



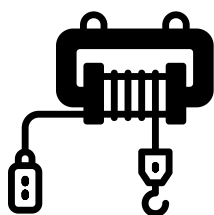
RCRV: Oregon Winch Trials

Oregon Winch Trials

Lesson at a Glance

Introduction

A **winch** is a mechanical device that is used to **haul in** (wind up) or **pay out** (wind out) a **package** attached to a rope, cable, or wire--- otherwise known as a **tension member**.



A simple winch consists of a spool (or **drum**) attached to a hand crank. Winches are used everywhere from tow trucks to elevators to research vessels. This activity will ask students to identify winches in the world around them and reflect on the importance of failure in the engineering design process before building, breaking, and rebuilding winches of their own.

Winch Hunt

- Ask students: Think about your own community. Where are construction sites around town? Have you ever seen a car being towed?

Winches on the RCRVs

- Learn more about the different types of winches being used on the RCRVs by watching the video: **Sea Winch**

Failure is Good?

- Ask students to talk with a partner: what is a time you “failed” and learned something new? Share out!

In order to avoid damaging costly equipment, **winch systems are always designed so that the tension member breaks BEFORE the winch!** Your challenge will be to design a system that does just that.

Let the Winch Trials begin!

This series of trials uses a **digital force gauge** to measure the force it takes to break different components of your model winch systems

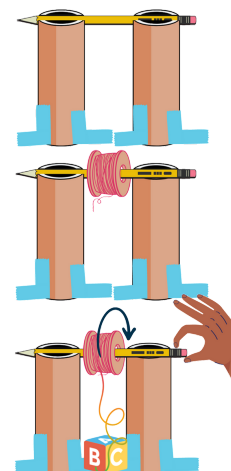


TRIAL 1: Tension Member Trials

- Play “tug of war” with a variety of “tension members” (strings, threads) to discover the peak force that it takes to break the line. Remember, the line must be *weaker* than the winch you build.

TRIAL 2: Cardboard Winch Prototyping

- Use cardboard tubes and other materials to draft your first winch design.
- Use your digital force gauge to figure out how much force it takes to break the winch!
- Remember, the winch must be *stronger* than the tension member you use.



REPEAT AS MANY TIMES AS DESIRED TO BUILD A STRONGER DESIGN!

EXTENSION: We love to see you fail

- Take photos and videos of your trials documenting your process
- Make a short video (try an editing app like Stopmotion, TikTok, or Canva) to share the excitement!

