

2004 Calgary



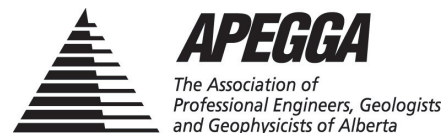
Science Olympics

Event Package for Registered Teams

**Saturday, February 28, 2004
Big 4 Building, Stampede Park**

**Team sign-in begins at 8:30 a.m.
Events begin promptly at 9:00 a.m.**

Sponsored by:



Using this event package

This event package is intended for registered teams in the **2004 Calgary Science Olympics**. It outlines all of the work-at-home events for each Division. Teams are required to practice the event or complete and bring a project for the event(s) for their Division only. Each event outlines what is required to complete the project and gives an idea of judging criteria.

What is the Calgary Science Olympics?

The Calgary Science Olympics is an inter-school challenge where teams compete in problem-solving events that test the principles of science. There are two types of events:

- work-at-home events, which are made in advance and brought to the Olympics for on-site testing and judging or practiced in advance and performed the day of the Olympics
- mystery events, which are solved the day of the Olympics with no pre-planning.

Although winners of each event receive certificates of achievement or medals, our primary goal is to give students a chance to showcase their own ideas and see other students' ideas in action.

Important things to keep in mind

- If you think you've found a loophole in the rules or you've come up with a solution you think our judges may object to, phone us in advance to check it out. Please respect the intent of the rules as much as the rules themselves.
- We know it's sometimes hard to keep teams' competitive urges under control, when students have worked so hard on their devices and projects. Please uphold the ideals of fair competition. One of the most important objectives of our science curriculum at any grade is to foster positive attitudes by appreciating the ideas of others.
- While the event is underway, **ONLY** students should be at the event site. Coaches, parents and others need to give students room to compete without assistance.

This year's events

Division I and II participate for half a day. They take part in two mystery events and one take home event.

Work-at-home events

Division I:

Straw-ng Towers

Division II:

Rube Goldberg Contraption

Be sure to bring your project to the event to be tested and judged.

Division III and IV participate all day. They take part in three mystery events and two take home events.

Work-at-home events

Division III:

A to B

Fred Flintstone's™ Revenge

Division IV:

Kontiki's Treasure Island

Things are Heating Up!

Be sure to bring your projects to the event to be tested and judged.

Note: Mystery events are hands-on challenges based on current science curricula. Students will be expected to problem-solve as a team to complete these activities on-site on the day of the Science Olympics.

What you need to know

Following is detailed information on the problems you can work on in advance. You will need to bring the projects with you to the Big 4 Building on the day of the competition. All of the other activities are mystery events and you will only receive information about them at the actual time of the event. Bring with you your ability to think on your feet and in a group.

We do our best to keep the scoring fair. If you have any concerns about the judging of an event, refer them to the on-site judges. Your concerns will be reviewed and discussed, but the decision of the judges will be final.

Details, details, details

- A team is five students plus one teacher.
- The concession operated by the Big 4 Building sells hot dogs, sandwiches, beverages and snacks. However, students may wish to bring bagged lunches rather than purchase lunches.
- Please arrive in time to set up and be ready for a briefing on the day's events at 9:00 a.m. You will receive a registration package upon your arrival – check at the desk located outside Exhibit Hall A.
- Elementary school teams will compete in three events and should be finished in a half day. Junior and senior high school teams will compete in five events and should be finished closer to 4:30 p.m.
- Spectators are welcomed and encouraged! Bring someone along to watch! Bleachers will be set up – we do request that spectators remain in the bleacher area. Spectators and guests are invited to visit the hands-on science activity tables hosted by APEGGA during the event.

Questions? Need more information? Contact:

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APEGGA Public Relations Coordinator
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Straw-ng Towers

Division I

Object

The task for this event is to build the tallest freestanding straw tower. Teams should practice this event in advance although it will be performed the day of the event.

Materials

100 plastic drinking straws from McDonalds
25 pipe cleaners
scissors

Directions

1. Using only the materials given to you, try to make the largest freestanding straw tower.
2. The tower has to be able to stand on its own for three minutes.

Rules

You will have 30 minutes to build a straw tower using only the supplies given to you. The tower needs to be able to stand for three minutes unsupported after being measured.

Judging

Lots of encouragement and support but a hands off policy when it comes to actually making the towers and be careful not to make any suggestions. The teams are allowed to work on the floor but not allowed to attach the towers to the tables or chairs, or tape them to the floor. After the 30 minutes, the teams will be allowed to support their towers while the judges are measuring their towers. The tower will then be timed for three minutes to see if the measurement will be entered.

Note: The height of the tower may change during the three minutes so a new measurement may need to be taken at that time!

Object

To build a contraption that will delay a golf ball for as long as possible from reaching the far side of a surface.

Materials

Team members will position objects on the surface of a sheet of plywood 4 ft square. The objects must meet the following conditions:

- Objects may be natural or man made.
- Objects must be fastened or attached to the surface. They may be adjusted in any manner prior to the competition, but cannot be altered once the golf ball begins its journey.
- Objects may be assembled together to become devices, but a device may not be a pre-manufactured array of parts or factory built mechanism taken from a commercially available product. For example: teams may use springs or other parts taken from a VCR, but the team could not use the assembled tape ejection device as-is taken from the same machine.
- Objects may interfere with the natural travel of the golf ball, re-directing the motion in any manner, with the exception that an object or device may not grab or otherwise hold on to the golf ball for any period of time with the object of preventing the motion of the golf ball, and releasing it at some point in the future.
- Objects must not have any external or internal sources of energy that are derived from electrical sources or chemical sources. Mechanical energy that has been stored (i.e. a wound-up spring) is permissible.

The surface must meet the following conditions:

- The surface must measure four feet from edge to edge. A standard plywood sheet cut in half is the intended working surface.
- The plywood may be painted with any commercially available paint, but must be white in color and may not contain any materials embedded within the paint that could be deemed to introduce texture to the surface (i.e. addition of sand or other particulate matter designed to create a non-slip surface)

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Rube Goldberg Contraption (cont'd)

Materials (cont'd)

- No coverings to the surface of the plywood are allowed. The surface may not be coated or covered in any way (i.e. carpeting or linoleum) with the exception of painting as previously noted.
- Sanding of the surface of the plywood is permissible given that it is intended to remove projecting slivers and to make the plywood safer to work with. Judges may disqualify an entry if it is deemed that sanding was used to roughen or groove the surface with the intention of slowing the golf ball.

Rules

1. The Judge presiding over the competition will release a golf ball at one edge of the surface at a point designated by the team.
2. The golf ball will be timed as it travels over the surface until it reaches the opposite edge.
3. For the purposes of awarding points, a grouping of objects will be deemed a single device if in the opinion of the judges the objects are assembled in such a way that they interact with the golf ball as a group. For example: a rubber band stretched between two spools has the intended function of causing the golf ball to bounce. These three objects work as a unit, therefore they are a single device, and do not count as three objects towards the point score (as outlined below).
4. To gain points the golf ball need only touch an object or device for it to be deemed to have encountered it. The objects do not need to impart force or visibly alter the direction of travel of the golf ball in order to score points.
5. Judges decision regarding touching of objects by the golf ball will be final.

Judging

1. The score awarded to each team is derived from two sources. Total score is out of 100 possible points. 50 points will be awarded for time and 50 points will be awarded for objects/devices encountered by the golf ball on its trip.
2. Times will be recorded and 50 points will be awarded for the longest time. Each placing in the recorded times will be awarded 2 points less. In other words 2nd longest receives 48 points, 3rd longest 46 points and so on.
3. Objects/devices encountered is also worth 50 points, but teams start out with a score of zero for this category. For each object or device (see Rules for definition of device) the golf ball encounters on its trip, the team will be awarded 5 points up to a maximum of 50 points total.

Object

Design and build a human-powered vehicle that carries a person and a catapult. The catapult will be used to knock down a target.

Design Rules

1. The vehicle must be brought to the competition as a kit to be assembled as part of the event. The team must be able to assemble the vehicle in ten minutes. Power tools are not allowed for assembly.
2. The only power source for the vehicle will come from the muscles of the competitors.
3. The catapult may be powered by anything not deemed unsafe. (Fire and compressed air are not allowed.)
4. No pre-made wagons or peddle vehicles are allowed.

The competition

- One member starts in the vehicle with the others holding on to it.
- On a start command, all the team members move the vehicle into a launching area where the person in the vehicle shoots a volleyball at the target with the catapult.
[See diagram – next page]
- All the team members move the vehicle back to the start line and a new student becomes the passenger.
- The attack procedure is repeated until five members have ridden the vehicle or until the target is completely destroyed. (If your team has less than five people then someone may go again, but following the same order as before.)
- Teams have a maximum of two minutes to complete the task.

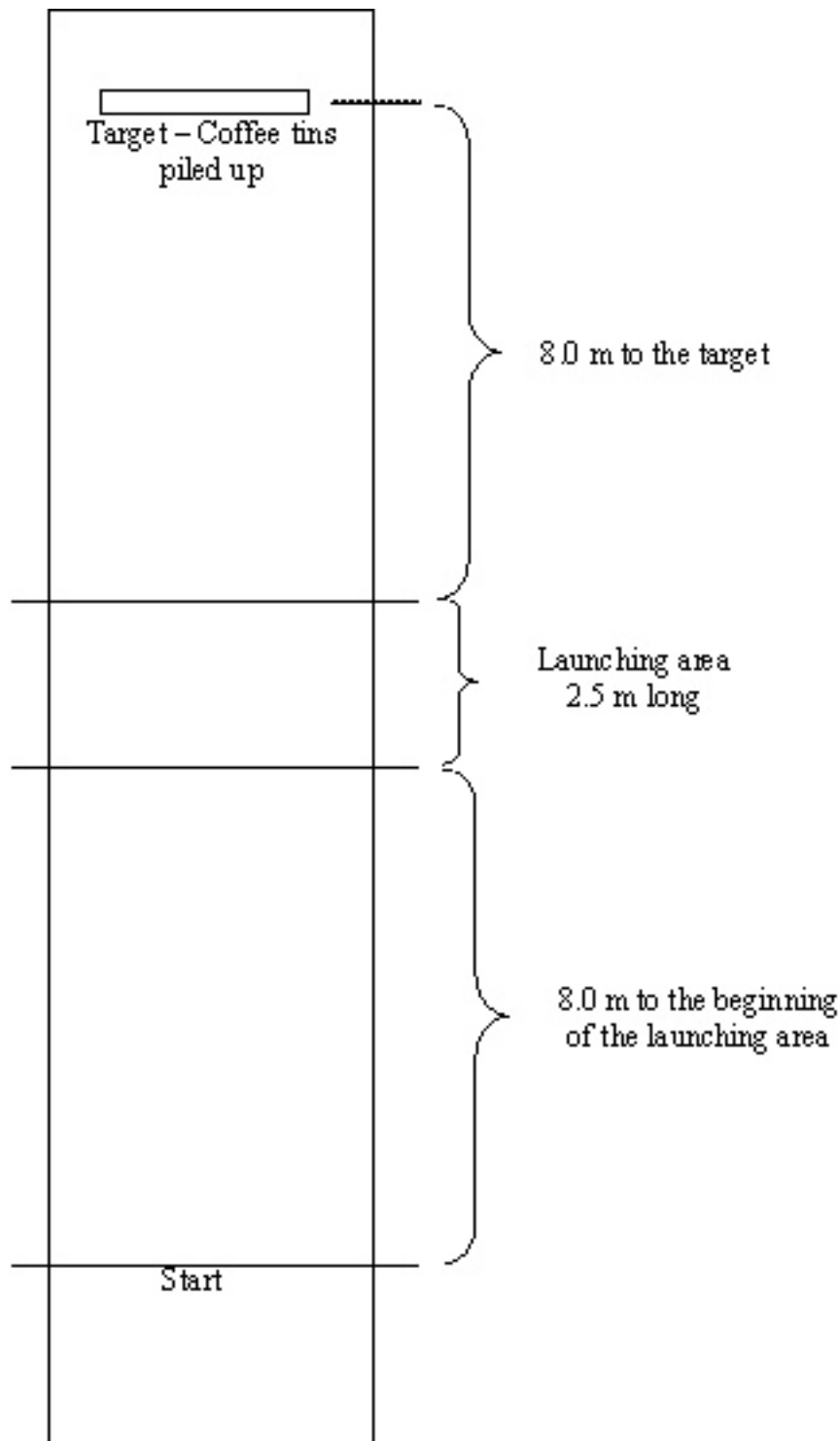
Rules

1. The teams have 10 minutes to assemble their vehicles after a signal is given.
2. The passenger must wear a bicycle helmet supplied by the team.
3. All the members must be touching the vehicle while it is being moved.
4. Only the passenger may shoot the catapult.
5. The catapult may be shot only while the vehicle is in the launching area.

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Fred Flintstone's™ Revenge (cont'd)

The actual event will be in the form of a double-knockout tournament with two teams going head-to-head. The team that inflicts the most damage to the target advances. In the event of equal damage, the shortest time advances. If two teams tie completely, a coin toss will decide the winner.



Object

To get an object from point A to point B over a set course in the shortest time.

Event description

A foot bag (e.g. Hacky sac™) will be placed in a circle at a location marked “A.” The teams must bring a device that will move the foot bag to location “B,” marked in another circle. The team starts behind a starting line holding all or part of their device. At a signal they move their device into position, including attaching the foot bag, and return behind the starting line. When all the team members are behind the line they may activate the device. Time stops when the foot bag stops inside circle “B.”

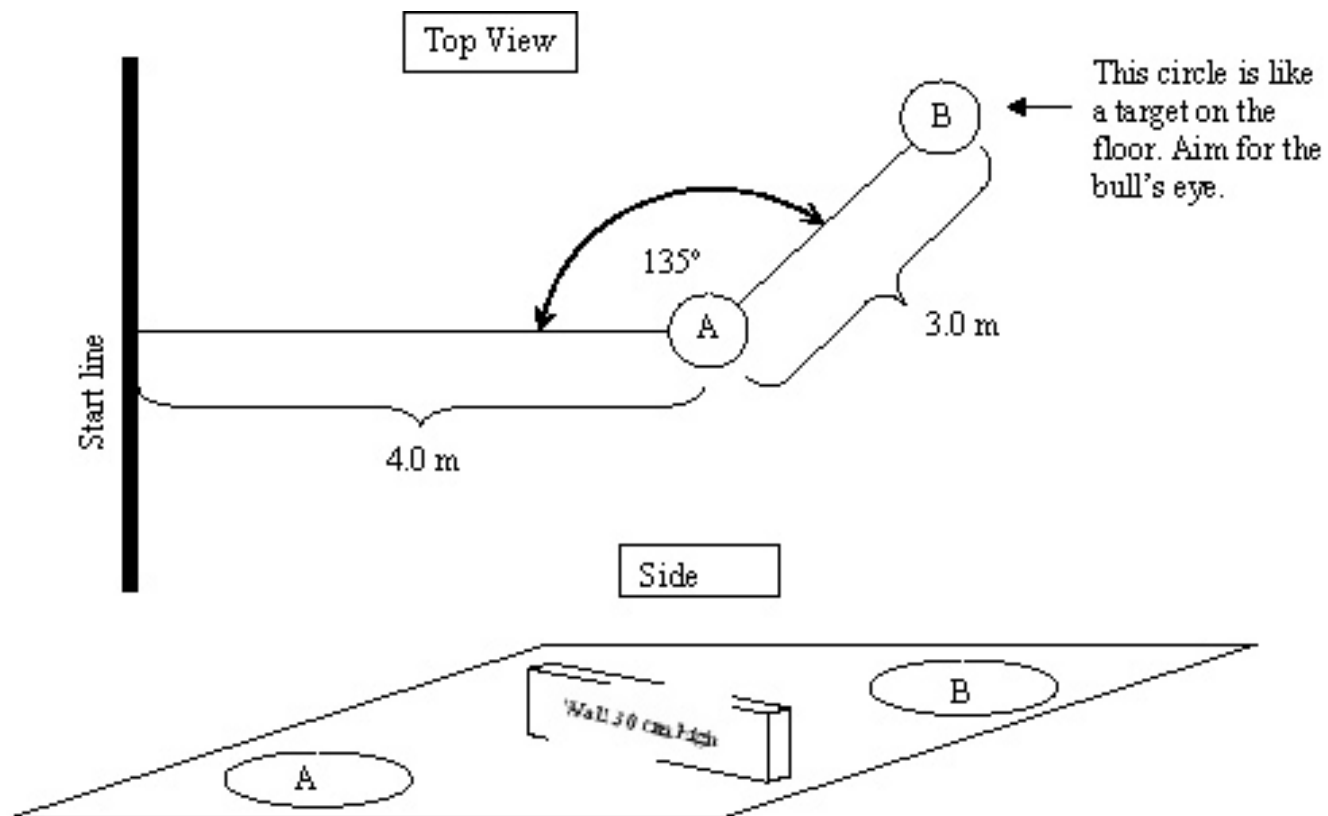
Circle “B” will be drawn like a target with concentric circles. All trials completely within one concentric circle will be judged equal in accuracy. Within one concentric circle, time will determine the placing. The winner will be the trial inside the closest concentric circle with the shortest time. Think accuracy first.

Rules

1. An official foot bag will be supplied and must be used.
2. The foot bag may not move unless the entire team is behind the starting line.
3. The foot bag must go over the “wall” (30 cm high).
(See diagram – next page)
4. The foot bag must stop as close to the centre of circle “B” as possible.
5. Compressed air or fire cannot be used. Any devices deemed unsafe will be disqualified.

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A to B (cont'd)



Things are Heating Up!

Division IV

Object

Each team shall construct a device prior to the day of the event that will hold and heat 1.00 litre of water.

Rules

1. Only human body energy supplied by the students will be the source of energy. This energy can be changed into other forms in order to heat the water. No heat pumps are allowed.
2. No combustible materials or solar energy may be used.
3. The test water will be tap water at room temperature.

Judging

1. When the team number is called the team has six minutes to heat a 1.00 litre sample of test water.
2. The 1.00 litre samples of test water will be made available to each team from a central judge's area and will be delivered by the team back to that area.
3. A glass thermometer (like the ones in a standard chemistry lab) is to be inserted into your device (leave a space!).
4. At the end of the six minutes the temperature and mass of the water in the team's container will be measured and recorded.
5. In the event that a team's water reaches the boiling point, the trial ends and the time and mass of the water will be recorded.
6. The winner of this event will be the team with the highest power output measured in watts.

Object

The task for this event is to construct a land sailboat which will be propelled by two large fans (diameter of blades is 48cm) across the “ocean” floor and brought to port behind Treasure Island [see diagram – next page]. The winner will be the team that can sail across the floor and bring their sailboat to port closest to the spot marked with an “X”.

Construction of the Sailboat

There is no restriction on the size or type of craft which you can construct. You can also use the materials of your choice. Be forewarned that the floor on which the event is taking place is made of concrete.

Rules

1. Only one member of each team is allowed to place the sailboat at the starting line in front of the first fan.
2. Afterward, the sailboat has to propel behind Treasure Island on its own.
3. The individual member of the team has two minutes to put the sailboat through as many trials as possible.
4. The closest three trials to the “X” spot will be recorded.

Judging

1. The distance from the “X” spot to each sailboat will be measured.
2. The winner will be the team that has recorded the closest distance to the “X”.
3. In case of ties, the second closest distance will determine where the team places.

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Kontiki's Treasure Island (cont'd)

The Map of Treasure Island

