



Cariboo Junior Skills Competition

Scope Document

Wind Turbine (2023)

Thompson Rivers University
March 3, 2023

General Information:

- Teachers/advisors are allowed to provide guidance and advice while the wind turbine is being designed and constructed and at the competition before the testing begins.
- There is a wealth of information on wind turbines at www.kidwind.org.

Eligibility:

This competition is open for teams:

- Of up to three (3) students from grades 6 to 9 from the same school.
- Teams may include students from more than one grade
- **Each team must have both male and female participants.**
- Teams must have one teacher/advisor.

Purpose of the challenge:

- To increase student awareness of careers in trades and technologies through a hands-on competitive event.
- To construct a working model wind turbine.

The challenge is to:

- In advance of the competition, to work as a team to design and construct, to specifications, a wind turbine. Teams are encouraged to experiment with their design however, the turbine built for experimental purposes **WILL NOT** be allowed at the competition.
- Within four (4) hours, at the competition site, using the previously prepared design, construct a wind turbine.

The project is to learn about:

- Turbine and blade design research.
- Wind power/energy and geographical constraints
- Electricity generation theory and practice
- Construction principles: structure and strength
- Adhesives and bonding
- Leadership
- Teamwork
- Time management

Supplied by the Cariboo Regional Skills Coordinator at time of registration:

- 3.5-volt hobby motor complete with propeller mount and 12 hole adjustable turbine base
- Wooden dowels, 1/4" diameter



Supplied by the Cariboo Regional Skills Coordinator at the competition:

- Paper, regular bond, 8.5" x 11" (21.6 cm x 27.94 cm),
- Balsa wood, 3" or 4" x 36" x 1/8" (7.62cm or 10.2 cm x 91.4 cm x .32 cm)
- Balsa wood, 3" or 4" x 36" x 1/16" (7.62 or 10.2 cm x 91.4 cm x .16 cm)
- Utility knife
- Geometry set
- White glue
- *Scissors
- *Masking tape
- *Tape measure / ruler

Design and Construction Rules and Regulations:

- Each team must bring **ONE COPY** of the model wind turbine design sketch or blueprint, ready for display. Posters must include team name and school name.
- The design must show evidence of originality.
- The quality of the sketch or blueprint will be an evaluation factor.
- Teams may choose to appoint a "Team Leader", but teamwork, participation by all team members, and time management will be evaluated.

Construction specifications:

- Once completed, the turbine will be mounted to a tower for testing (see picture below, tower provided)
- The propellers should be securely attached to the generator via the 12-hole turbine mount (black plastic piece)



Judging Criteria:

Design (10% of total competition mark)

- Evidence of originality
- Quality of wind turbine sketch or blueprint
- Appropriately labelled components

Construction (10% of total competition mark)

- Adherence to design
- Structural soundness
- Economic use of materials
- Quality of construction
- Leadership, participation, and teamwork

Voltage Generation (80% of total competition mark)

- Highest voltage generated under test conditions.
- Where a tie occurs, the quality of construction will be judged as the tie breaker.



Voltage Generation Test Procedure:

- The model wind turbine is positioned on a table approximately 0.9m x 2m table, 60 cm from a three-speed, oscillating pedestal fan, which stands approximately 100cm high. Manual support or touching of the turbine during the test period is **not** allowed.
- A digital voltmeter is attached across the generator output terminals.
- The fan is turned on and stepped through three speeds in 20 second intervals.
- The highest voltage reading at each speed is recorded. The **highest aggregate score at the three speeds** will win the category.
- The model wind turbine must survive the entire one-minute test intact to be eligible to win in this category.
- In the event that there is a tie in total points for design, construction and voltage generation, the turbine that produces the highest generated voltage wins.

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