JUNIOR SEABEE

CM – CONSTRUCTION MECHANIC

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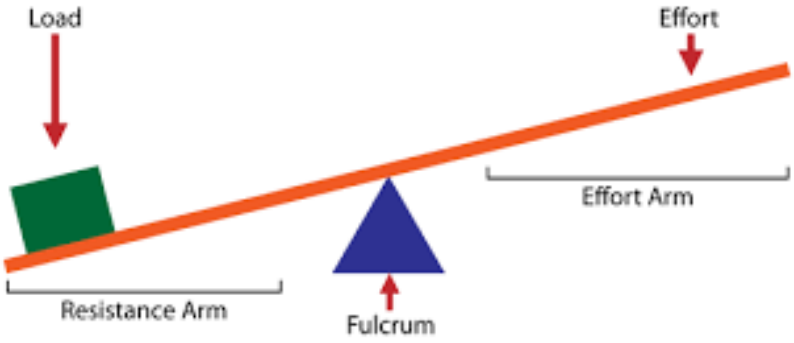
Machines are everywhere

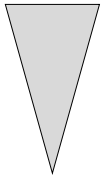
Seabee Construction Mechanics are called upon to fix all of the machines needed to build on construction projects. Their understanding of machines and how they function is fundamental to their success in this effort. In our project today, we will learn about different kinds of simple machines, and see how many of them we can find in our environment, and how we use the various machines every day.

Types of Simple Machines

There are six basic types of simple machines. They include:

Lever – a lever is a simple machine made up of a beam, rod, or bar, set onto a fulcrum, hinge, or pivot point. The fulcrum can be moved from one direction to the other to adjust the amount of force needed to move the object or load. Some examples of levers that you might be familiar with include a see saw (or teeter totter), a pair of scissors, or a bottle cap opener.





Wedge – a wedge is a triangular tool that tapers to a narrow edge, and can be used to separate two objects. A wedge creates force by pushing two objects apart. Some examples of a wedge include an Axe or a knife blade.

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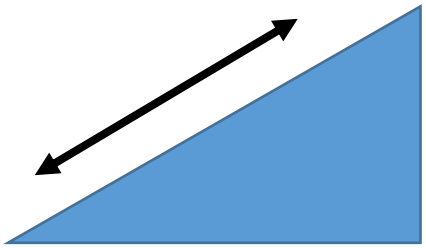
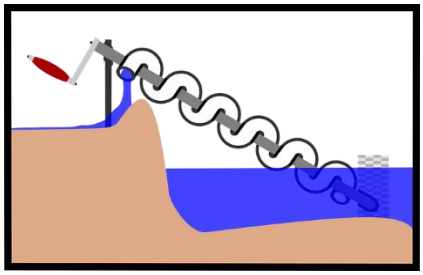
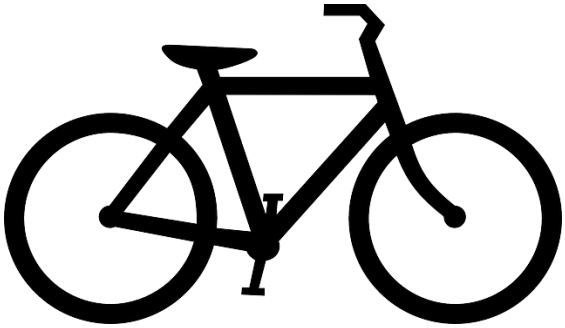


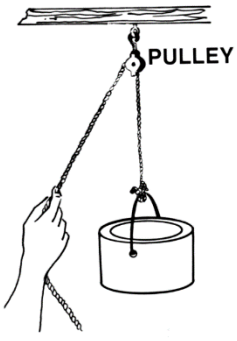
Incline plane – an incline plane is used to lift objects, and the degree of the plane changes the amount of effort needed to move the object vertically. Think about this as using a ramp rather than lifting objects up steps. Incline planes can also be used to more easily bring objects down. An example of an incline plane is a wheelchair ramp that makes it easier for a person in a wheelchair to get into a building, rather than having to climb a step or stairs in their chair



Screw – a screw uses the same principles as the incline plane, using a circular function, as objects move up and around the plane. Screws can be used to pull a large amount of materials from one location to another, particularly if your screw has a tube like the one pictured here. There are screws in many household objects, and in practice screws are helpful when drilling and mining.

Wheel and Axle – a wheel is a circular frame that revolves around a post or rod, and these two pieces work together to make it easier to move things across a distance. The larger the wheel, the longer it takes to rotate, but the axle rotates faster with less effort. Pedaling small circles on your bicycle spins the wheels which makes your bike go farther faster.





Pulley – pulleys use a similar wheel and axle to reduce the effort it takes to lift an object. Using more than one pulley reduces the amount of effort required to lift an object. If you ever get a chance to see a crane in action, they use a system of pulleys to lift heavy objects.

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While it can be challenging to replicate all of these simple machines, we're going to use a few of them to see if we can accomplish our task – moving a can from the floor onto a box or small table

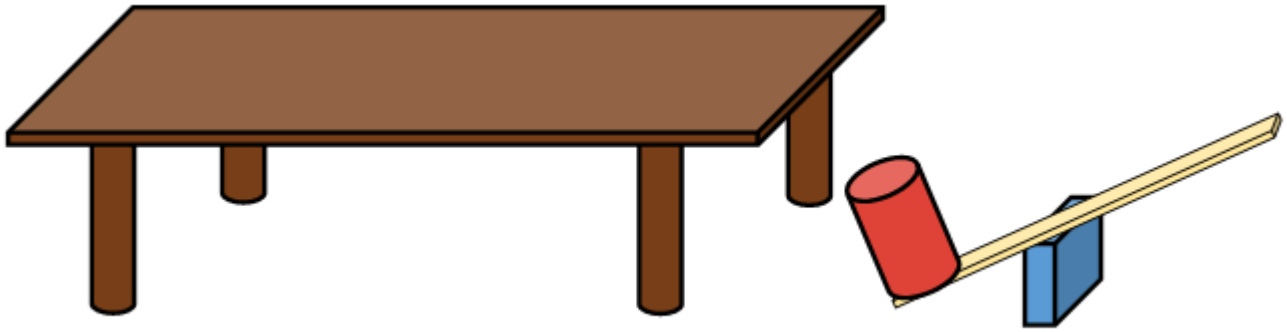
For our project today, you will need:

- A short coffee or side table or medium size box, approximately 1 foot high
- A 16 oz can of food to be used as a weight
- A long piece of wood or sturdy cardboard to use as a ramp and lever – a yard stick is perfect for this activity or a 2'-3' piece of 1x4 lumber
- A narrow box or other sturdy object more than half the height of the table or box above (to be used as a fulcrum). A hardback book that can stand on end might work for this.
- A medium sized car or other wheeled object (roller skate?) that can be used to move your 16 oz can

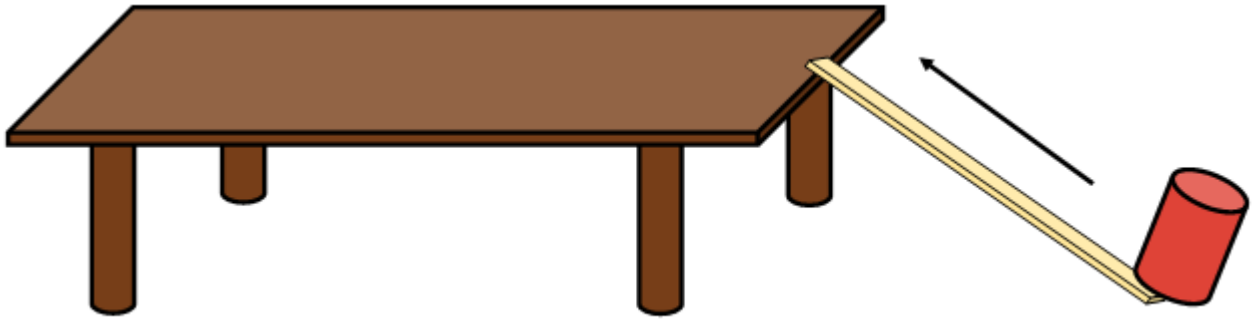
1) The easiest way to move the can from the ground to the table is to pick it up and put it down. But, what if our can were 100 times the weight? Or the table were 10 times as high? Do you think we would be able to lift the can the same way? Machines help us lift things that we wouldn't be able to lift, in ways that we wouldn't be able to lift them.

2) Place you're can back on the ground next to the table. Given what you have learned about simple machines above, what are some of the machines that you might use to try to lift the can from the ground to the table?

- A lever – is it possible to use a lever to lift the can?

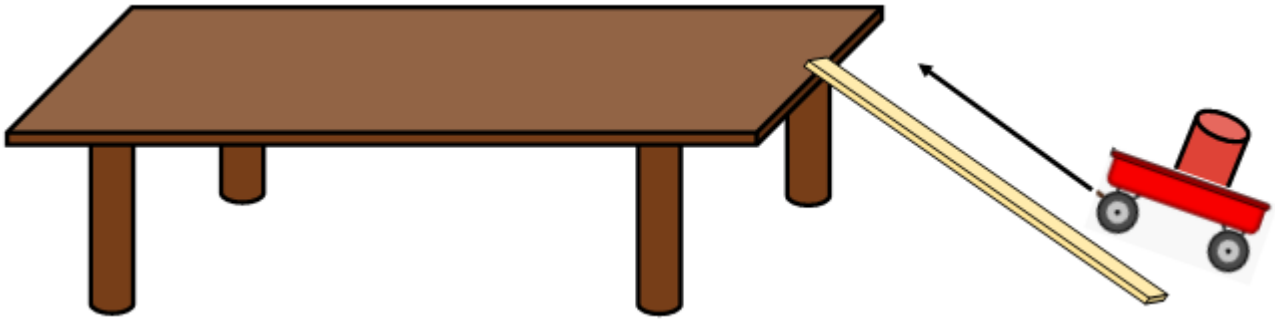


- An incline plane – is it possible to use an incline plane to lift the can onto the table?



3) Sometimes, we use more than one simple machine together to make a job easier. What types of machines can you combine to make it easier to lift the can onto the table?

- What if you combine a wheel and axle with an incline plane?



4) What other combinations can you come up with? How else can machines help in your daily life?

5) Clean-up is always the last part of anything we do! Put away any of equipment that you have used.

6) Please remember to post pictures or video on social media using #JuniorSeabee and #USNSeabeeMuseum so the world can see what you've learned. Share your creations on our Instagram or Facebook pages – tag us at **U.S. Navy Seabee Museum** and don't forget to follow us!