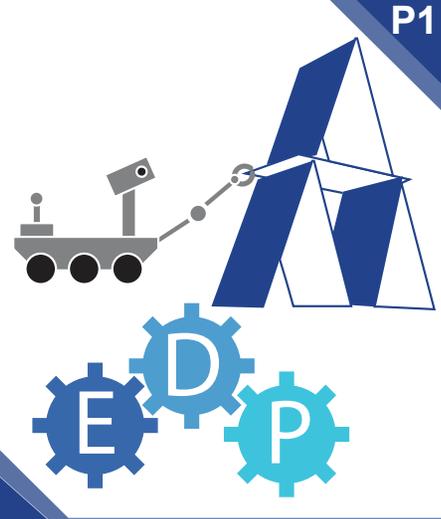


Learning Progression Prep Activities

P1



**What is Engineering?
Engineering Design Process**

Purpose

Youth engage in an engineering design challenge. Introduces an Engineering Design Process (EDP), criteria, constraints.

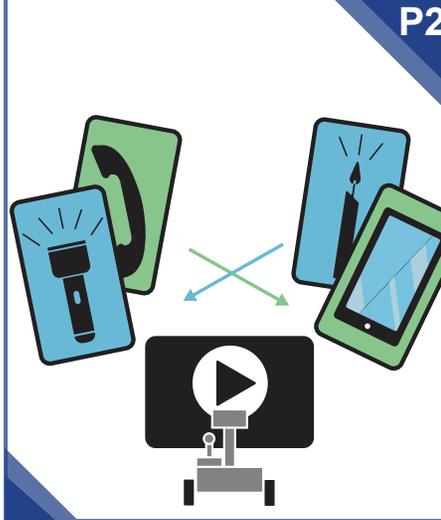
Key Take Away

We can use an EDP to solve problems. We are engineers.

Engineering Reflection

Today we used an EDP to solve problems with criteria and constraints just like engineers.

P2



**What is Technology?
Technology Solves Problems**

Purpose

Youth consider the definition of technology as any thing humans (engineers) design to solve a problem. The Special Report Video sets the context for the entire unit.

Key Take Away

We can design remote sensing technology to help scientists gather information from a distance.

Engineering Reflection

Today we investigated how engineers and scientists collaborate to design and improve technologies to solve problems.

Learning Progression Engineering



Looking Beyond Properties of Light

Purpose

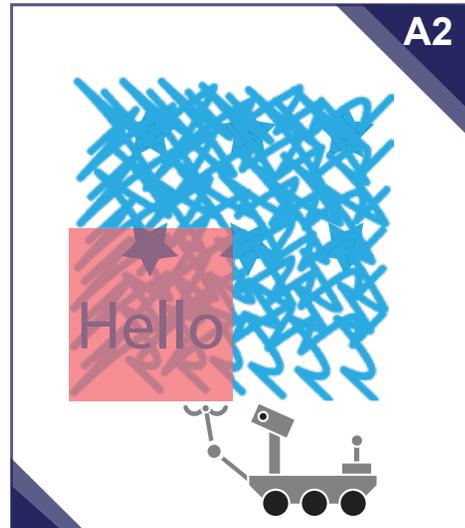
Youth use multiple mirrors to see around obstacles and create hand-held periscopes.

Key Take Away

We can use mirrors to see objects from a distance and around obstacles.

Engineering Reflection

Today, we investigated the properties of light with mirrors. Scientists and Engineers use mirrors as a remote sensing technology to collect information from a distance.



Secret Messages Color Filters

Purpose

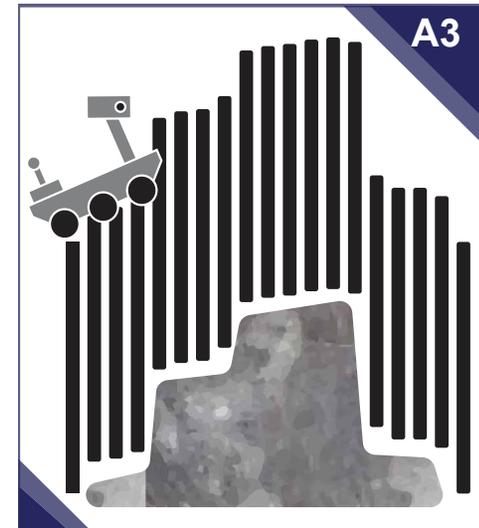
Youth explore how different colored filters work to hide or highlight other colors.

Key Take Away

We can use different filters to highlight different colors.

Engineering Reflection

Today, we investigated color filters. Scientists and Engineers use filters as a remote sensing technology to absorb light which highlights or hides information.



Taking Shape Topography

Purpose

Youth use straws as a model for LIDAR and record information about a surface. Youth discuss limitations of the model.

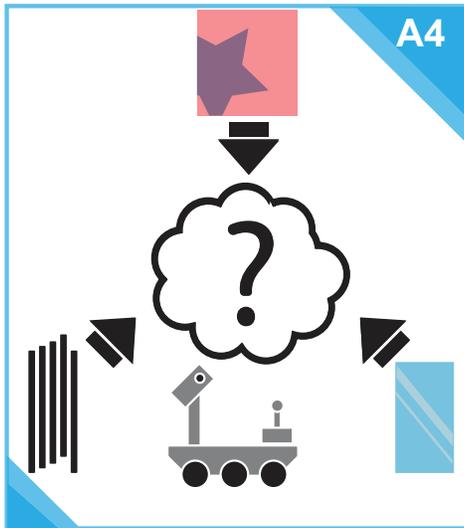
Key Take Away

We can determine the general shape and height of objects on a model surface using straws.

Engineering Reflection

Today we created, investigated, tested and improved model LiDAR devices. LiDAR is a remote sensing technology that uses light to determine the shape of a surface.

Learning Progression Engineering



Create a Device Invent Technology

Purpose

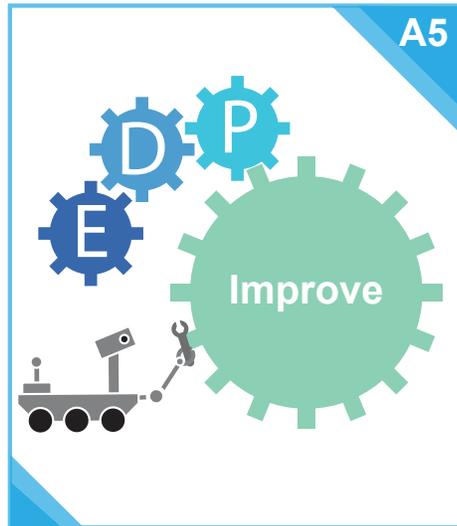
Youth apply what they have learned so far to design remote sensing devices to answer a question posed by a scientist.

Key Take Away

We can design remote sensing technologies as engineers to get information about a mystery moon from a distance.

Science Reflection

Today we used data from prior investigations to imagine, create and test how well our remote sensing technologies gather information.



Improve Improve Technology

Purpose

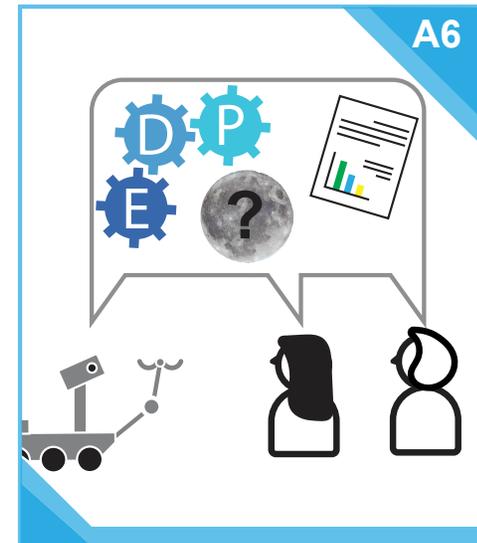
Youth improve their device, decide how to display the data, and make a recommendation to the scientist.

Key Take Away

We can improve remote sensing technologies.

Science Reflection

Today we improved technologies to get data we can now display in a visual way so others will understand it.



Engineering Showcase Communicate

Purpose

Youth prepare a final presentation. They recommend a site using the data they have gathered as evidence.

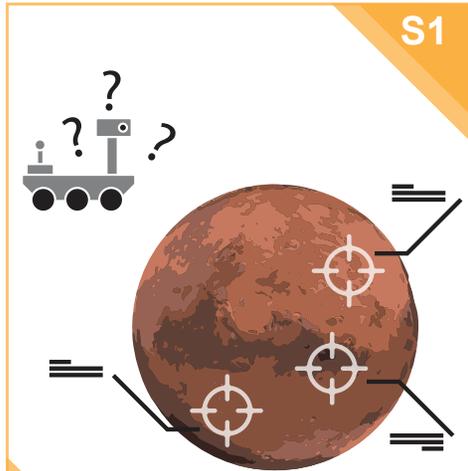
Key Take Away

We can communicate our recommendations based on the data we collected with our remote sensing technologies.

Science Reflection

Today we communicated our recommendations to the scientists. The EDP is a process we can use to solve other problems.

Learning Progression Science



S1

Remote Sensing & Mars Exploring Visual Images

Purpose

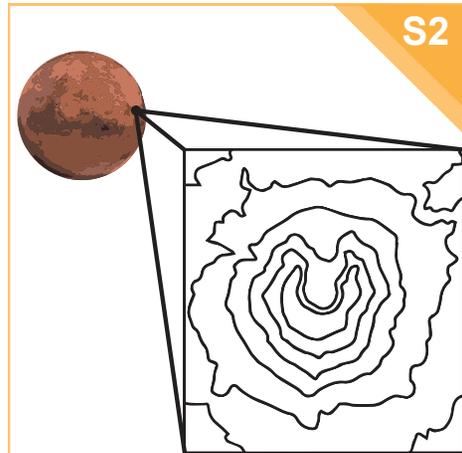
Youth use images of Mars to find a landing site for a rover of scientific interest to NASA that may indicate past water.

Key Take Away

We can identify landforms in remotely sensed images of Mars that might indicate evidence of past water.

Science Reflection

Today we investigated remotely sensed images to find landforms on Mars that indicate water. These reveal evidence that Mars once had water on its surface.



S2

Landing Site Topography Exploring Topographic Images

Purpose

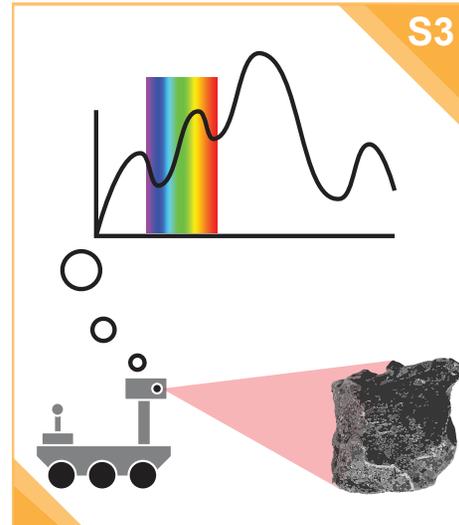
Youth compare topographic features of four potential landing sites.

Key Take Away

We can use topographic maps created with remote sensing technology (LiDAR) to determine the shape and height of the terrain on Mars.

Science Reflection

Today we investigated topographic maps created with LiDAR. These reveal the shape and height of landforms.



S3

Mineral Fingerprinting Exploring Spectroscopic Graphs

Purpose

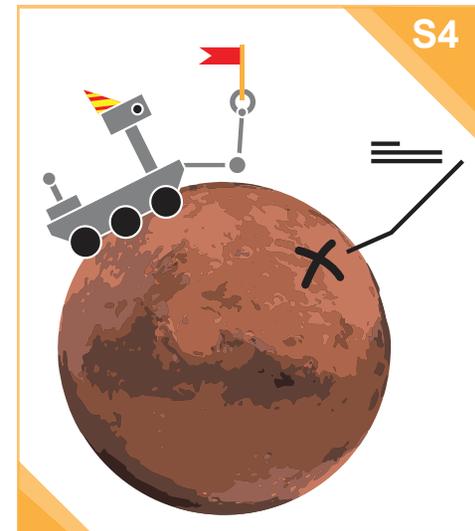
Youth identify minerals that indicate past water or volcanism.

Key Take Away

We can identify minerals on Mars by looking at graphs of the light they reflect created by remote sensing technology (spectrometers).

Science Reflection

Today we investigated spectral graphs for minerals that indicate past water. Spectral graphs reveal different minerals because of how they absorb and reflect light.



S4

Choose a Landing Site Evaluating Data

Purpose

Youth combine all data to recommend the safest, most interesting landing site.

Key Take Away

We can use data gathered from remote sensing technology to recommend the safest, most interesting landing site.

Science Reflection

Scientists often use multiple sources of data to make claims or decisions. Engineers and scientists work together to solve problems.