

Project G.L.A.D.
Forest Grove School District
Prepared by: Christina Gorla and Brooke Qunell
Simple Machines

Idea Pages

I. UNIT THEME

- There are four simple machines which make work easier, and they can be identified by their characteristics.
- Simple machines employ the principles of force and motion.

II. FOCUS/MOTIVATION

- Cooperative Groups by simple machine
- Realia
- Inquiry Charts
- Big Book –simple machines
- Observation charts

III. CLOSURE

- Invent a simple machine
- Internet
- Letter to Parent
- Create their own functional bedroom using simple machines.

IV. CONCEPTS/UNDERSTANDINGS

- Understand fundamental forces and how they apply to simple machines.
- Predict and explain which way an object will move based upon its mass, composition, and the force exerted upon it when using simple machines.
- Explain interactions between force and matter and relationships among force, mass, and motion when applied to simple machines.
- Predict the motion of an object based upon one or more forces acting on it.
- Predict ways to change direction or speed of an object by changing the forces acting upon it. For example, if we change a skateboarding surface from smooth to rough, the skateboard will decrease in speed across the surface.
- Identify real-world examples of forces affecting the motion of objects.
- Explain simple changes in the motion of an object when applied to simple machines.

V. VOCABULARY

simple machine	effort
fulcrum	load
tool	lever
combination lever	axle
leverage	pulley
gear	inclined plane
wedge	ramps
first class lever	second class lever
third class lever	load
cable	groove
wheel	sprocket
force	mass
motion	energy
screw	

VI. ORAL LANGUAGE/READING/WRITING SKILLS

- To recognize, pronounce and know the meanings of the vocabulary.
- To demonstrate literal, inferential and evaluative comprehension.
- To connect reading selections to other texts experiences issues and events.
- To demonstrate written language skills.
- To convey a clear idea or message using language and organization appropriate to audience and purpose.
- To effectively use eye contact, oral fluency, speaking rate, enunciation, volume, vocal energy, gestures, and posture individually and in-groups to communicate ideas effectively.

VII. MATH/SCIENCE/SOCIAL STUDIES SKILLS

- Apply foundation concepts of change, cause and effect, energy and matter.
- Apply explanatory concepts of model and system and their probability and replication.
- Use basic scientific process skills to observe, measure, use numbers, classify, question, infer, hypothesize, and communicate.
- Understand fundamental force, its forms and effects on motion.
- Understand the interaction of energy and matter.
- Understand how simple machines have made life easier for people in history such as during the time of the Native Americans, explorers, westward movement up to the present.

VIII. RESOURCES AND MATERIALS

Non-fiction

- *Wedges*, Anne Weisbacher, Capstone Press, 2001
- *Tools*, Ann Morris, Lothrop, Lee & Shepard Books, 1992
- *Tools*, Venice Shone, Scholastic, 1990
- *Force & Motion*, Peter Lafferty, DK Publishing, 1992
- *Wheels and Axles*, Anne Weisbacher, Capstone Press, 2001

- *The Wheel*, Ian Locke, Simon & Schuster Young Books, 1993
- *Pulleys*, Anne Weisbacher, Capstone Press, 2001
- *Inclined Planes*, Michael Dahl, Capstone Press, 1996
- *Screws*, David Glover, Rigby Interactive Library, 1997
- *Pulleys and Gears*, David Glover, Rigby Interactive Library, 1997
- *How Things Work*, Claire Llewellyn, Scholastic, 1995
- *The Science Of Tools*, Andrea Munro, Weigl Publisher Inc., 2001
- *On a Building Site*, Henry Pluckrose, Franklin Watts, 1998
- *On the Farm*, Henry Pluckrose, Franklin Watts, 1998
- *Visual Timeline Of Inventions*, Richard Platt, Dorling Kindersley Book, 1994
- *Power Machines*, Ken Robbins, Henry Holt And Co. Inc., 1993
- *Pulleys*, Michael Dahl, Capstone Press, 1996
- *Levers*, Michael Dahl, Capstone Press, 1996

Fiction

- *How Do You Lift A Lion?*, Robert E. Wells, Albert Whitman & Co., 1996
- *The Giant Jam Sandwich*, Jonh Vernon Lord, Houghton Mifflin Co., 1972
- *How Will We Get To The Beach?*, Brigitte Luciani, North-South Books, 2000
- *My Side Of The Mountain*, Jean Craighead George, Penguin Group, 1959
- *Workshop*, Andrew Clements, Houghton Mifflin Co., 1999
- *The Lot at the End of My Block*, Kevin Lewis, Hyperion Books For Children, 2001

Spanish books

- *Cómo funcionan algunas cosas*, Sharon Dalglish, Shortland, 1999
- *¿Qué pasa allá afuera?*, Sharon Dalglish, Shortland, 1999
- *Grandes inventos*, Sharon Dalglish, Shortland, 1999
- *Poleas*, Michael Dahl, Capstone Press, 1998
- *Palancas*, Michael Dahl, Capstone Press, 1998

Teacher Resource

- *Science Experiments With Simple Machines*, Sally Nankivell-Aston and Dorothy Jackson, Franklin Watts, 2000

Web Sites

- www.san-maring.k12.ca.us
- www.viking.stark.k12.oh.us
- www.coc.uh.edu
- www.mos.org
- www.southern.com
- www.ed.uri.edu
- www.plainfield.k12.in.us
- www.indirect.com
- www.viking.stark.k12.oh.us
- www.coc.uh.edu
- www.mos.org
- www.southern.com

Simple Machines

By Christina Gorla and Brooke Qunell

Simple machines are basic tools that help people do work. They lift and move heavy loads, push and pull objects, open tops, and much, much more.

Even the earliest humans used simple machines, from stones used as wedges to inclined planes for walking paths. They knew that making their work easier would save time and energy, which both were important for survival.

Most machines we use today are made up of a complex combination of simple machines.

They make many everyday tasks easier with less effort.

A **wheel** can be used to move things more easily from one place to another. **Axles** are the bars that go through the center of many wheels. Motorcycles and bicycles have two **axles**, one for each **wheel**.

The **wheel and **axle** work together to move things more easily.**

A **pulley** is a small wheel that works with a **rope** or **chain**. The rope or chain fits into a groove on the **pulley** and keeps the chain in place.

The **pulley makes lifting loads easier.**

Inclined planes can be used to move things from a lower place to a higher place and from a higher place to a lower place. A **plane** is any flat surface. When the flat surface is raised at one end it becomes an **inclined plane**.

A **wedge** is a type of **inclined plane** that helps to cut or split things. A wedge can also hold open a heavy door.

A **screw** is another kind of **inclined plane**. It holds two things together and can be used for lifting.

All **inclined planes help move things with less effort.**

A **lever** helps us move things with less force. Every lever is made of a **bar** and a **fulcrum**. The bar is the part of the **lever** that moves and turns. The fulcrum is the point that does not move.

The **lever makes our daily tasks easier.**

Simple machines are basic tools that help people.

Wheels and axles, pulleys, inclined planes, wedges, screws and levers make work easier and play more fun.

How is your life easier because of simple machines?

Narrative Input Chart

Simple Machines with Mrs. Elpmis at Senihcam Elementary School

By Christina Gorla

It was our first day back to Senihcam Elementary School and my classmates and I had been looking forward to starting the fourth grade. (classmates)

After introductions and our review of the school rules, our new teacher, Mrs. Elpmis, began to talk to us about the first science unit we would embark on in the fourth grade. (teacher)

She asked us to think back on our summers and decide what kinds of simple machines we had used to make the jobs we did over the break easier. We were to return the next day with a picture and paragraph about our summers and the simple machines we had used. (chalkboard)

The next day, I decided to go first. "My name is Michael, and this summer, I went to visit my Aunt Pearl, and helped her out at the Retirement Home that she runs. (Michael and poster)

She told me that I would be in charge of putting the American Flag up on the pole every morning, and be responsible for taking it down and folding it nicely in the evening. (poster on chalkboard)

At first I remembered thinking, 'My aunt must think I'm a monkey, I can't climb that pole twice a day.' I soon realized there was a much easier way to go about this job, because the flag pole had a pulley system. The ropes connected to the pole and had clips to attach the flag as well. When I pulled on one side of the rope, it moved the flag up, and when I pulled on the other side of the rope, it pulled the flag

down again. I felt very proud of the responsibility my aunt had given me, and I realized that the pulley system helped make my job easier this summer. (Flagpole)

After my presentation, Mrs. Elpmis called on a new girl I had never seen before at Senihcam Elementary.

"Hi, my name is Nora and I just moved here. (Nora & poster)

When we moved a few weeks ago, we rented a U-Haul, piled all of our belonging in it, and drove to our new home. I realized during this moved that it is a lot of work to relocate, but I also realized how one machine made our lives a lot easier during the move. (moving boxes)

The U-Haul truck had this special ramp we could pull out the back of it and set on the ground. It allowed my family to carry heavy loads up the gradual incline, without having to climb up steep stairs to get our boxes. I have discovered now that we were using an inclined plane, which is a simple machine. Without the help of that special ramp, our moving day would have been even more difficult than it was." (ramp, move boxes around)

Nora received applause and positive comments from the class, and then Mrs. Elpmis called on another student to give his presentation.

"My name is Ozwaldo, and this summer, I helped my older brother, Paúl on his paper route. We had to get up early in the morning and deliver between 50 and 100 papers depending on the morning. Because we didn't want to take all day doing it, and we didn't have a car, we had to think about how we could get the paper route done quickly, so we could enjoy the rest of our summer days. (Ozwaldo)

We had thought about walking at first, but decided it would take a very long time, so we decided to ride our bicycles instead. We had to buy baskets that hooked on our bicycles to hold the newspapers, but the bikes enabled us to get the job done faster." (Poster & Paúl)

Bikes have wheels and axles on them that help to cover a lot more distance in a shorter amount of time than our own feet would have allowed us to do. Because of these great simple machines, my brother Paúl and I were able to have fun-filled summer afternoons." (bicycle)

Students asked questions of Oswaldo, and then Priscilla was called on.

"My name is Priscilla, and I went to day camp at Barneby Park this summer. Because I was one of the oldest kids there this summer, I was able to help out the little kids. Our counselor told me I was big and strong enough to help change the teeter totter base for the kids. This was a hard job because I had to look at the kids and their sizes in order to make a decision about which notch on the base the teeter totter had to sit on." (Priscilla & Poster)

The teeter-totter is a simple machine because it makes lifting something heavy (a kid for example) easier. I found out that the teeter totter is a lever and that its base is called a fulcrum. The base allows the lever to go higher. When there was a big kid who wanted to ride with a small kid, I had to change the fulcrum to be closer to the bigger kid. When there were two kids around the same size, the fulcrum had to be equal in the middle. I learned a lot from the teeter totter this summer!" (Teeter-totter)

Various students continued with their presentations, and we realized that there are lots of simple machines we use everyday. Some students talked about hammers, scooters, eggbeaters, teeth, ladders, watches, and more. (hammer, scooter, eggbeater, tooth, ladder, and watch)

Mrs. Elpmis told us she was proud of our discoveries with the simple machines we used this summer. She didn't have to ask us twice why people should use simple machines. We all called out in unison, "Because they make work easier!" (conversation bubble)

Process Grid

Simple Machines	What Are Its Parts?	How Does It Work?	Where Can You Find It?	How Does It Make Work Easier?	What Does It Look Like?
Pulley	Small Wheels, Ropes or Chains, Grooves, Metal, Wood or Plastic parts	A pulley is a small wheel. A rope or chain fits into a groove on the pulley. Someone pulls rope and it moves up or down.	Flagpole Boat Tree house Crane	It lifts heavy loads up and down.	
Inclined Plane	Plane-flat surface, High place, Low place, Metal, wood, or plastic parts	Plane that has one end higher than the other.	Ramp Stairs Playground Truck Ladder Street Highway	Helps move heavy objects from one height to another more quickly and easily.	
Wedge	Thin edge, thick edge, Wood, rubber, or plastic parts	It pushes things apart, splits, or cuts things.	Ax Teeth Doorstop Scissors Knives	It cuts, splits, or pushes things more easily.	
Lever	Bar, Fulcrum, Metal or wood parts	The bar moves and turns as the fulcrum supports it.	Teeter totters Pencil Hammer Wheelbarrow Nail clippers	It lifts heavy loads.	
Wheel & Axle	Axle, rod, wheel, cranks, sprockets, gears.	The wheel spins freely around the axle. The axle and rod are in the center of the wheel.	Cars Wagons Bikes Steering wheel	The wheel and axle can carry, push and mix things more easily.	
Screw	Groove, Thread, Metal or wood parts	Threads are the grooves that help wind the nail into an object.	Caps Tops Nuts Bolts Drill Staircases Slides Tops	Helps tighten and grip things with less force than pushing or pulling.	

Chants, raps, and poems

I Can Spell

By Christina Gorla and Brooke Qunell

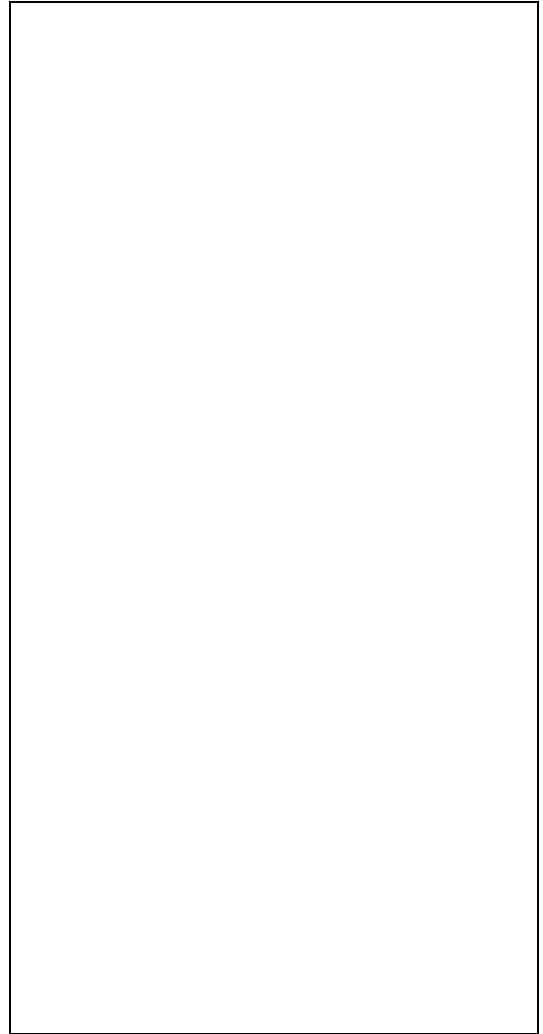
I can spell lever, l-e-v-e-r.
I can spell hoist, h-o-i-s-t.
I can spell wedge, w-e-d-g-e.
But I can't spell compound machine.

I can spell wheel, w-h-e-e-l.
I can spell tools, t-o-o-l-s.
I can spell screw, s-c-r-e-w.
But I can't spell compound machine.

I can spell lift, l-i-f-t.
I can spell load, l-o-a-d.
I can spell ramp, r-a-m-p.
But I can't spell compound machine.

I can spell pull, p-u-l-l.
I can spell work, w-o-r-k.
I can spell gear, g-e-a-r.
But I can't spell compound machine.

Yes, I can! Yes, I can!
C-O-M-P-O-U-N-D M-A-C-H-I-N-E! Compound Machine!



Hooray for Simple Machines

(sung to the tune of "Farmer in the Dell")

By Christina Gorla and Brooke Qunell

Hooray for simple machines,
Hooray for simple machines,
Hooray for simple machines,
You make work easier!

The wheel and the axle,
The wheel and the axle,
The wheel and the axle
Move the car on the ground.

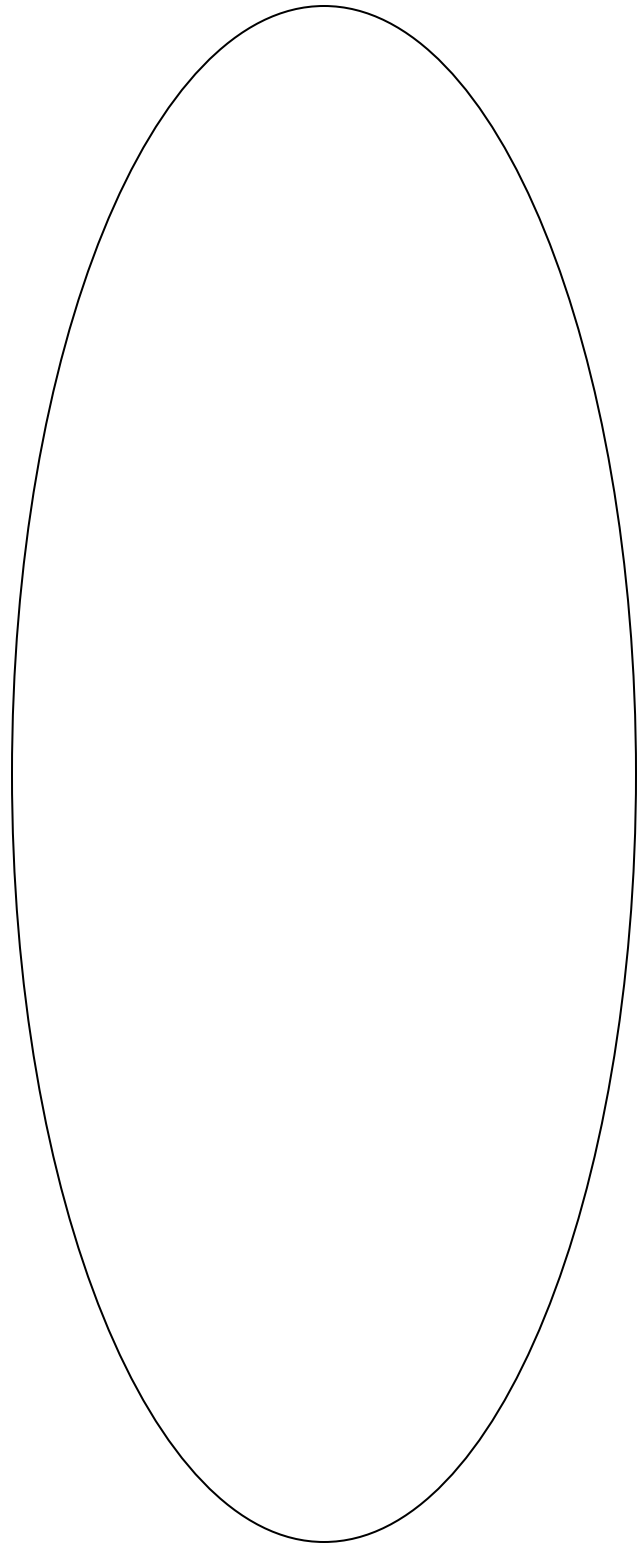
The inclined plane,
The inclined plane,
The inclined plane
Helps the wheel chair into the building.

The lever lifts the load,
The lever lifts the load,
The lever lifts the load
On a teeter totter.

The wedge holds the door,
The wedge holds the door,
The wedge holds the door
So it won't slam shut.

The pulley uses a wheel,
The pulley uses a wheel,
The pulley uses a wheel
To move the flag up the pole.

Thank you simple machines,
Thank you simple machines,
Thank you simple machines
You make work easier.



I'm A Machine

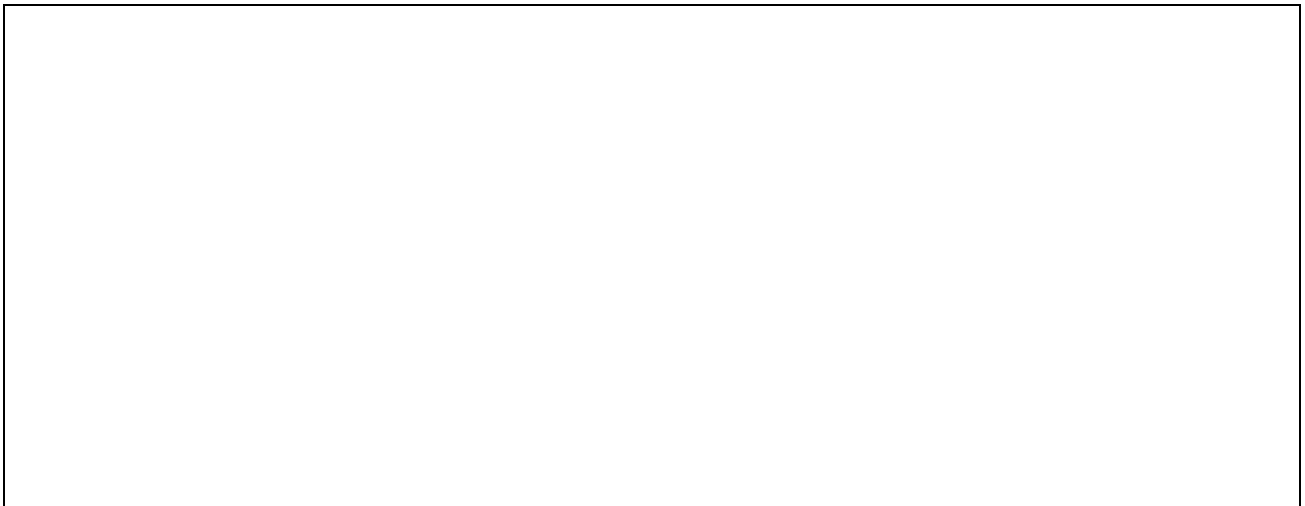
(sung to the tune of "I'm A Little Piece of Tin")
by Christina Gorla and Brooke Qunell

Useful, handy simple machines,
We can do most anything!
Pushing, pulling, moving weight,
Spinning, rolling, hoisting freight.

I'm a machine, clang, clang.
I'm a machine bang, bang.
I'm a hard-working machine.

We simplify the toughest things,
Prying, screwing, hammering.
Lifting, turning, sliding through.
Look at all that we can do.

I'm a machine, clang, clang.
I'm a machine bang, bang.
I'm a hard-working machine.



Is This Force? Yes, Ma'am

By Sue Lowe, Christina Gorla and Brooke Qunell

Can a force be a push?	Yes, Ma'am!
Can a force be a pull?	Yes, Ma'am!
Tell me, how does it work?	It pushes and pulls.
It pushes and pulls?	Yes, that's how it works.
Can a force change a motion?	Yes, Ma'am!
Can a force change size and shape?	Yes, Ma'am!
Tell me, how does it work?	It pushes and pulls.
It pushes and pulls?	Yes, that's how it works.
Can a force change the speed?	Yes, Ma'am!
Can a force change direction?	Yes, Ma'am!
Tell me, how does it work?	It pushes and pulls.
It pushes and pulls?	Yes, that's how it works.
Forces do all these things?	Yes, Ma'am!
Forces transform our world?	Yes, Ma'am!



Our Life Is Easier, Because of Simple Machines

(sung to the tune of "When Johnny Comes Marching Home")

By Serene Campbell and Linda Sparks

Wedges are doing work for us, hurrah, hurrah!
Wedges are doing work for us, hurrah, hurrah!
 They pry, they cut, they separate,
 Axes, scissors, and knives are great!
And our life is easier, because of simple machines!

Levers are doing work for us, hurrah, hurrah!
Levers are doing work for us, hurrah, hurrah!
 Shovels lift weight and rakes move piles,
 Teeter-totters make us smile.
And our life is easier, because of simple machines!

Screws are doing work for us, hurrah, hurrah!
Screws are doing work for us, hurrah, hurrah!
 They drill, they connect, they join two things,
 Car jacks, light bulbs, and jar lid rings.
And our life is easier, because of simple machines!

Pulleys are doing work for us, hurrah, hurrah!
Pulleys are doing work for us, hurrah, hurrah!
 They make moving weight less of a chore,
 They open our blind and hoist from the floor.
And our life is easier, because of simple machines!



Inclined planes are doing work for us, hurrah, hurrah!

Inclined planes are doing work for us, hurrah, hurrah!

They ease our movement up and down,

Slides, stairs, and ramps all around.

And our life is easier, because of simple machines!

Wheels and axles are doing work for us, hurrah, hurrah!

Wheels and axles are doing work for us, hurrah, hurrah!

They turn, open and roll around,

Doorknobs, and bikes are where they're found.

And our life is easier, because of simple machines!

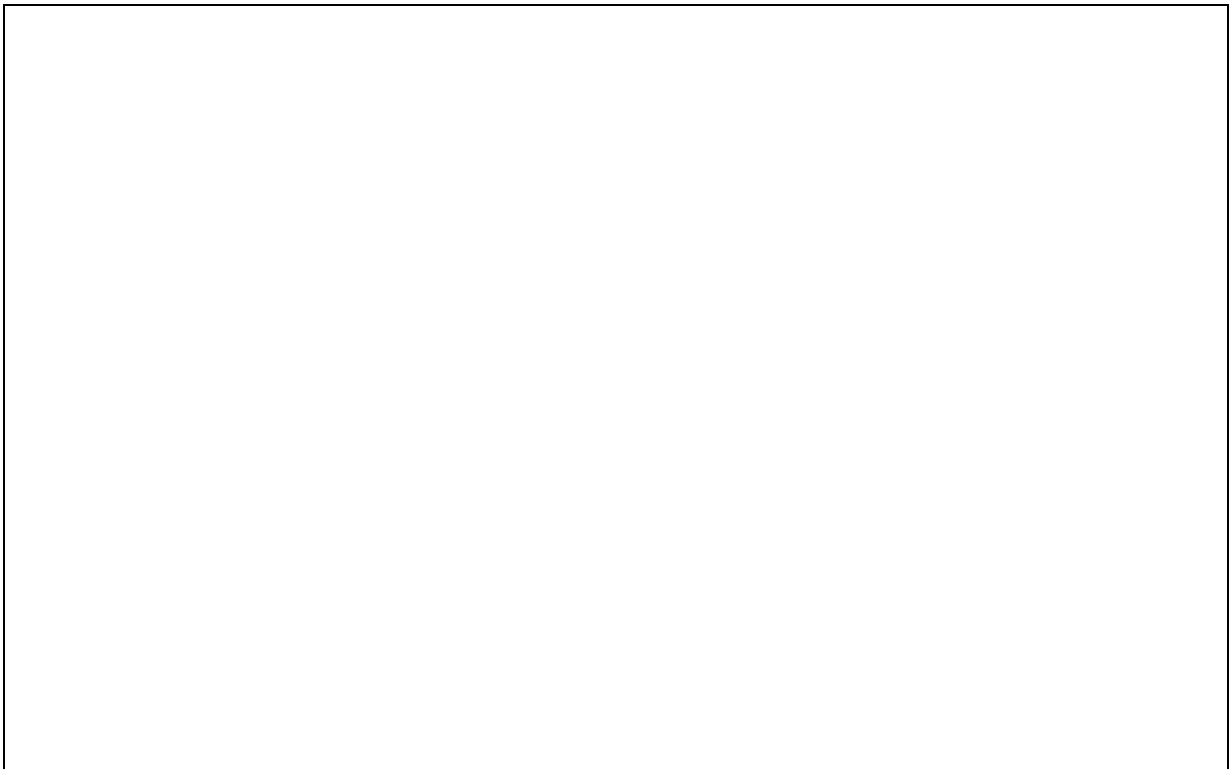
Simple Machines are doing work for us, hurrah, hurrah!

Simple Machines are doing work for us, hurrah, hurrah!

They make our work easy as you see,

Jobs are smooth for you and me.

And our life is easier, because of simple machines!



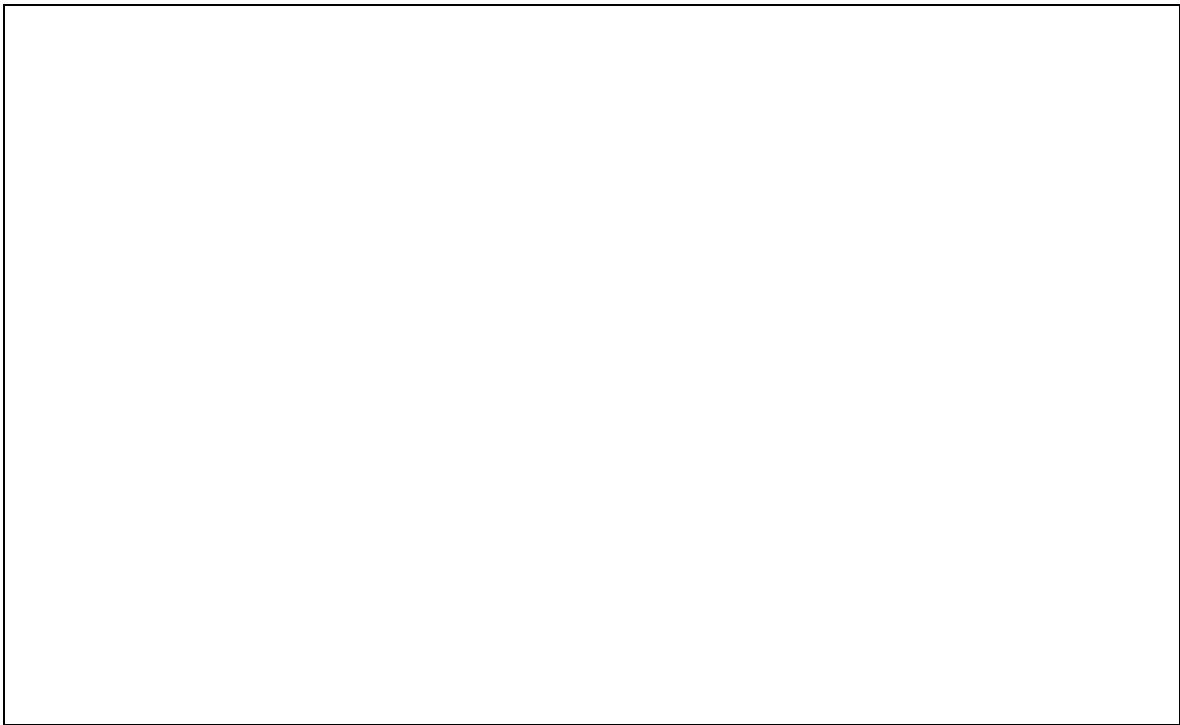
Simple Machine Bugaloo

By Christina Gorla and Brooke Qunell

I'm talking about simple machines and I'm here to say,
"They help us out in amazing ways!
They make daily work easier for you and me.
Take a look around and identify the simple machines you see!"

The pulley system will help you hoist the flag,
The pulley can also aid in lifting your bag.
Inclined planes, levers, wheels and axles too,
Doing the Simple Machine Bugaloo!

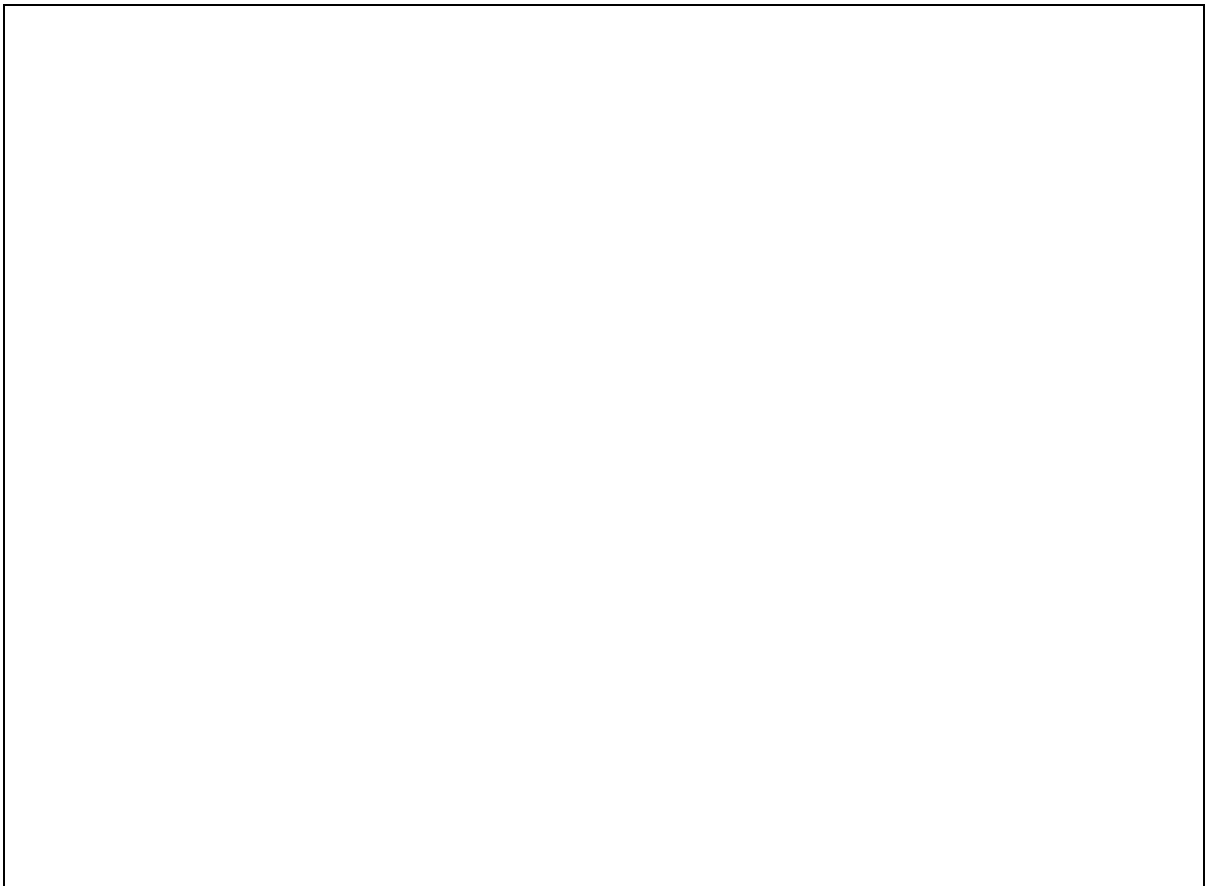
The wheel and axle will help you ride your bike to the store.
The wheel in a fishing reel allows your line to soar!
Inclined planes, levers, wheels, and axles too,
Doing the Simple Machine Bugaloo!



The screw will connect the shelf to the wall,
And keep up all the picture frames hanging in the hall.
Inclined planes, levers, wheels, and axles too,
Doing the Simple Machine Bugaloo!

The lever pops the lid on the soda you drink.
It helps you turn on the faucet in your kitchen sink.
Inclined planes, levers, wheels, and axles too,
Doing the Simple Machine Bugaloo!

The wedge cuts through the wood for the lumberjack.
The wedge can be put in a door to keep it open a crack.
Inclined planes, levers, wheels, and axles too,
Doing the Simple Machine Bugaloo!



Simple Machines Here, Simple Machines There

By Brooke Qunell and Christina Goria

Machines here, machines there,
Simple machines are everywhere!

Inclined planes are sloping.
Pulleys are hoisting.
Wheels are spinning.
Levers are lifting.

A staircase in a house,
A jack under a truck,
Axes in the forest,
And dirt bikes through the muck.

Machines here, machines there,
Simple machines are everywhere!
Machines! Machines! Machines!

