Roving Into 3D Design

**Name**:

**Date**:

**Lesson Title**: Roving into 3D Design

**Subject**: Science/Art/Technology

**Objective:**

Students will be able to design a model of a 3D rover, using CAD software.

Students will be able to identify parts and features useful on a rover that explores other planets.

**Background Knowledge:**

This lesson is most effective when ran after at least one other lesson about rovers. Typically, I do a lesson talking about the types of rovers and showing then the existing Mars and past Moon rovers.

**Introduction:**

Start by having students call back to their prior knowledge by asking the question: **How can rovers help explore areas humans can’t get to?** Have students share their answers with the class or with a partner.

**Lesson Procedure:**

**I Do/We do:** Tell students that today they will be learning about the parts of Mars rovers and what goes into the design of a rover.

Ask students: **What is the mission of rovers on other planets?** Have students share their thoughts with a partner or with the class.

Explain that rovers have a variety of objectives. In the case of Curiosity, the mission is to determine if Mars ever was habitable to microbial life. Opportunity, meanwhile, was sent to search for signs of past life, and aided in the discovery that Mars had areas which stayed wet for long periods of time in the past. If each rover has a mission, they will need specialized equipment to complete that mission.

As students to think or write down: **What parts would most rovers need to complete a mission?**

Discuss as a class the parts needed. Explain that current rovers usually have specialized wheels, a power source, cameras, and other data collection equipment.

Tell students that today they will use 3D design to create a model rover with the parts you discussed. If students have never done 3D design before, take a few minutes to model how to use TinkerCAD.

Review the design requirements for the project with students. These can be scaled up or down depending on your class by adding to how many parts their rover must include. Suggested requirements are: Designs must have wheels, power source, camera, and one other data collection device (like a robotic arm).

**Lesson Continued:**

**You Do:**

Allow students to start designing. During this time, monitor student work as they 3D design their rovers. During the work time, it can help to have students pause on occasion and do the following:

* Show your design to a partner. Explain what feature you are working on.
* Take a look at a real Mars Rover. Are there parts you can add to make yours like the real deal?

When students are done, encourage them to add extra details using the color feature in TinkerCAD. Allow ample time for students to experiment with their designs and create their model rovers.

When class is almost over, have students sign out. The designs should auto-save, but you can also force a save by clicking on the TinkerCAD logo.

**Closing**: Have students share with a partner: **How will the parts they include on their rover help the rover have a successful mission when exploring another planet?**

**Extensions:**

-If you have 3D printers, you can have students 3D print their rovers. This is a good time to introduce and/or review lessons on 3D printing.

-Students can add more details and label the parts of the rover on a print out.

-Have students model an existing Mars rover. Once done, students can then complete a research project and presentation about that rover.

-Creative writing: What would the rover’s first week on Mars/the Moon look like?

**Supplies needed:**

-Computer

-Internet Access

Notes:

**Differentiation**:

-Depending on the age range and level of your class, you can require more or less parts to be added to the rover.

-Students in lower grade levels can use pre-made parts in Tinkercad, such as wheels and solar panels.

-Students at higher levels can attempt the assignment in more complex 3D modeling software, such as the free version of SketchUp (<https://www.sketchup.com/plans-and-pricing/sketchup-free>)