

## 6<sup>th</sup>-Grade Science

### Earth & Space Science

- Igneous, metamorphic & sedimentary rocks
- Soils – uses

#### Makerspace Ideas

- Measure soil characteristics and properties
- Compare & contrast rocks and minerals
- Rock store display
- Ohio Dept Nat. Resources or US Geological Survey – rock examples
- Geology.com – testing minerals
- Analyze soil samples

### Physical Science – Matter & Motion

- Kinetic & potential energy linear motion
- Objects in motion – speed and direction

#### Makerspace Ideas

- Evaluate ration of helium to air in party balloons
- Design and build a system that uses water to cause a wheel to turn. Evaluate the designs from the class to determine which design features are most effective. Redesign the water wheel to incorporate best design practices.

### Life Science – Cellular & multicellular

- Cell theory

#### Makerspace Ideas

- Build a model of a plant or animal cell and explain how the cellular structures and their functions contribute to the survival of the cell.

[www.learner.org/resources/series116.html](http://www.learner.org/resources/series116.html) videos and interactives

Note: Models, demonstrations, and experiments created by students could be displayed outside the makerspace. They could also be presented at the Starry Night event in April. This could be an opportunity for classroom teachers to show the community what is being learned in the classroom.

Maybe each grade could work on a year-long project or model (representing the yearlong curriculum) to present at Starry Night? This year's Starry Night theme is: "Where Arts and Science Meet: Fueling Imaginations".

# 7<sup>th</sup>-Grade Science

## Earth & Space Science

- Cycles and patterns of Earth and the Moon
- Earth's hydrologic cycle/oceanic currents
- Thermal energy and the currents
- Position & movement of Earth, sun and moon

### Makerspace Ideas

- Build a model to represent a cross section of Earth's surface (soil, rock, surface, ground water) that can enable investigation of multiple water pathways. Explain and demonstrate to the class.
- Design and conduct an experiment using 3-D modeling, drawing or technology to represent the factors that must exist for a full or partial solar or lunar eclipse. Use actual data to create the model. Present with detailed explanation to the class.
- Make a chart or graph that illustrates moon phases, Earth's rotation, sun position and resulting tidal data for one month. Include specific data about

- USING SNAP CIRCUITS - Plan and implement a scientific experiment to investigate the amount of electric current flowing through different positions of both series and parallel circuits. Analyze the data for series circuits to determine patterns and trends.

## Physical Science

- Conservation of Mass & Energy
- Arrangement of atoms on Periodic Table of Elements
- Transformation & transfer of energy

### Makerspace Ideas

- Design packaging (using various types of materials) for an egg that will allow it to drop from a considerable height without breaking. Organize and communicate resulting data in multiple formats.
- Design and construct a roller coaster so that a marble will travel over a track that involves at least three hills.
- **OR FOR STARRY NIGHT – BUILD AS A CLASS OR WHOLE GRADE:**

<http://www.paperrollercoasters.com/gallery.htm>

- Design and construct a machine that performs a simple task in many steps. Use materials that are lying around the classroom and the home. Test the machine as each additional component is added. Redesign to solve problems encountered during the testing. Record any problems encountered as well as the changes made to the machine to overcome these problems.
- OldSkool Skateboard people come for a visit – students Graphically represents the energy of the skateboarder during a run.

## Life Science

- Cycles of matter and flow of energy
- Impact of matter and energy transfer within the biotic component of ecosystems.
- In any particular biome, the number, growth and survival of organisms and populations depend on biotic and abiotic factors.

### Makerspace Ideas

- Trace and explain how matter and energy are transferred through an ecosystem.

### Resources

Cove Forest & Salt Marsh Interactives

<http://www.knowitall.org/sclife/>

Biomes and Ecosystems (Map, photos, videos, lesson) – OTHER TOPICS AS WELL

<http://www.windows2universe.org/earth/ecosystems.html>

6-Question online quiz with certificate (Schoology?)

<http://www.proprofs.com/quiz-school/story.php?title=about-ecosystems>

<http://www.attheworks.org/files/documents/Polymer%20Lesson%20Plan%205th%20grade.pdf>

# 8<sup>th</sup>-Grade Science

## Earth & Space Science

- Physical Earth – Earth’s interior, seismic waves
- Earth’s crust – tectonic plates
- Geological processes, record

### Makerspace Ideas

- Design and build a model of an earthquake-resistant structure (e.g., bridge, building, home). Draw a blueprint of the plan or design. Provide data to validate the choice of design. Test results using a shake table or another quantifiable measuring device.
- Put together a model of karst topography enabling a 3-D view of a cave or sinkhole. Research the processes that must occur to form karst topography. Communicate the research in writing or orally

<http://www.usgs.gov/education/animations/karst97-536/karst.pdf>

## Physical Science

- Forces and Motion
- Forces between objects
- Forces have magnitude and direction
- Different types of potential energy

### Makerspace Ideas

- Design/Build catapults

<https://www.youtube.com/watch?v=UyyPhkYQn1U&feature=youtu.be>

<http://makeitatyourlibrary.org/play/easiest-mini-catapult-ever#.Vi0doberTIU>

- Design and build a prototype of a device that can be attached to a crane to lift and move cars made of iron. The force of attraction lifting the car must be able to be released to deposit the cars in the desired location. Test the designs of different groups in the class to determine which design can lift the largest mass.
- Use an energy bar graph to show different types of energy (gravitational potential, elastic potential, kinetic energy) for a stretched rubber band that is launched straight up into the air. Show bar graphs for five different positions: before launching,  $\frac{1}{4}$  the way up,  $\frac{1}{2}$  the way up,  $\frac{3}{4}$  the way up, and at the top of its path.

## Life Science

- Species and Reproduction
- Fossil records
- Inherited traits

### Makerspace Ideas

- Create a model timeline that represents the relative ages of fossils of a particular organism in sedimentary rock layers.
- Create a double-helix DNA model out of recyclable materials and present to the class.

<http://craftsncoffee.com/2015/04/24/science-fair-salvation-how-to-make-a-double-helix-dna-model/>

## Other Makerspace Experiments:

Cola-Can Battery <http://makeitatorylibrary.org/technology/cola-can-battery#.ViOd9berTIU>

Inexpensive Mini Turbine <http://makeitatorylibrary.org/outside/inexpensive-mini-turbine#.ViOeqrerTIU>

Lego Gyroscope <http://makeitatorylibrary.org/play-technology/lego-gyroscope#.ViOfA7erTIU>

Slingshot Rockets <http://makeitatorylibrary.org/play/teach-engineering-slingshot-rockets#.ViOfOLerTIU>

Marble Machines Board <http://makeitatorylibrary.org/workshop-play/marble-machines-board#.ViOfLerTIU> (My husband could make the peg board/frame and the students could create their own contraption using wooden pegs and miscellaneous supplies/materials in the makerspace).

Simple Sail car <http://makeitatorylibrary.org/play-technology/simple-sail-car#.Vi0gprerTIU>

4-Wheel Balloon Car <http://makeitatorylibrary.org/play/make-your-own-4-wheel-balloon-car#.Vi0g0LerTIU>

Water Rocket <http://makeitatorylibrary.org/outside-play/water-rocket#.Vi0g-7erTIU>

Solar Powered Robot from Trash <http://makeitatorylibrary.org/technology/solar-powered-robot-trash#.Vi0h1rerTIU>

Fun Circuits with Conductive Paint <http://makeitatorylibrary.org/technology/fun-circuits-conductive-paint#.Vi0iFberTIU>

Pop Bottle Greenhouse <http://makeitatorylibrary.org/outside/pop-bottle-greenhouse#.Vi0iWrerTIU>

How to make an Electromagnet <http://makeitatorylibrary.org/technology/how-make-electromagnet#.Vi0ip7erTIU>

Easy Rubberband Car <http://makeitatorylibrary.org/play/easy-rubberband-car#.Vi0iyberTIU>

Propeller-Powered car <http://makeitatorylibrary.org/play/propeller-powered-car#.Vi0i-LerTIU>

Duct tape compass <http://makeitatorylibrary.org/living/duct-tape-compass#.Vi0jJLerTIU>

Ferrofluid (magnetic) in Five Minutes <http://makeitatorylibrary.org/play/make-your-own-ferrofluid-5-minutes#.Vi0jcLerTIU>

Viking Catapult <http://makeitatorylibrary.org/outside-play/diy-viking-catapult-bamboo-skewers#.Vi0kVLerTIU>

Solderless Bristle Bot <http://makeitatorylibrary.org/play-technology/big-3-solderless-bristle-bot#.Vi0lCrerTIU>

Solar Cockroach VibroBot <http://makeitatorylibrary.org/technology/solar-cockroach-vibrobot#.Vi0IRLerTIU>