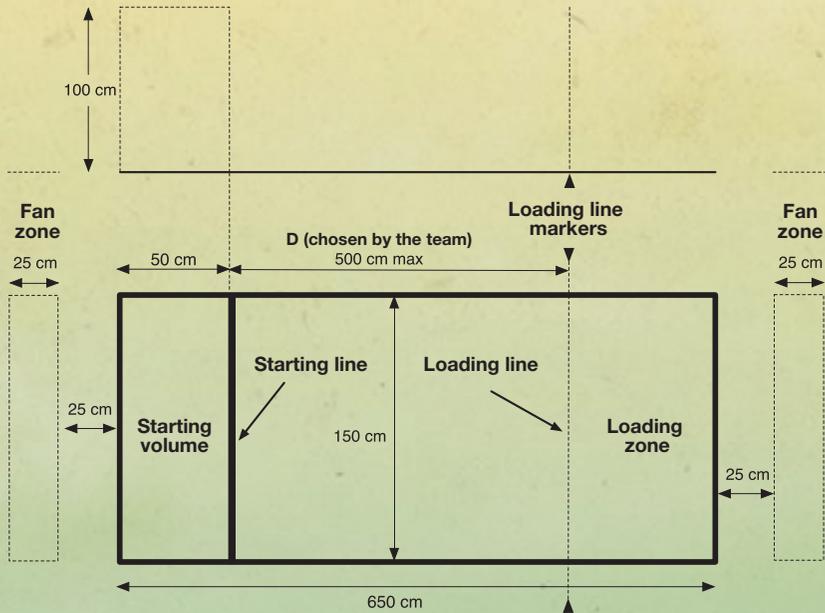
COMPETITION DESCRIPTION

To successfully complete this challenge, the **vehicle** will have to complete the round trip as quickly as possible while meeting the following conditions, as chosen by the team:

- 2.1. It must use wind energy for the outbound trip and gravitational energy for the return trip.
or
It must use gravitational energy for the outbound trip and wind energy for the return trip.
- 2.2. Since the fan will be on throughout the attempt, the wind will help the vehicle in one direction but hinder it in the other.
- 2.3. A **load** may be brought back to the **starting volume** from the **loading zone** to earn additional points.

PLAYING AREA

- 3.1. The edges of the playing area will be marked on the floor by red adhesive tape. A Lasko 3733 fan will be used for the challenge. This is the same model that was used for the 2010 challenge, *Hang on to your hat*.
- 3.2. All playing area dimensions are precise to the nearest half centimetre.
- 3.3. The available floor space outside the playing area cannot be guaranteed.



TO SCORE, THE VEHICLE MUST:

- 4.1. Fully cross the **starting line**;
- 4.2. Fully cross the **loading line**; and
- 4.3. Fully cross the starting line again.

FORMULA
$$P = \left(\frac{D^2}{t} \right) \times \frac{\text{final mass}}{\text{initial mass}}$$

- 5.1. **D**: distance (rounded to the nearest centimetre) between the starting line and the loading line. This distance, chosen by the team, can be anywhere between 150 cm and 500 cm.
- 5.2. **t**: time interval (determined by a stopwatch) between the moment the vehicle crosses the starting line and when it fully crosses the starting line again after having reached the loading zone. The time is measured in seconds, precise to the nearest tenth of a second.
- 5.3. **Initial mass**: mass (measured to the nearest gram) of the vehicle at departure.
- 5.4. **Final mass**: mass (measured to the nearest gram) of the vehicle or the loaded vehicle, if a load is used. For the load to be counted in the score, it must be on the vehicle and no longer touch the floor when the vehicle and its load fully cross the starting line.

5.5. Two official attempts are allowed during the allocated time. Distance D may be different for the two attempts. The score obtained for the best attempt will be kept.

DEFINITIONS

- 6.1. **Starting volume:** The starting volume measures 50.0 cm x 150 cm x 100 cm high. These dimensions do not include the adhesive tape.
- 6.2. **Markers:** Objects used to show the location of the loading line. They are put in place at spots 50 cm outside the playing area, on each side, by the referee at the distance announced by the **team representative**.
- 6.3. **Starting line:** This line is drawn using adhesive tape placed along the outside edge of the starting volume on the loading zone side of the playing area.
- 6.4. **Loading line:** Virtual line determined by the positions of the markers put in place by the referee outside the playing area, beyond both sidelines.
- 6.5. **Loading zone:** Zone located beyond the loading line. It is a space on the floor measuring 100 cm x 150 cm. The load and **load support**, if applicable, must be placed in this zone.
- 6.6. **Fan zones:** The team must place the fan on the floor in one of these zones.
- 6.7. **Vehicle:** Everything located in the starting volume when the official attempt begins. The vehicle's mass must be between 200 g and 5,000 g. If a tool is used to start the vehicle, it is not part of the vehicle.
- 6.8. **Load:** If the team wishes, an object weighing between 100 g and 1,000 g can be brought from the loading zone back to the starting volume to earn additional points (see "final mass" in Clause 5.4). If the team chooses this option, the team must provide the load and it must be placed in the loading zone. The upper part of the load may not exceed 100 cm in height at any time.
- 6.9. **Load support:** An object, provided by the participants, can be used, notably to make it easier to pick up the load. If the team chooses this option, the total mass of the loading support and the load must be between 100 g and 1,000 g. The loading support must not exceed 100 cm in height. The loading support can transmit its potential gravitational energy to the vehicle only when it travels in the direction for which gravitational energy is used.
- 6.10. **Team representative:** Member designated by the participating team who will, during the official attempt, have the following responsibilities:
- 6.10.1 Tell the referee what the team has chosen as its distance D so the referee can put the **markers** in place;
 - 6.10.2 Tell the referee that his/her team is ready to perform an official attempt; and
 - 6.10.3 Start the vehicle.

If there are any discrepancies between the English and the French versions of the flyer, the French version prevails.

RULES

A team can be disqualified or lose an attempt if it fails to comply with any of the following rules:

- 7.1. The only energy that may be used to move the vehicle is the energy provided by fan wind in one direction and potential gravitational energy in the other.
- 7.2. Any other form of energy, except combustion, may be used to perform actions other than to move the vehicle.
- 7.3. When the team declares itself to be “ready” for an official attempt, the vehicle must be stationary in the starting volume. The team may no longer touch the vehicle until it is started.
- 7.4. The vehicle must be started by means of a single action, using one hand only. A tool may be used. The energy provided by this action may not be transferred to the vehicle.
- 7.5. If a load and load support are used, they must comply with all the relevant conditions set out in the “Definitions” section.
- 7.6. The vehicle must remain whole and in contact with the playing area at all times during an official attempt.
- 7.7. The vehicle, load support and load must not come into contact with the fan.
- 7.8. The vehicle, load support, load, tools and the rest of the technical material must fit into no more than 2 separate boxes that would normally each hold 5,000 sheets of letter-sized paper (8.5” X 11”). The boxes must be separate and no larger than their original dimensions when closed.
- 7.9. The vehicle’s operation must not pose any danger to people nor be likely to damage the competition premises.

The organisers of the local finals can adapt the conditions so they differ from those that will apply during the national finals. However, it would be better to comply as fully as possible with the rules that will apply during the national finals. The *Science, on tourne!* steering committee will not be responsible for any changes made to the rules for the local finals.



NATIONAL FINALS

BEFORE THE COMPETITION

8.1. On the evening before the competition, each team – whether competing in the *Professional* or *Amateur* category – must have its vehicle as well as the load and loading support, if applicable, inspected. At this time, the team must show that its vehicle complies with all the rules.

DURING THE COMPETITION

8.2. The order in which the teams will participate will be chosen randomly.

8.3. Each team will have five minutes off to the side to prepare its vehicle. A table will be provided for this purpose.

8.4. When invited to do so by the competition host, the team will place its material in the presentation area and will then have two minutes to give its oral presentation. The team will have five minutes to:

8.4.1. Position and prepare the vehicle.

8.4.2. Position the fan.

8.4.3. Position the load and load support, if used.

8.4.4. Perform one or more (unofficial) attempts.

8.4.5. Tell the referee what its D value is.

8.4.6. Perform one or two official attempts.

8.4.6.a. The team representative must remain near the vehicle while the other team members leave the playing area with the boxes and the rest of the technical material.

8.4.6.b. The team representative must inform the referee that the team is ready for its official attempt. From that point on, he/she must no longer touch the vehicle (or the load or load support, if they are used) until the vehicle is started.

8.4.6.c. The referee checks the playing area and ensures compliance with rules 7.3 and 7.5.

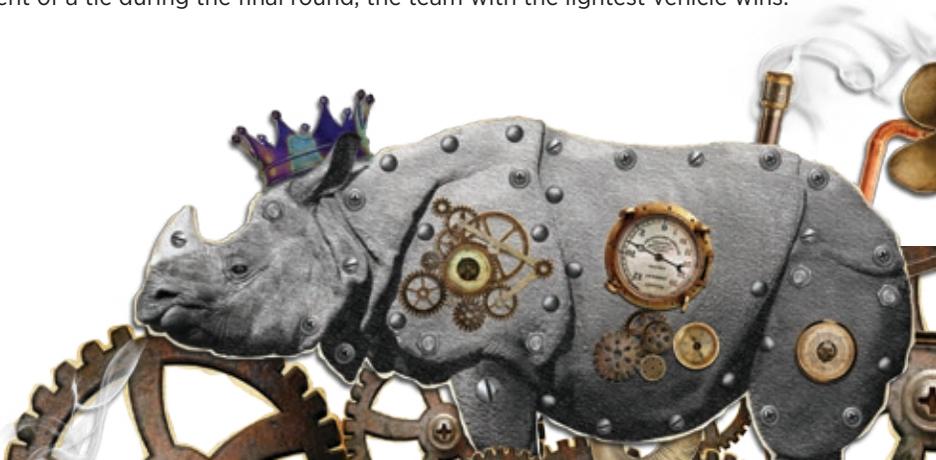




- 8.4.6.d. A whistle is blown to announce the beginning of the official attempt and the referee turns on the fan at its highest speed, position 3.
 - 8.4.6.e. The team representative may then perform the starting action.
 - 8.4.6.f. The attempt may be interrupted by the team if it wishes. In this case, no score is calculated for this attempt.
 - 8.4.6.g. The initial mass and the final mass are measured at the end of each successful attempt. The clock is stopped so this can be done. While the clock is stopped, the team may not prepare its vehicle for its next attempt.
 - 8.4.6.h. The team may, if there is still enough time left in its allotted five minutes, perform a second attempt. For this attempt, distance D may be longer or shorter than the one announced for the first attempt.
 - 8.4.6.i. The best score obtained for the two official attempts is used to establish the team's ranking.
- 8.5. The five teams that obtained the best scores qualify for the final round.

FINAL ROUND

- 8.6. The competition steps are repeated, except for the oral presentation. The fan is turned on at its intermediate speed, position 2.
- 8.7. The winning team is determined by adding the scores the team obtained in the qualifying round and the final round.
- 8.8. In the event of a tie during the final round, the team with the lightest vehicle wins.





Participate in Science, on tourne!

Many valuable prizes!

Good luck everyone!

PRIZES AND 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 l'Innovation et des Exportations.

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.

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, de l'Enseignement supérieur et de la Recherche.

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, de l'Enseignement supérieur et de la Recherche.

Ingenuity Award

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

Offered by Norda Stelo.

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.



Communication Award

This bursary will be awarded to a team for the quality of its communication, transmission of its message and use of the French language. Each member of the winning team will receive a **\$1,500 travel bursary** to participate in the *Sciences et Citoyens* event at the Futuroscope in Poitiers, France, in fall 2016. To be eligible for this award, the teams must write a text in French presenting their vehicle.

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

Award of Merit

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

Offered by the Fédération des cégeps.

BURSARIES

Only participants in the *Professional* category at the national finals are eligible for these bursaries; the winners will be chosen by means of a draw.

Visit the website for more details.

One **\$4,000** tuition fee bursary

Offered by Université Laval.

One **\$1,000** tuition fee bursary

Offered by the École Polytechnique de Montréal.

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

Offered by the École de technologie supérieure.

Jury's Choice Award

A **\$1,000** award will be presented to a team designated by the jury during the national finals. The selection criteria for this prize are chosen by the members of the jury.

Offered by the Centre de démonstration en sciences physiques.

People's Choice Award

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

Offered by the Trottier Family Foundation.

FOR INFORMATION ABOUT THE EVALUATION CRITERIA USED TO DESIGNATE AWARD WINNERS, PLEASE VISIT THE PRIZES SECTION OF OUR WEBSITE.



PARTICIPATION PRIZES

Two trips for two people to James Bay in 2016.
Offered by Hydro-Québec.

A discovery day with **Norda Stelo** engineers and technicians – a unique opportunity to prepare your life plan!

A CAE medical simulator demonstration offered to ten participants.

3D scanning. Two teams will have their vehicles scanned in 3D. *Offered by Créaform.*

A tour of the SIMCO Technologies facilities.

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

And that's not all! Other participation prizes, offered by Université Laval and Acfas, will be awarded by random draw. All participants present at the national finals are eligible for this draw.



Thank you to all our partners!

Major partners



Gold partners



Silver partners



Bronze partners

