Science on tourne !

26th edition

scienceontourne.com

Flying aces

National final

May 5, 2018

Cégep de Granby

Intercollegiate ***science*** contest

An event of

CENTRE DE DÉMONSTRATION EN SCIENCES PHYSIQUES

Québec

canal SAVOIR

CÉGEP DE GRANBY

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***

To design an autonomous machine able to throw shuttlecocks and hit targets.

Local finals
JANUARY 10 TO APRIL 13, 2018

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 5, 2018 AT THE CÉGEP DE GRANBY

The national final brings 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.

canal SAVOIR

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.

Flying aces

The challenge

1.1. The challenge: To design an autonomous moving machine able to throw shuttlecocks and hit targets.

Scoring formula

P = sum of marks in targets hit

2.1. A target is considered hit if:

2.1.1. a shuttlecock crossed the gate under the horizontal bar and stopped on either of the 4 targets behind that gate;

2.1.2. the machine supports were in the shooting zone when the shuttlecock was thrown;

2.1.3. the shuttlecock is immobile on the surface of the target at the end of the official attempt.

2.2. The marks of a given target can be scored only once.

2.3. If a shuttlecock makes contact with more than one target, the highest score *P* is counted.

2.4. The team determine the height of the horizontal bar from the floor (rounded to the nearest centimetre). The maximum height allowed is 85 cm. In the event of a tie, the lowest height will give a better ranking. If there is still a tie, then the lightest machine will have the advantage.

Material and ***playing field***

3.1. The playing field is composed of a starting volume, a shooting zone, 3 gates and 12 targets along 3 corridors.

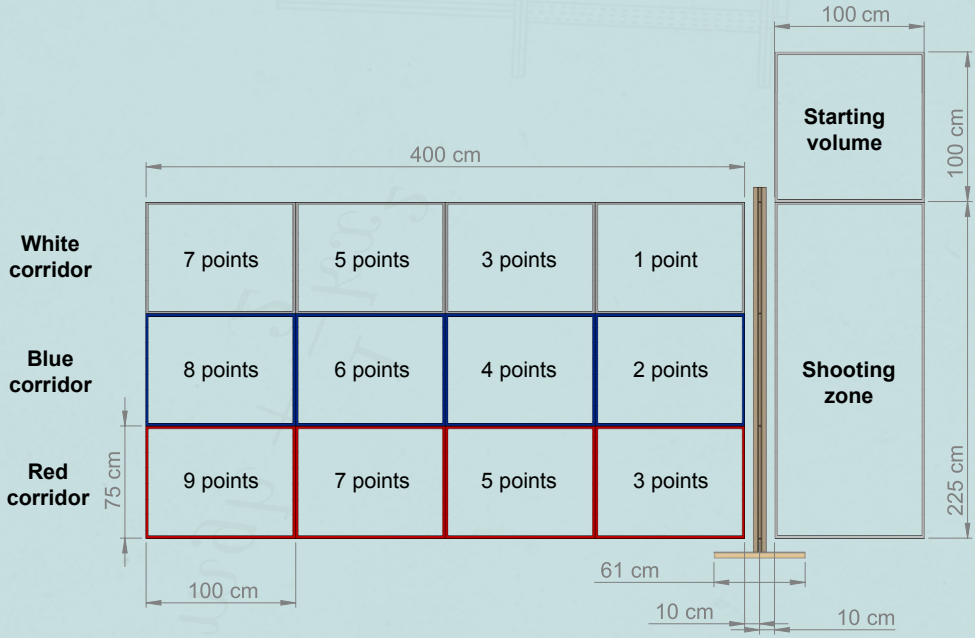
3.1.1. The starting volume measures 100 cm x 100 cm x 200 cm (WLH). Its base is limited by tape adhered to the floor inside the zone.

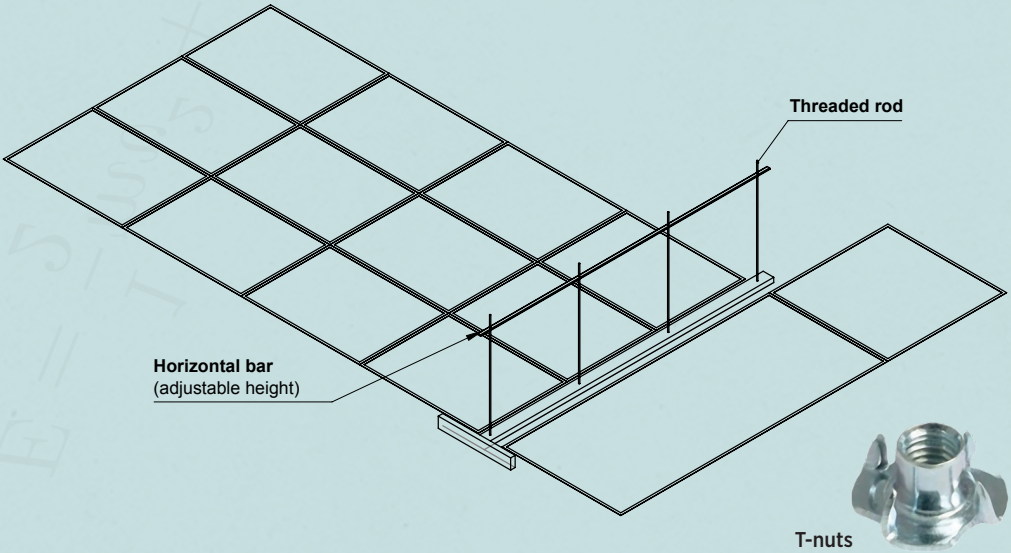
3.1.2. The shooting zone measures 100 cm x 225 cm (WL). It is outlined by a piece of tape adhered to the floor inside the zone.

3.1.3. Each gate is limited vertically by two threaded rods, on the floor by a board of nominal dimensions 2 in x 4 in x 8 ft (5.1 cm x 10.2 cm x 243.8 cm) and on the top by a horizontal bar. The four 5/16-18 threaded rods are 36 in long (91.4 cm) and screwed in t-nuts under the board. The rods are fixed by nuts and flat rings on top of the board. A wooden strip of size 5/16 in x 1 1/16 in x 8 ft (0.8 cm x 2.7 cm x 243.8 cm) makes the top part of the gate. It is supported by ¾ in (1.9 cm) clips. The height of the gate is determined by the team, up to a maximum of 85 cm.

3.1.4. The targets are aligned, 4 behind each gate, making 3 corridors. Each target is 100-cm long and 75-cm wide and is outlined by a piece of tape on the floor, inside the boundaries of the target.

3.2. The official projectiles are six *Matrix 100* nylon badminton shuttlecocks (available at *Canadian Tire*). They are provided by the organizers and cannot be modified.


100 cm
Starting volume
100 cm
400 cm
White corridor
7 points
5 points
3 points
1 point
Blue corridor
8 points
6 points
4 points
2 points
Shooting zone
Red corridor
9 points
7 points
5 points
3 points
75 cm
225 cm
100 cm
61 cm
10 cm
10 cm


Threaded rod
Horizontal bar
(adjustable height)
T-nuts

Rules

A team can be disqualified or lose its official attempt if it fails to comply with one or more of the general rules.

4.1. Any form of energy may be used except for combustion.

4.2. At the beginning of the official attempt, the machine must be entirely inside the starting volume. Only the machine, the shuttlecocks and the tool used to turn on the machine can be there at that time.

4.3. To turn on the machine only one action of one hand is allowed. A tool can be used.

4.4 The energy provided by the action in 4.3 cannot be used to move the machine or throw a shuttlecock.

4.5. Once in play, the machine must be autonomous.

4.6. The machine should not touch the gates or the targets during the attempt, but the shuttlecocks may touch the gates.

4.7. At the end of the official attempt, the machine should not have any support point in the starting volume.

4.8. The machine's operation must not pose any danger to people nor be likely to damage the playing field or the competition premises.

4.9. The machine, the 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 should not be deformed and their lids should close.

The organisers of the local finals can adapt the conditions so they are different from those set for the national final. However, it would be better to comply as much as possible with the rules that will be applied during the national final. The *Science, on tourne!* steering committee is not responsible for any rule-related changes made for the local finals.

Sequence of events

BEFORE THE COMPETITION

5.1. On the evening of Friday, May 4, each team – whether competing in the *Professional* or *Amateur* category – must have its machine inspected.

DURING THE COMPETITION

5.2. The order in which teams will compete is determined by a draw.

5.3. Each team will have five minutes backstage to assemble and prepare its machine. A table and an electric plug will be provided for this purpose.

5.4. The team representative announces the height of the portals to the official.

5.5. 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.

5.6. The team has five minutes to complete the following steps:

5.6.1. Place and prepare its machine.

5.6.2. Perform one or more unofficial attempts, if necessary.

5.6.3. Execute one or two official attempts.

5.7. The team's representative signals the official that the team is ready for the official attempts. The other team members withdraw with the material not being used. The machine should be stationary and entirely contained in the starting volume. The team should not interact anymore with the machine until it is turned on.

5.8. The referee makes sure that the playing field and the machine conform to the rules.

5.9. A whistle signals the beginning of an official attempt.

5.10. The team representative can then turn the machine on.

5.11. Once the machine is on, the team can terminate the attempt by informing the referee or by touching the machine.

5.12. When the shuttlecocks are immobile and the official attempt has ended, the clock is stopped and the score is compiled.

5.13. Time permitting, the team may perform a second attempt, starting from step 5.6, but only has the time left on the clock. The height of the portals may be modified at this point.

5.14. The best score obtained for a team's two official attempts will be used to establish the team's general ranking for the qualifying round.

5.15. The five teams with the highest scores qualify for the final round.

FINAL ROUND

6.1. The teams will perform in the inverse order of the ranking after qualifications.

6.2. Steps are repeated from 5.6 on.

6.3. The winning team is the one with the best score of the two attempts of the final round. In case of a tie, 2.4 applies.

Safety first!

It is highly recommended to wear safety gear, such as glasses and gloves when you work on 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.

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.

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 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 final.

Offered by the Trottier Family Foundation.

Communication Award

Mobility bursary to participate in a thematic scientific trip, in 2018, in France, during the *Fête de la science* (October 2018), in collaboration with the Consulate General of France in Quebec City and the National Conservatory of Arts and Crafts (CNAM).

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

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

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 **$1,500** tuition fee bursary

Offered by the École Polytechnique de Montréal.

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

Offered by the École de technologie supérieure.

Participation prizes

Two trips for two people to James Bay in 2018.
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*.

Paid summer internship of 3-4 months at *EMS*.

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.

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Thank you to *all our partners!*