Mission Briefing

ROVs

You will construct a remotely operated vehicle (ROV) that will be attached to a helium balloon and move it through the air. What is an ROV? ROVs, or Remotely Operated Vehicles, can be controlled either **wirelessly** with a radio frequency (RF) remote control **(R/C) transmitter** or they can be **wired** and controlled with a bundle of wires called a **tether.** Today, your team will:

- Earn the parts necessary to construct an ROV
- Build a working ROV

□ **Objective 1: Know Your Role** page 2
Select your team members and each person's responsibilities.

□ **Objective 2: Sketch a Mechanical Device** page 3
Identify the critical components of a common mechanical device to unlock the Rover Kit.

□ **Objective 3: Gather Materials** page 6
Collect the Rover Kit.

□ **Objective 4: Review Instructions** page 6
Decipher the instructions to build a working rover.

□ **Objective 5: Build the Rover** page 6
See if you can get it to move!

□ **Objective 6: Control the Rover** page 7
Control the rover with a remote control.

□ **Objective 7: Build a Backwards Rover** page 8
Try your hand at adjusting your rover to reverse the controls.

□ **Objective 8: Compare the Controls** page 8
Report on what you did to change the controls.

Pathways

Project Manager Pathway: Completion of **All 8 Objectives = 5 points** for Project Manager

Public Relations Pathway: Completion of **Objective 8 = 5 points** for Public Relations Manager

Scientist Pathway: Completion of **Objective 2 = 5 points** for Research & Development Manager

Objective 1: Know Your Role

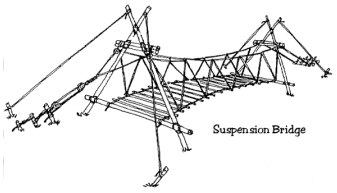
Select a role for each member of your team. You will be held responsible for the duties of your role.

Project Manager

Responsibilities: Keep the team on task. Read Objectives aloud to your team. Communicate with the instructor.

The Project Manager receives special points for moving the team through all 8 objectives.

Research & Development Manager



Responsibilities: Collect and transport all supplies and materials. Make measurements, record data, and read schematics.

The R&D Manager receives special points for completing Objective 2.

Public Relations Manager

Responsibilities: Communicate with other teams, either verbally or online. Write up all social media posts, with input from other team members. **Responsible for any laptops or mobile devices.**

The PR Manager receives special points for completing Objective 8.

In order to complete Objective 1:

- ☐ Select a role for each member of your team (R&D manager can have two people);
- ☐ Enter your team information below;
- ☐ Record your team information on the board or easel paper for others to see.

Team Name:	
Project Manager's Name:	
R&D Manager's Name(s):	
PR Manager's Name:	

Objective 2: Sketch a Mechanical Device

Complete this Objective to unlock the ROV kit.

In Order to Complete Objective 2, Step 1:

☐ Have the **R&D Manager** read the following information:

Every device that we use in our lives has some ***basic functions*** and would be of no use to us if it could not perform those basic functions.

For example, while a car may be a variety of shapes, sizes, or colors and come with bells and whistles like sound systems and dvd players, the basic function of a car is to drive passengers from one place to another.

Every device is also designed considering some ***constraints***. A car might be designed one way to drive on the highway, but another to drive through a dirt road, and yet another to race on tracks like the Indy 500.

In order to achieve their basic functions under specific constraints, every device features some ***critical components*** that enable it to succeed. A car must feature an engine or motor, a transmission, axles and wheels.

☐ Consider the following prompt:

What is the most important device or machine in your life? It might be a car, a hairdryer, your oven, or anything you use every day. It might be something other people use like an airplane or a cash register.

☐ Choose a device or machine and write it down: _____

☐ Identify five functions of this device or machine:

1. _____
2. _____
3. _____
4. _____
5. _____

☐ Circle the most important basic function from the list above.

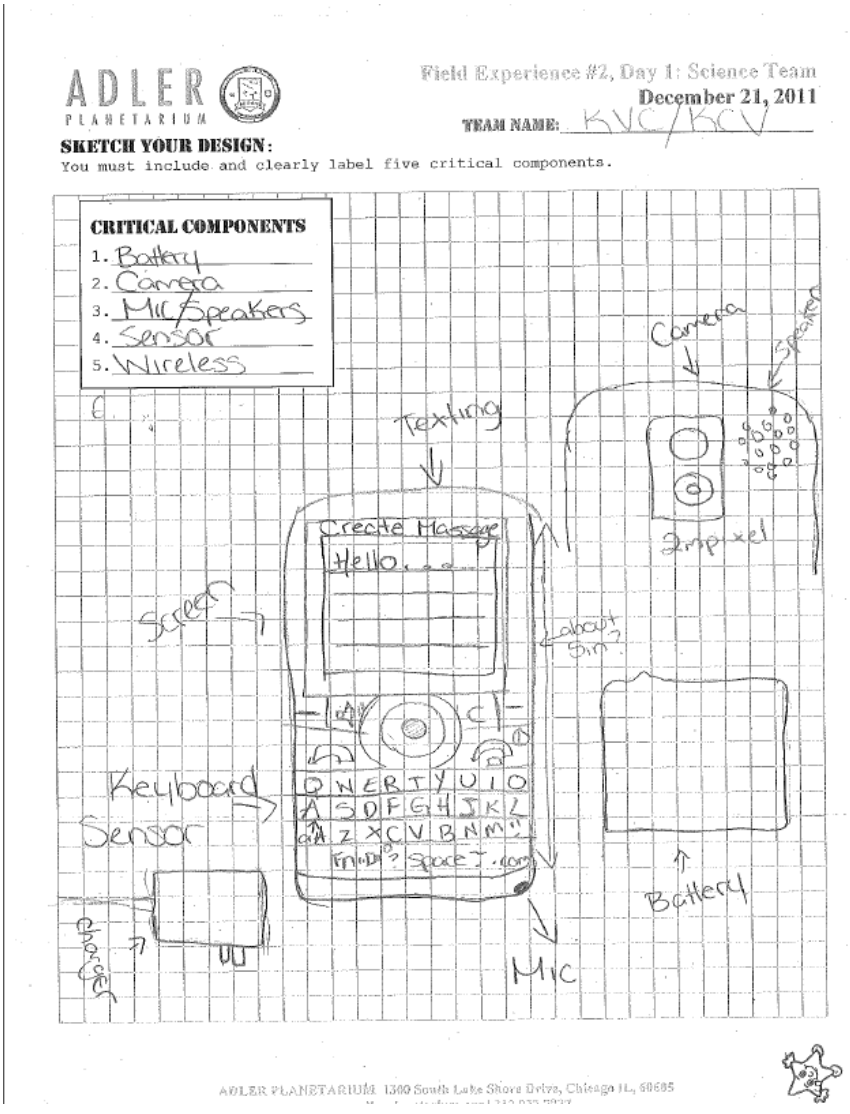
In Order to Complete Objective 2, Step 2:

☐ Using the graph paper provided on the next page sketch a model of your machine. The **R&D Manager** should complete the sketch.

1. **Include, draw and clearly label only five (5) critical components.**
   a. Make sure these are the most critical components!
   b. Your machine must be able to perform its basic functions with only the parts you've shown;
   c. A component can be a collection of things; wheels can count as a component, so can buttons.

2. **Indicate the approximate sizes of your whole machine and each component:**
   a. What is your scale?
   b. Be specific, use units like inches or feet.

3. **You must draw more than one perspective:**
   a. Draw it from above, below, the side, the front, the inside, etc. Example drawing:



SKETCH YOUR DESIGN:
You must include and clearly label five critical components.

CRITICAL COMPONENTS

1._____
2._____
3._____
4._____

Objective 3: Gather Materials

In Order to Complete Objective 3:

- ☐ Have your **Project Manager** take your sketch to the instructor to unlock the Rover Kit.
- ☐ Once you have the Rover Body and Manual, have the **R&D Manager** use the manual to collect all of the supplies that you will need to build the rover.

Objective 4: Review Instructions

In Order to Complete Objective 4:

- ☐ Have your **Project Manager** review the manual for instructions and important information.

Objective 5: Build the Rover

In order to complete Objective 5:

- ☐ Use the Rover manual to build **Project 1**.

MAKE SURE YOU: Place the base grid on the Rover body **AND LOCK IT** into position by turning the **hexagonal** alignment posts.

Objective 6: Control the Rover

In order to complete Objective 6:

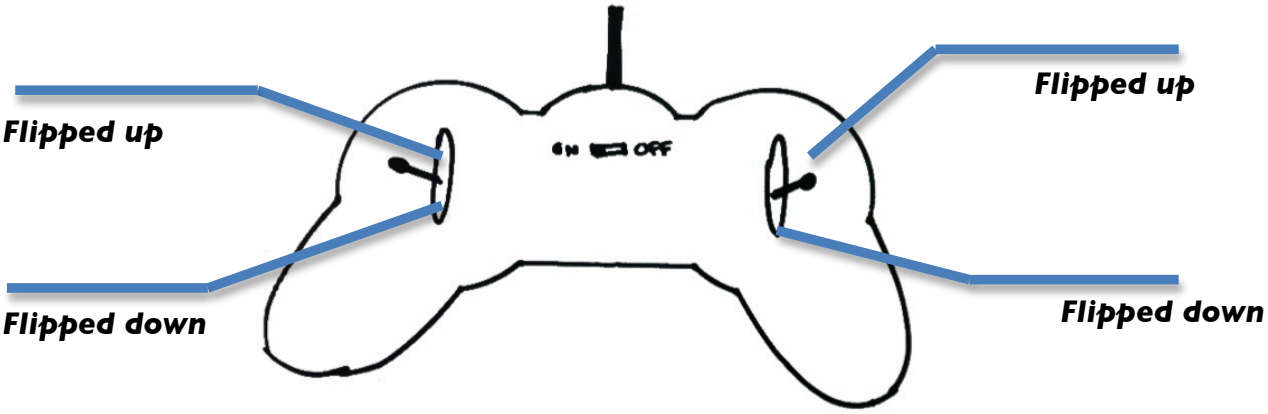
- ☐ Play with the Rover controls using the remote control.
- ☐ Fill out the following information to describe the controls:

What happens when you press the top left button of the remote control?
What happens when you press the top right button of the remote control?
What do you do to move the rover forward?
What do you do to turn the rover to the left?

Objective 7: Build a Backwards Rover

In order to complete Objective 7:

- [ ] Find **Project 4** in the manual.
- [ ] Build the Rover from Project 4.
- [ ] Fill in the diagram below to tell us how the remote controls this new Rover.



Objective 8: Compare the Controls

Objective 8 Responsibilities:

- [ ] The Project Manager should:
  - Make sure all materials are accounted for
- [ ] The R&D Manager should:
  - Return all supplies.
- [ ] The Project Manager should:
  - Post the team's results online.

In order to complete Objective 8:

- [ ] Discuss the difference between the two rovers you created.
- [ ] Have your **PR Manager** construct an online post detailing what type of job these rovers might be suited for.
- [ ] Clean up your workspace and supplies.