

WORKSHOP EXTENSION ACTIVITY

Built by The Home Depot Kids Workshop

December 2021: Christmas Car

Ages 5-12

CONNECT.

Imagine watching an adult lift something above their head (like a Christmas tree onto your new Christmas car) but it's just too heavy to do all by yourself. Other than asking someone to help you, what could you do?

INVESTIGATE.

The goal of a simple machine is to change the direction or amount of force that is needed to move an object—or, as it's called in physics, *do work*! Lifting a heavy Christmas tree above your head certainly counts as work. A simple machine may be able to change the force needed to do this, so it becomes a little easier!

You'll need:

- Three books
- String
- Empty spool
- Pliers
- Wire hanger
- Wire cutter (with adult assistance)
- Scissors

1. A tree is too big and heavy to experiment with. So, for now, let's practice with books! Stack them together and wrap string around all four sides like you're wrapping a present. Double-knot the top.
2. Lift the books by the string and think about how much effort (or work) it takes to move them. Then, look through the rest of your materials and consider how they could be used to make it easier to lift these books. Experiment and see if you have any luck!



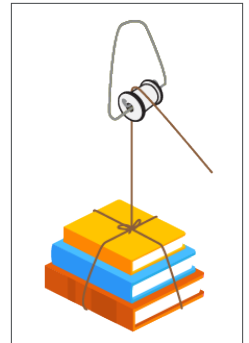
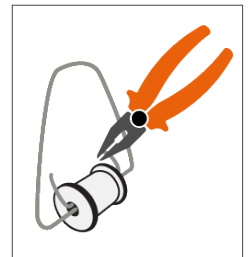
OPTIMIZE.

You'll need:

- Your Christmas Car
- All the materials in the Investigate section

Let's use your materials to build a pulley system, which is one kind of simple machine.

1. Ask an adult to use the wire cutters to cut the middle of the hanger's bottom wire.
2. Pull both ends of the bottom wire apart slightly so you can thread them through the spool. Each end should go entirely through the spool, like the picture here. An adult can help you use the pliers to bend the wire ends up just a little, so the spool doesn't move around.
3. Hang the hanger in a closet or over a doorknob.
4. Loop a piece of string over the top of the spool and cut it so it is long enough to touch the floor on both sides.
5. Tie one end of your string to the top knot of your book stack and place the books under your new pulley system.
6. Hold onto the loose end of the string and pull it straight down toward the floor. By changing the direction of the force (pulling the string down rather than lifting the books up), you should find that the books are easier to lift!
7. Finally, take another look at your Christmas Car and its tree. If you were at a store or tree farm and needed to lift this tree onto your car all by yourself, could a pulley system help you? Sketch what this simple machine could look like and consider sharing your idea with a Home Depot employee or another location that sells Christmas trees!



You're using tools, like wire cutters, just like an electrician would if they were fixing a problem in your house. An electrician is an expert at electrical wiring and helps keep the power on!