

AMAZING MACHINES

A LEGOLAND® California Educational Resource Guide Grades 3-6



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Welcome to LEGOLAND California!

Education Programs: "Amazing Machines" was developed by the LEGOLAND Education Department. For information on LEGOLAND Education programs, visit www.LEGOLAND.com/edu.

Directions: From Interstate 5, buses exit Palomar Airport Road East. Turn LEFT on Hidden Valley Road, and LEFT into LEGOLAND. Cars exit Cannon Road East and turn RIGHT on LEGOLAND Drive.

Arrival and Entry: Please arrive 30 minutes before your program. Teachers must be present during the 45-minute program.

Lunches: School groups may bring lunches in disposable containers and use self-storage bins. Lunches may be pre-ordered when you book your program, or purchased at LEGOLAND restaurants.

Safety: LEGOLAND Parks are built to the highest standards of quality and safety. Height restrictions apply on selected attractions throughout the park.

Background Information

Simple Machines make work seem like play.

Have you ever used a shovel in the sand? Have you ridden a bicycle? Have you seen a flag raised on a flagpole? If so, then you have seen three simple machines at work—levers, gears, and pulleys!

LEVERS

Levers move diagonally, and help us to lift heavy objects easily. A shovel can be used as a lever. Other examples of using levers are using a screwdriver to open a paint can, or sitting on a see-saw and lifting the person on the other end. A crane is a lever, and so are piano keys, which use the lever's power to increase force.



GEARS

Gears are wheels with teeth around the edge. They mesh with other gears to cause circular movement, as on an electric can opener.

Gears can be used to make things go faster or slower, as on a bicycle. Gears can also change the direction of movement.

Gearing up is when a large gear drives a small gear and makes the small gear go faster.

Gearing down is when a small gear drives a large gear and makes the large gear go slower.



PULLEYS

Pulleys, like those on a flagpole, are smooth wheels with a groove around the wheel. A cable or belt fits into the groove of the pulley wheel. Two pulleys can be connected by the belt, which enables one pulley to turn the other.

Pulleys, like gears, cause faster or slower movement when the size of the pulley wheels are changed. Using a pulley helps lift or move things more easily, and reduces friction. Window blinds and tow trucks use pulleys.



Before and After the Visit: Minds-On Activities

Gears and Pulleys on Kid Power Tower

Think about the Kid Power Tower ride at LEGOLAND.

The car that riders sit in weighs about 200 lbs. Estimate the weight of two riders. About how much total weight do riders raise when they pull on the motorized pulley cable?

Would riders be able to lift this weight without the help of machines?

Gearing up and going fast is fun, but going slow can be fun, too. Kid Power Tower's motors and gears create a smooth, powered, free fall when riders let go of the cable.

What is it called when gears are used to slow down?



Scavenger Hunt

Find these amazing machines we use every day.
List each simple machine in the group where they belong.

Shovel
Flagpole cable
Electric can opener

Bicycle
Crane

Bottle opener
Rotary mixer

Window blinds
Tow truck cable

Gear

Lever

Pulley

Discovery Worksheet

Find the simple machines in these rides!

Write the name of the simple machines at work.

Remember:

Gears are wheels with teeth. They mesh with other gears to cause movement in a circle.

Levers move diagonally to help lift heavy objects more easily.

Pulleys use a belt or cable to help move things more easily.



Kid Power Tower
riders pull a cable to help them get to the top. Name the simple machine riders use.

Bionicle Blaster
turns in a circle. Which simple machine causes this movement? Hint: It is hidden inside the ride, but one is shown for decoration on top of the ride!



The Big Test
features a fire truck with a crane. The crane works at an angle to lift heavy objects easily. What simple machine is at work?

Fun Town Fire Academy
features a heavy water jet. What simple machine helps riders aim it easily?



Hands-On Activities

Learn about Simple Machines

What are simple machines?

Think about simple machines you use every day.

How do they make work easier?

Go to the Imagination Zone and discover levers, gears, and pulleys and how they work.



Build a Motorized Model

Work in pairs to build Windy Windmill, a motorized model that uses gears and pulleys. Make sure the gears mesh and the pulley belts are in the groove of the pulley wheels. When the model is built, attach a battery pack to the motor and see the windmill run!

Later, Build Models On Your Own!

These models may be available:

Model	Uses Gears	Uses Pulleys	Uses Motors
Awesome Auto	x	x	x
Tiny Twister	x	x	x
Tommy Technosaur	x	x	x
Techno Turtle	x	x	x
Puppet Playhouse	x		x

About Amazing Machines

Educational Objectives

- Learn about simple machines, such as gears, levers, and pulleys.
- Experience and explore how simple machines work.
- Relate the activities to the experience of LEGOLAND attractions.



California Curriculum Standards

THIRD GRADE: California Curriculum Standards Addressed

Math: Measurement and Geometry

2. Students describe and compare the attributes of plane and solid geometric figures and use their understanding to show relationships and solve problems.
 - 2.4Combine and take apart three dimensional objects to construct new three dimensional objects.

THIRD, FOURTH, FIFTH, and SIXTH GRADES

Math: Problem Solving and Mathematical Reasoning

1. Students make decisions about how to approach problems.
 - 1.1 Analyze problems by identifying relationships, discriminating relevant from irrelevant information, sequencing and prioritizing, and observing patterns.
2. Students use strategies, skills, and concepts in finding solutions.
 - 2.1 Predict outcomes and make reasonable estimates.
3. Students move beyond a particular problem by making general conclusions, summary statements and posing new, related questions and comments.
 - 3.3 Make connections between the solution and other mathematical solutions, concepts, other school subjects, and the real world.