

Task Sheet

Lesson 1- Build a Tower

Task

Build a tower that an elevator can be used to pull up an elevator on the inside or outside.

Materials

- Cardboard boxes
- Masking tape
- Scissors

Criteria for Success

- Tower is tall enough to pull up an elevator
- Tower is sturdy enough to support the weight of a small elevator
- Tower stands on its own

Lesson 2 – Build an Elevator

Tasks

- Build an elevator from cardboard or other container. Attach a string to it that is about four times as long as your tower is tall.
- Pull something up by lifting the elevator with the string
- Make a one wheel pulley and pull up the elevator
- Make a two and four wheel pulley and pull up the elevator again for each design
- Make an elevator with a counterweight

Materials

- Masking tape
- Smaller containers to use as an elevator.
- String
- Skewers or wood dowels
- Materials to pull up in the elevator

Criteria for Success

- Your elevator is well built and has a string attached to it.
- You can pull something up the tower using your elevator.

- You figure out the advantages and disadvantages of different pulley designs.

Lesson 3 – Gears

Tasks

Use GearSketch to explore the following gear systems:

- One large gear and one small gear
- Three gears of varying sizes
- A compound gear
- Double compound gears
- Optional: Using gears to change the speed of a turning bike wheel

For the second part of this lesson you will build your own gears:

- Glue a gear template to a piece of cardboard
- Cut out the gear by following the template
- Cut out a second gear

Materials

- GearSketch online gear simulator: <http://www.gearsket.ch/>
- Gear Templates
- Cardboard
- Glue
- Scissors or box cutters

Criteria for Success

- You were able get all the different gear systems to work on GearSketch
- You understand how you can use gears to make something spin very fast or very slowly.
- You cut out one or two cardboard gears that look nice and will work to build a gear system.

Lesson 4 – Gears and the Elevator

Tasks

- Turn a large gear using a small gear
- Turn a small gear using a large gear
- Pull up the elevator using your gears

Materials

- Cardboard gears
- String
- Skewers
- Masking tape
- Ruler or measuring tape

Criteria for Success

- You are able to spin your gears so one gear turns the other one.
- You build a gear and axle system that allows you to pull up your elevator.
- You figured out the best gear order to raise your elevator successfully.

Lesson 5 – Pulleys and Gears Elevator**Tasks**

- Set up the elevator to pull it up with a pulley
- Attach the string to an axle connected to gear system
- Pull up the elevator using the pulley AND gear systems

Materials

- Materials from previous lessons
 - Cardboard tower
 - Elevator
 - Pulley setup
 - Gears setup
- Extra pieces of skewers
- Masking tape

Criteria for Success

- You set up the elevator to be pulled up using a pulley system to reduce the amount of force required.
- You set up the gears to make it faster to pull up the elevator.
- You are able to pull something up in the elevator using your pulley and gear