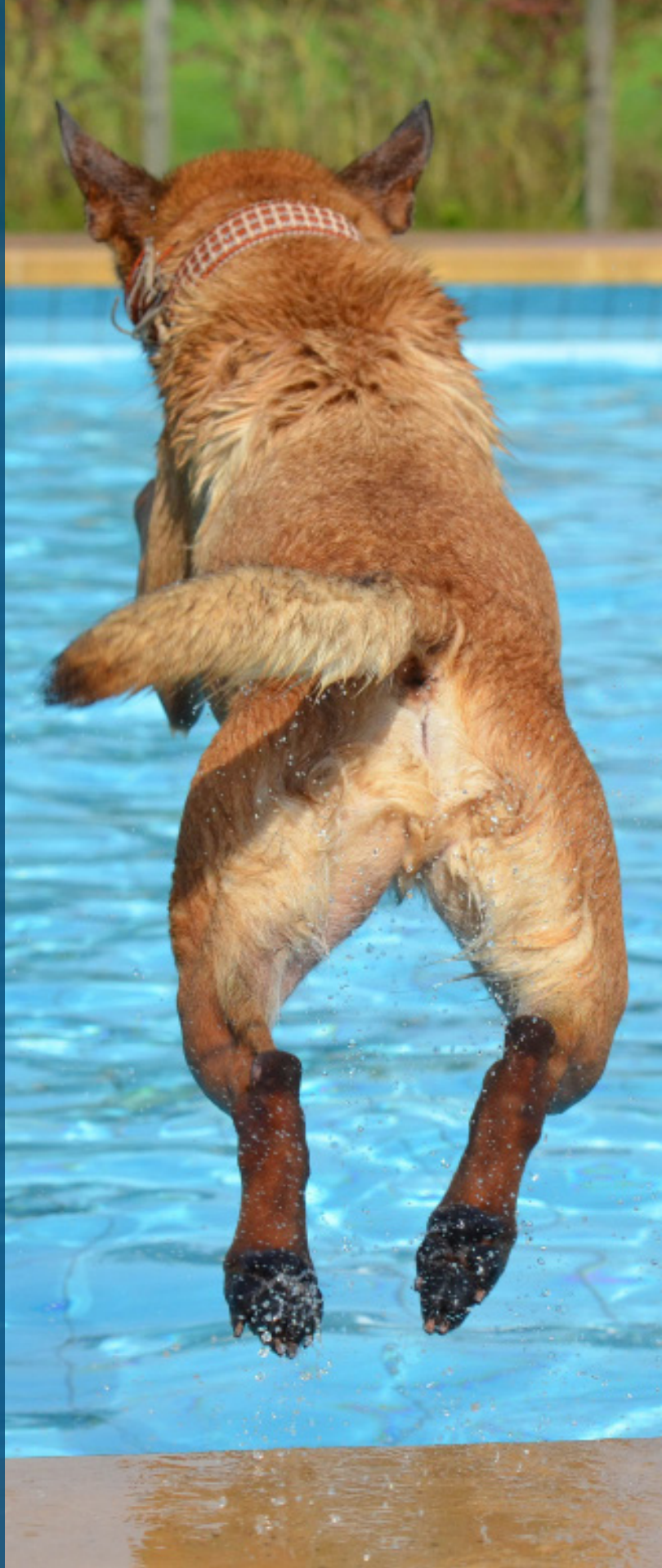
SUMMER SCIENCE Activities for Kids!

Dive into

four projects that turn boring into BRAINY



nomad press

Books to Inspire Learning

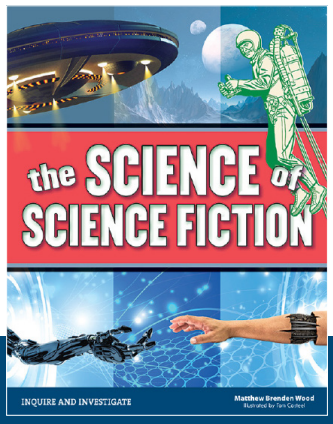
Fun Stuff for Kids To Do This Summer!

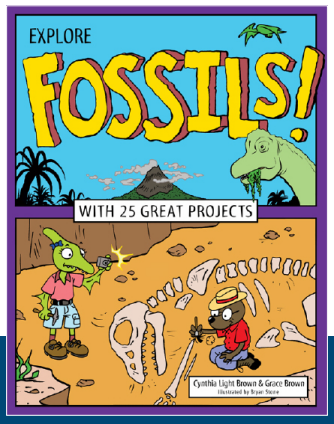
Ah, summertime. . . the season of hot days, trips to the cool pool, hours spent swinging in the hammock, and that never ending complaint that arises from children everywhere: “I’m bored!”

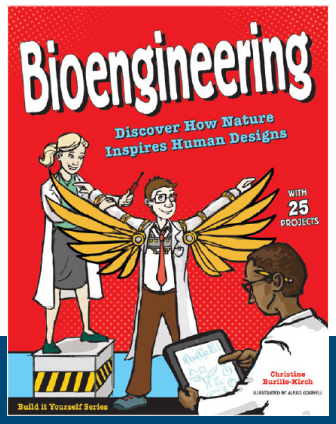
Maybe not every kid gets bored during the summer months, but most do, and when that happens it’s always useful to have a plan. Science activities that kids can do at home with minimal adult supervision are a terrific part of any summertime plan.

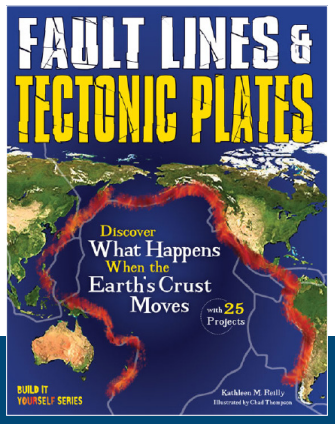
In this ebook, you’ll find four fun, fascinating, educational projects from the Nomad books shown below. You’ll also find an excerpt from a riveting, edge-of-your-seat nonfiction book from Nomad Press called *Great Escapes: Real Tales of Harrowing Getaways.* Have fun!

Interested in finding more activity ebooks from our resource library? Check out this webpage! nomadpress.net/resources/library









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Measure the Speed of Light - With Chocolate!

SUPPLIES

- microwave
- bar of chocolate
- ruler
- calculator

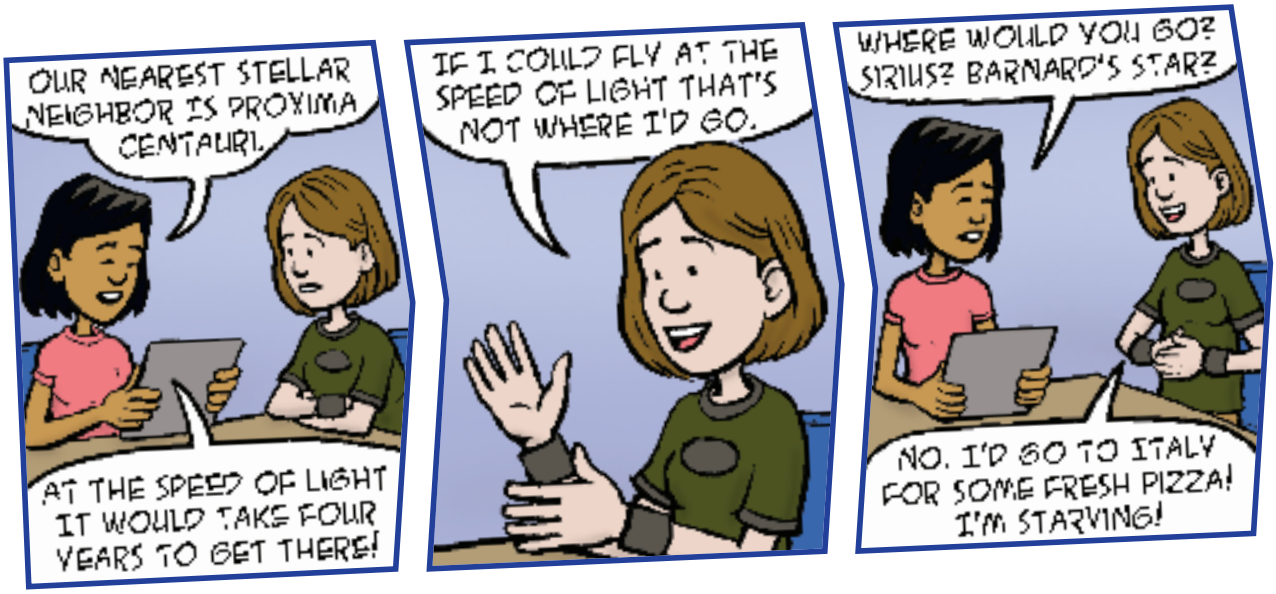
Einstein showed that nothing can travel faster than the speed of light, which is an incredible 186,282 miles per second or 299,792,463 meters per second. But you don't need to be Einstein to measure the cosmic speed limit, you just need a microwave and some chocolate! Sweet!

Microwave ovens use microwaves to heat food. Microwaves are a kind of electromagnetic radiation, like light waves and X-rays. All electromagnetic radiation travels at the speed of light, and if we measure the speed of the microwaves, we've measured the speed of light!

- **Prepare your microwave.** If your microwave has a rotating plate inside, remove it and put a microwave safe plate upside-down on the rotator. You want the chocolate to stay put.

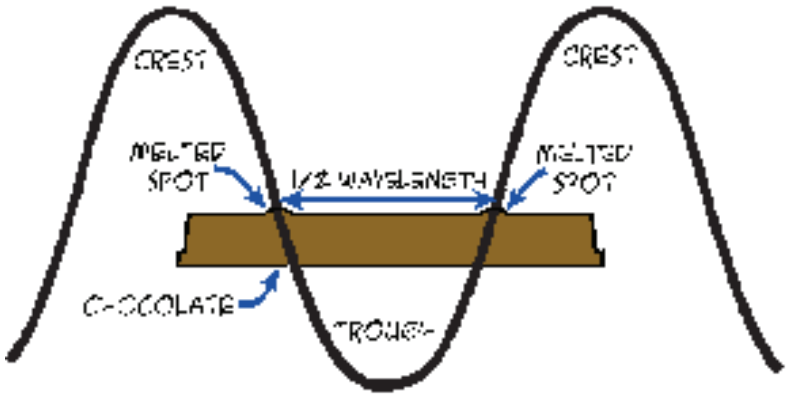
- **Prepare your chocolate.** Unwrap a bar of chocolate and place it at the center of the plate. It doesn't need to be covered. Don't eat it!

- **Nuke it.** Heat the chocolate until you see two or three spots begin to melt. This should take no more than 20 seconds. When finished, let the chocolate cool for 1 or 2 minutes.



Measure the Speed of Light (continued)

- **Measure the chocolate.** Once it's cooled off, remove the plate and chocolate from the microwave. Using a ruler, measure the distance between the melted spots in centimeters, and convert it to meters by dividing by 100.



- **To calculate the speed of the microwaves, we need to know their wavelength and frequency.** Light travels in waves, and the distance between the melted spots of chocolate is half of a wavelength. So we need to multiply your measurement by 2 to find out the wavelength.

- **Next, we need to know the frequency of the microwave, or how quickly the wave moves up and down per second.** Most microwaves work at a frequency of 2.45 gigahertz, which means the waves move up and down 2.45 billion times per second! Have someone check your microwave's manual or label to make sure this is the frequency of your microwave.

- **Calculate the speed of wave.** Finally, we can calculate the speed of the wave by using this formula: Speed of wave = wavelength x frequency

- **Your answer will be in meters per second.** How does it compare to the speed of light?

To investigate further, research other ways people have measured the speed of light. Are there other ways you could do it at home?

DID YOU KNOW? Light can circle Earth more than seven times in one second, more than a million times faster than a passenger plane.

Play Nanobot Soccer

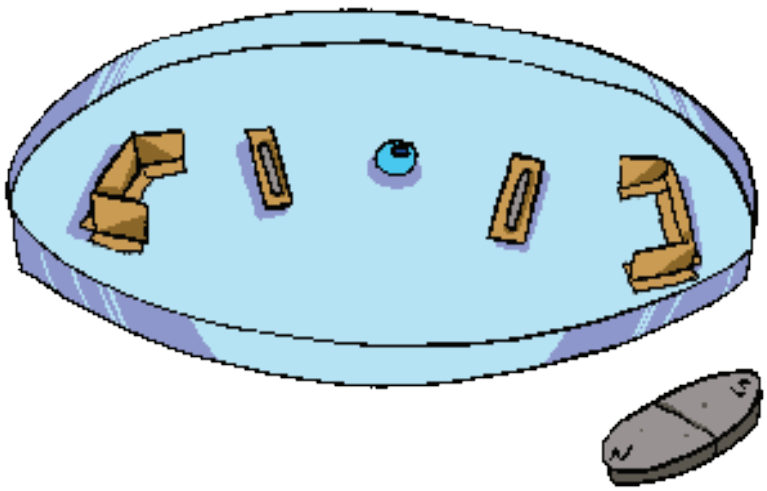
Researchers at the National Institute of Standards and Technology built a soccer stadium the size of a grain of rice and tiny nanobot soccer players. In this activity, you'll build a soccer stadium that is gigantic compared to the playing field that hosts the yearly nanobot soccer tournaments.

SUPPLIES

- yogurt or coffee container lid
- masking tape
- stapler
- bead or kernel of rice
- magnets
- corrugated paper
- sandpaper

- **Clean off a yogurt or coffee container lid.** Make two goals on the opposite sides of the lid with masking tape. Tear off a piece of masking tape, fold it slightly lengthwise in the middle, but do not tape the ends together. Place the sticky ends of the masking tape on the lid to make a ridge. Do this three times until you have made a goal. Complete the same process on the opposite side of the lid.

- **Tear off 1 inch of masking tape and fold over once.** Continue to wrap the tape around itself until you have made a small rectangle, only slightly larger than a staple. Place a staple in the middle of the tape piece with a stapler. This is your soccer player. Prepare a second tape soccer player if playing with a friend. Use a bead or grain of rice as your soccer ball.



- **With magnets underneath the lid, guide your tape soccer players around the stadium.** What happens if you use a piece of corrugated paper or sandpaper instead of the lid? Does the magnet move the player around as easily? Why or why not?

- **Make a maze out of masking tape.** Remember to set a goal and design a prototype first. Try to get your player from one side of the maze to the other. Scientists might use magnets to get nanobots containing medicine to the correct location in the body. What are some other ways to use magnets to improve the health and well-being of sick or injured people?

Watch a nanobot soccer tournament at this website: www.nist.gov/public_affairs/factsheet/nanosoccer.cfm

Make an Underwater Volcano

SUPPLIES

- tea candle or small chunk of wax
- glass, heat-safe beaker
- sand
- water
- hot plate or electric burner

About 80 percent of the earth's volcanoes occur underwater! How are these different from volcanoes on land? Now you can get a sense of what they look like in action!

Caution: Ask an adult for help with this project.

- **If you're using a tea candle, pop the candle itself from the little metal holding container.** You don't need the wick.
- **Place the candle or wax chunk in the bottom of the heat-safe glass beaker.** Try to place the piece as close as you can to the very center of the beaker and try not to tip the beaker, so the candle doesn't slide once you've placed it.
- **Gently and slowly pour the sand over and around the chunk of wax or candle.** Again, you want to be sure you don't shift the location of the wax. Completely cover the wax chunk while keeping the sand lower than one-third of the way up the beaker's sides.
- **Very slowly pour water over the sand until the beaker is about three-quarters full.** You want to be sure you cover all of the sand completely, and also allow some extra room for just water on top of that, otherwise you won't see the volcano erupting very clearly. Don't fill the water too close to the top of the beaker, because if it starts bubbling, you don't want it all to spill out and make a mess.
- **Place the beaker on a burner or hot plate.** Have an adult turn on the heat to about medium-high and watch closely. What happens? What do you see? How is this similar to what an underwater volcano looks like?

Make a Sedimentary Treat

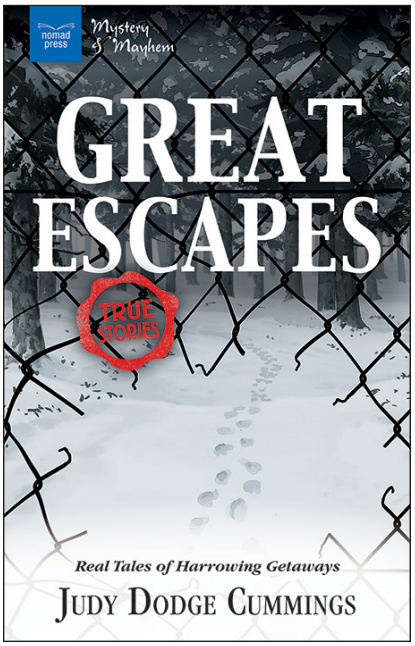
SUPPLIES

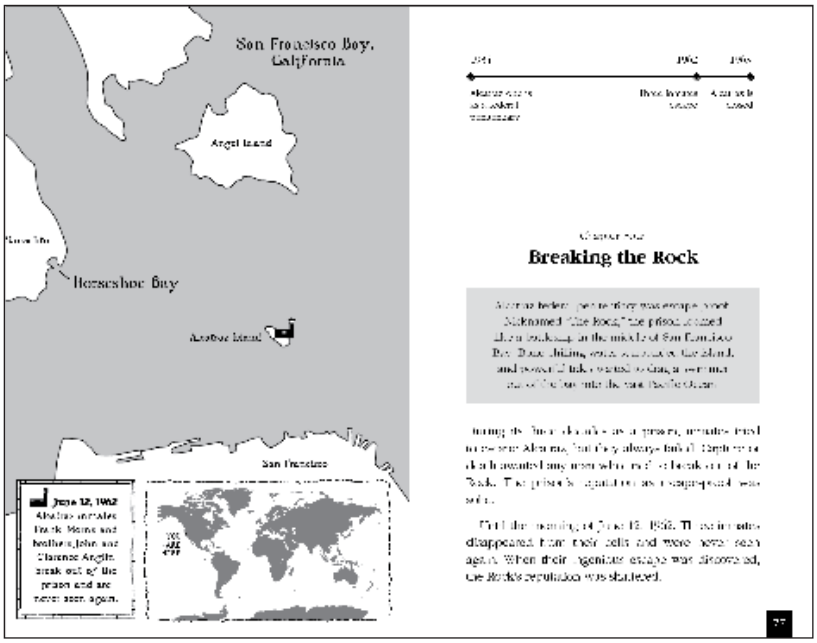
- clear plastic cup
- M&Ms, chocolate chips, and candy bars broken into different size pieces
- Rice Krispies cereal
- Oreos or other similar cookies, crushed into fine pieces
- spoon
- milk

Sedimentary rocks are sometimes made up of different layers that form in different environments. Over millions of years, the sea level rises and lowers, creating different environments in the same place. Use your imagination and yummy ingredients to make a sedimentary rock you can eat!

- **Imagine you are standing in a river that flows into the ocean.** The river contains pebbles, gravel, sand, and mud that are deposited near where you are standing.
- **In the bottom of the cup, place a layer of large and small pieces of candy bars, chocolate chips, and M&Ms.** This represents different-sized sediments from a river.
- **Imagine the sea level rises and now you're standing on a beach.** What are you standing on? Put a layer of Rice Krispies into your cup to represent sand.
- **Imagine the sea level rises again.** You're still in the same place, but 10 feet underwater! Put a layer of crushed Oreos in the cup. to represent the mud that settles at the bottom of the ocean.
- **Imagine the sea level goes down, then goes down again.** Put a layer of Rice Krispies in the cup to represent beach sand, then a layer of large and small pieces of candy, chocolate chips, and M&Ms to represent the river sediments.
- **Press down the layers in your cup to represent the compression from the weight of sediments.** Pour milk into the cup to represent water with minerals that cements sediments together into rock.
- **Look at the layers from the side.** You should see rocks on the bottom, then sandstone, then mudstone, then sandstone, and rocks on top.
- **Now dig in!**

Read a Sneak Peek!





Sometimes, an intolerable situation calls for a drastic measure—fleeing for freedom. Whether you're a slave seeking freedom to the North or a convict swimming for your life in a shark-infested canal, the urge to be free drives your every move. In *Great Escapes: Real Tales of Harrowing Getaways*, readers ages 9 to 12 meet five ingenious fugitives and freedom seekers who all shared one common goal: escape.

Chapter Four - Breaking the Rock

Alcatraz federal penitentiary was escape proof. Nicknamed the Rock, the prison loomed like a battleship in the middle of San Francisco Bay. Bone chilling water surrounds the island, and powerful tides waited to drag a swimmer out of the bay into the vast Pacific Ocean. During its three decades as a prison, inmates tried to escape Alcatraz, but they always failed. Capture or death awaited any man who tried to break out of the Rock. The prison's reputation as escape proof was solid.

Until the morning of June 12, 1962. That's when three inmates disappeared from their cells and were never seen again. When their ingenious escape was discovered, the Rock's reputation was shattered.

One misty morning in April 1954, a prison boat slid alongside the dock on Alcatraz Island. From the balcony of the staff apartment building, the guards' wives watched new inmates disembark. A short, wiry man hobbled down the gangplank, his legs and wrists chained.

Alan West was a veteran of prison life. This car thief had served nine years in prison by his 25th birthday and had made several escape attempts. The prison officials who transferred him to Alcatraz were convinced he would never find a way off the Rock. But from the moment West set foot on the island, he was looking for a way out.

As a bus drove the new inmates from the dock to the cell house, West studied the layout of the prison grounds. Four guard towers eyed inmates from all directions. In front of the three-story cell house was a recreation yard surrounded by a cement wall topped by barb wire. North of the rec yard was the industry building where inmates manufactured gloves, clothing, and brushes.

At the cell house, West's chains and cuffs were removed and he was issued a uniform. A long corridor called Broadway cut the cell house in half. Three tiers of cells lined each side. These were cell block B and cell block C. At each end of Broadway, a gun gallery ran the length of the building. Armed guards stationed in these ceiling-level observation decks overlooked the entire cell house.

Alcatraz Island
photo credit: Christian Mehlführer

Initially a military fort, Alcatraz could house 500 inmates. However, it never held more than 260 people. Cell block A, located on the far side of B block, was empty. D block, better known as "seg," was reserved for troublemakers.

An officer locked West in his cell and tossed him a rule book. The cell was stark. A cot, sink with one faucet, toilet, and a desk riveted to the wall were his new home. If West stood in the middle of the room and held his arms out, his fingers could touch both walls.

West hated Alcatraz. Bells or whistles signaled inmates to stand for a cell count, go to meals, report for work, or go outside. Talking was banned except at certain times. Everything in a prisoner's cell had an assigned place, even the soap.

During the next two years, West questioned old timers about previous escape attempts. There had been 10 attempts since the prison opened in 1934. Inmates had tied tin cans to their waists as floatation devices. They had disguised themselves as army officers. They had stormed guard towers, attacked guards, climbed the fence, and swam for the mainland. All efforts had failed.

But West was not discouraged. He just needed the perfect plan.

Find what happens when Alan West tries to escape Alcatraz in
Great Escapes: Real Tales of Harrowing Getaways!

Buy the book at nomadpress.net/nomadpress-books/great-escapes

READ!

Wonderopolis: Lots of kids' questions answered in fun ways!
http://wonderopolis.org/

A selection of stories for middle schoolers
https://teachingelawithjoy.com/10-favorite-short-stories-for-middle-school-found-online/

WATCH!

The Kids Should See This: Super cool short videos kids (and adults) will love!
http://thekidshouldseethis.com/

MinutePhysics: Cartoon science explanations!
https://www.youtube.com/user/minutephysics

DO!

NASA Earth: Some fascinating views of the planet we call home.
https://www.nasa.gov/topics/earth/index.html

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