

WIND-POWERED TRACTOR

CAT# 80-50-W029



The power that propels this truck is not electric power but wind power! The propeller spins and creates a force so the truck moves forward. There are many examples of this principle in our everyday life: The electric fan, air conditioner, kitchen ventilator, wind power, electric generator, and steamship. Your students will love this build as well as the challenge of racing them after they have completed their design!

PRIMARY DIVISION: GRADES 1-3

Overall Expectation: STEM, Matter and Energy Focus

Explore structures and mechanisms, including the roles of materials in supporting structures and making devices work.

Specific Expectation

Identify and describe the purpose of simple machines such as levers and pulleys.



Activity

Students use the Wind Powered Truck to understand how wind energy can be converted into mechanical energy. They observe how the spinning propeller creates a force that moves the truck forward. This helps them grasp basic concepts of energy conversion and motion in a fun and engaging way.

JUNIOR DIVISION: GRADES 4-6

Overall Expectation: STEM, Matter and Energy Focus

Investigate the principles of forces, energy, and control in simple machines and structures.

Specific Expectation

Explore the relationships between the components of simple machines and the forces acting on them.

Activity

With the Wind Powered Truck, students investigate the concept of wind energy and how it converts into kinetic energy. They experiment with different propeller sizes and shapes to see how it affects the truck's speed and distance traveled. This enhances their understanding of force, energy, and the mechanics of wind-powered movement.

INTERMEDIATE DIVISION: GRADES 7-8

Overall Expectation: STEM, Structure and Mechanisms Focus

Investigate how technological problem-solving meets human needs and leads to innovation.

Specific Expectation

Analyze the impact of friction and lubrication on the efficiency of mechanisms.

Activity:

Students use the Wind Powered Truck to explore factors affecting its performance, such as air resistance and friction. They experiment with different materials for the truck's body and wheels to reduce friction and improve efficiency. This helps them learn about optimizing design for better performance and understanding real-world applications of wind power.

SECONDARY DIVISION: GRADES 9-12

Overall Expectation: Physics Focus

Apply principles of physics to understand the operation and efficiency of mechanical systems.

Specific Expectation

Analyze mechanical advantage and efficiency in simple and compound machines.

Activity

Using the Wind-Powered Truck, students delve into concepts of wind energy conversion, action-reaction forces, and mechanical efficiency. They calculate the power output of the propeller and the reaction force produced by the wind. They also discuss how effectively this force is converted into the truck's forward motion, relating it to real-world applications like wind turbines and renewable energy sources.

CROSS-CURRICULAR CONNECTIONS

Mathematics

Students can calculate the forces involved and the efficiency of energy conversion using mathematical formulas.

Technology

They explore different designs and materials for optimizing the wind-powered truck's performance.

Language Arts

Students can write reports or presentations on the principles of wind energy conversion and their applications in various engineering fields.

Summary

By experimenting with the Wind Powered Truck, students engage in hands-on learning experiences that deepen their understanding of mechanical principles, wind energy, and action-reaction forces while meeting curriculum expectations. This project promotes critical thinking and curiosity in STEM disciplines, encouraging students to explore the world of physics and engineering and understand the importance of designing efficient and practical solutions using renewable energy sources.