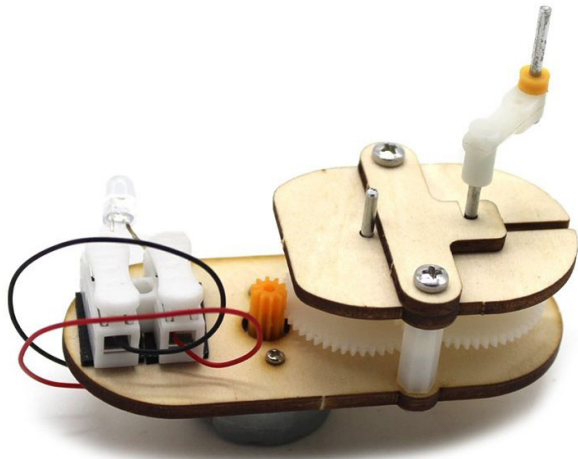


# HAND CRANK GENERATOR

CAT# 80-50-W069



This hand-crank generator is an excellent STEM kit to demonstrate the transfer of mechanical energy into electrical energy. It is a compact device designed to convert mechanical power into electrical power. As students turn the crank, they directly power a small light bulb without the need for batteries. It's a hands-on way to illustrate the conversion of energy from one form to another.

## 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 Hand-Crank Generator to understand how mechanical energy can generate electricity. They explore the mechanism of the crank and discuss how it turns motion into electrical power. This activity introduces the concept of energy conversion and simple machines.

## 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

Students use the Hand-Crank Generator to investigate how the force applied to the crank generates electricity. They analyze the relationship between the force exerted and the electrical output. This activity helps them understand the connection between mechanical force and electrical energy.

## INTERMEDIATE DIVISION: GRADES 7-8

### Overall Expectation: STEM, Matter and Energy Focus

Investigate the ways in which 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**

With the Hand-Crank Generator, students explore how friction affects the efficiency of energy conversion. They experiment with different materials for gears and bearings to reduce friction, discussing the importance of lubrication. This activity introduces concepts of mechanical efficiency and optimization.

## **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 Hand-Crank Generator, students delve into concepts of work, energy, and power. They calculate mechanical advantage and efficiency of the generator system at different speeds and loads, relating it to real-world applications in engineering and technology.

## **CROSS-CURRICULAR CONNECTIONS**

### **Mathematics**

Students calculate gear ratios, mechanical advantage, and efficiency using mathematical formulas related to the hand-crank generator.

### **Technology**

They explore modern generator systems and compare them to the kit's design.

### **Language Arts**

Students can write reports or presentations on generator technology, historical developments, and future innovations in renewable energy.

### **Summary**

By using this Hand-Crank Generator kit, students engage in hands-on learning experiences that enhance their understanding of mechanical and electrical principles while meeting curriculum expectations. It fosters critical thinking and provides a tangible demonstration of energy conversion concepts.