

Electric Vehicles

Grade Level: 6

Science and Technology Topic: Electricity and Electrical Devices

Introduction/Context:

This is an open-ended project where students design and make an electric vehicle that will transform electrical energy into a form of energy that makes their device move. The activity begins with an analysis of the automotive industry and environmental problems associated with that industry and the products produced (e.g., decline in number of vehicles sold, fossil fuel crisis, and pollution). Students are asked to make a better product that addresses some of these issues.

Prior Knowledge and Skills:

- Measuring and Layout
- Safe handling of hand tools and materials as well as safe procedures for working with electricity
- Basic fastening techniques: gluing, clamping, drilling for screws, nuts and bolts
- The components of a circuit
- Design Process

Tools and Materials:

- Jinx wood
- wheels in various sizes
- straws
- wire
- battery holder
- pulleys
- gears
- elastics
- dowel
- fastening materials – glue, tape, screws, nails
- motors
- batteries - your choice
- saws
- clamps
- mitre boxes
- easi-cutters
- wire cutters
- clothes pins

Curriculum Expectations:

1. evaluate the impact of the use of electricity on both the way we live and the environment;
2. investigate the characteristics of static and current electricity, and construct simple circuits;
3. demonstrate an understanding of the principles of electrical energy and its transformation into and from other forms of energy.

Big Ideas:

- Electrical energy can be transformed into other forms of energy. (Overall expectations 2 and 3)
- Electrical energy plays a significant role in society, and its production has an impact on the environment. (Overall expectation 1)
- Society must find ways to minimize the impact of energy production on the environment. (Overall expectation 1)

Learning Goals (student-friendly language):

I will design and build an environmentally friendly vehicle, powered by electricity and control its motion with a switch.

Activity Description:

One of the largest and most important industries in North America is the automobile manufacturing industry. As fossil fuels (oil) from which gasoline is made, and which currently is being used to fuel automobiles, are becoming more and more scarce, the executives of these car companies are interested in designs that do not require fossil fuels to run their vehicles. They know that grade 6 students across the province have been studying electricity and feel that these students may have some ideas for new car designs that are driven by electricity. They have therefore approached you to design and construct a model of a vehicle that meets the following design specs (requirements).

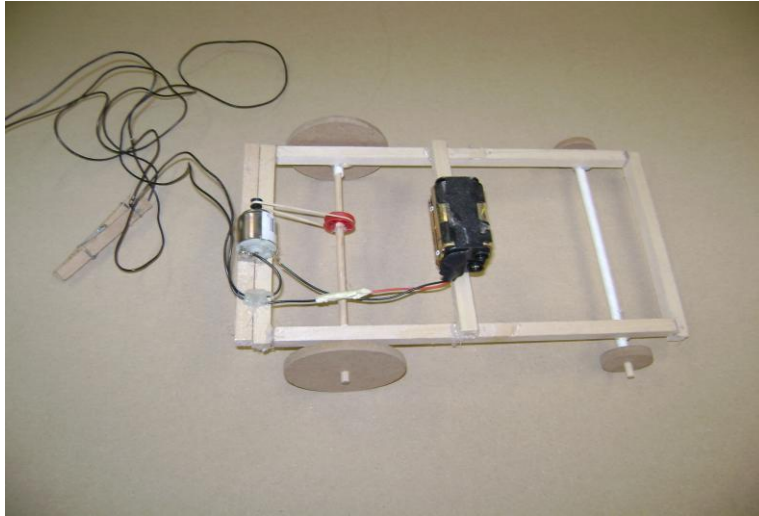
Your prototype (model):

- must be run by electricity
- must be controlled by a switch
- must travel 1 meter under its own power

A Design Brief containing the following information must accompany your vehicle:

- a clear, concise statement of the problem to be solved
- 3 sketches of possible solutions to the problem
- an explanation and the reasons for your plan choice
- an evaluation of how well your solution solves the problem
- a Technical Drawing (a neat, accurate drawing of the final design which includes labels and dimensions)

Sample Photo:



A Sample Electric Vehicle

Assessment and Evaluation (including Criteria for Success):

Evidence of Student Learning: design notes and drawings, working prototype, understanding of how electrical systems work, appropriate choice of materials, demonstration of knowledge of design process with a particular emphasis on field testing (e.g., a detailed design brief recording process of technological problem solving), presentation of design and final product with suggestions for improvement

Criteria: safe, appropriate, and effective use of materials and tools, design specification requirements are met, presentation shows understanding of key learnings, including consideration of economic and environmental factors that determine the suitability of materials for use in manufacturing a product

Completeness & Accuracy of Planning Sheets	/20 or level 1- 4
Constructive Use of Class Time	/20 or level 1- 4
Safe Use of Tools & Equipment	/20 or level 1- 4
Responsible Use of Materials	/10 or level 1- 4
Performance of the Model	/10 or level 1- 4
Technical Drawing	/20 or level 1- 4
Total	/100 or level 1- 4