Temple Emanu-El

Jewish Family Projects

Spaghetti Bridges Engineering project

"The whole world is a very narrow bridge, and the most important part is not to be afraid." -Rabbi Nachman of Bretzlav

https://youtu.be/Pp9U6lyoIqg Dyson engineering video

This is a cool educational project, but why is this Jewish?
This educational project is brought to you in honor of Joseph Strauss the Jewish chief engineer who designed the Golden Gate Bridge. His statue can be seen on the San Francisco side of the bridge. 1870-1938 this year is the 150th anniversary of his birth.

Joseph Strauss was born in Cincinnati, Ohio, to a family of German-Jewish ancestry, He graduated from the University of Cincinnati in 1892. He served as both class poet and president. Strauss graduated with a degree in civil engineering.

Joseph Strauss had many hobbies. One of these included poetry. After completion of the Golden Gate Bridge he returned to his passion of poetry and wrote his most recognizable poem "The Mighty Task is Done". He also wrote "The Redwoods", and his "Sequoia" can still be purchased by tourists visiting the California redwoods.

As Chief engineer of the Golden Gate Bridge in San Francisco, California, Strauss overcame many problems. He had to find funding and support for the bridge from the citizens and the U.S. military. There were also innovations in the way the bridge was constructed. It had to span one of the greatest distances ever spanned, reach heights that hadn't been seen in a bridge, and hold up to the forces of the ocean. The towers, at 746 feet (227 m) above the water, were the tallest in the world until 1993. Strauss was concerned with the safety of his workers. He required that a net be installed beneath the Golden Gate Bridge during construction. This net saved a total of 19 lives.
https://en.wikipedia.org/wiki/Joseph_Strauss_(engineer)

Materials: dry spaghetti, rubber bands or twist ties, tape, a bag of sugar or something to use as a weight, and string.

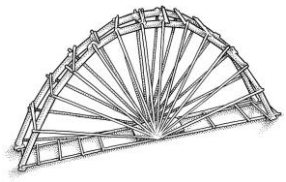
The brief

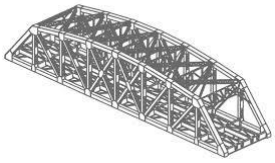
Construct a free-standing bridge out of spaghetti, strong enough to support a 1/2lb bag of sugar.

The method

Think about bracing strands together for strength. Some shapes are better at absorbing loads – triangles are particularly strong. Rubber bands make for good junctions.

Top tip Be patient. Through trial and error, you'll become proficient at working with spaghetti.





Build a Rube Goldberg Machine

https://www.youtube.com/watch?v=6aFVbjwA_y4 Teach engineering quick video for how to build a Rube Goldberg

Jewish value: The Shema (Hear O Israel: Adonai is Our God, Adonai is One) teaches us that all of the universe is One. Just as God is one, so too is everything connected to an inherent Oneness. As such, we recognize that we are all interconnected with each other and that interconnectedness is the basis of so many of our values of upholding the dignity of all, for when we act, we truly affect the totality of the universe.

This is Jewish?

Rube Goldberg is a name of a Jewish cartoonist 1883-1970, engineer, author, sculptor, and inventor. The "Rube Goldberg machines" of having things that move to cause other things to move and eventually to end with a certain end result come from one series of Rube Goldberg's famous cartoons.

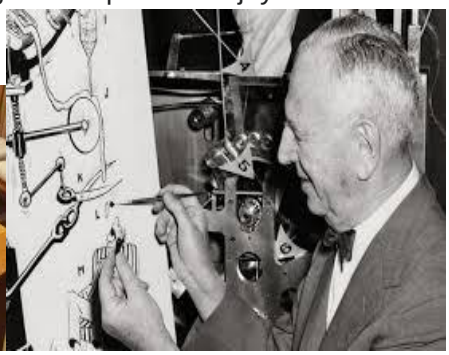
Goldberg was born in San Francisco, California, to Jewish parents Max and Hannah (Cohen) Goldberg. Goldberg is best known for his popular cartoons depicting complicated gadgets performing simple tasks in indirect, convoluted ways. The cartoons led to the expression "Rube Goldberg machines" to describe similar gadgets and processes. Goldberg received many honors in his lifetime, including a Pulitzer Prize for political cartooning in 1948 and the Banshees' Silver Lady Award in 1959.[1] He was a founding member and first president of the National Cartoonists Society[2] and the namesake of the Reuben Award, which the organization awards to its Cartoonist of the Year. He is the inspiration for international competitions known as Rube Goldberg Machine Contests which challenge participants to create a complicated machine to perform a simple task.
https://en.wikipedia.org/wiki/Rube_Goldberg

Materials: whatever you have around that can move a marble, or move whatever object you like from one place to another. Common materials used: Cardboard, dominos, blocks, plastic utensils, scissors, tape, rubber bands, old toys, like toy cars, or other knick-knacks.

The brief

Construct a Rube Goldberg machine that starts with a marble on one side of the table and moves it to the other without the marble dropping to the ground. If it brings down a domino structure, spins in a circle, and/or causes a toy or knick-knack to move then you get extra points. Enjoy!





Geodesic Domes

http://kibbutzlotan.com/EcoGuide/geodesicDomes.html

Geodesic Domes were designed by American engineer Bucky Fuller, who was inspired by beehives, fishing nets and other 'networks'. They became highly prized for cheap, efficient buildings on many Kibbutz in Israel. How does it work? Geodesic domes are extremely rigid using the strength of arches combined with the strength of triangles together to make a very strong structure. Multiple interlocking triangles form incredibly strong structures. To deform or buckle a triangle you have to compress or stretch the lengths of the sides, which is hard to do as they support each other. A geodesic dome's design allows it to support a surprisingly large amount of mass compared to the structure's own mass and size. Because of this, you should have seen that the geodesic dome could easily support your hand as it pressed down on the top of the dome, even when you increased the pressure a little. You would need to apply a lot of pressure before the dome would fail. The struts (the toothpicks in the model you made) of a geodesic dome are arranged to make triangles. This rigid network of triangles distributes any forces applied to the top of the dome to the rest of the structure.

You may have also noticed that since the geodesic dome approximates a sphere, it has a relatively low surface-area-to-volume ratio (meaning, its volume is relatively large compared to its surface area), and it can enclose a large amount of volume compared to the mass of the structure itself. In other words, it makes for a roomy space inside with very little building materials. Today there are more than 300,000 geodesic domes around the world.

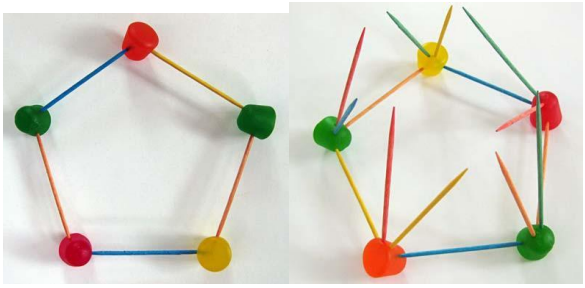
The brief
Using toothpicks and gumdrops make your own geodesic dome.

Materials: toothpicks, gumdrops

https://www.sciencebuddies.org/stem-activities/geodesic-domes-gumdrops How to video

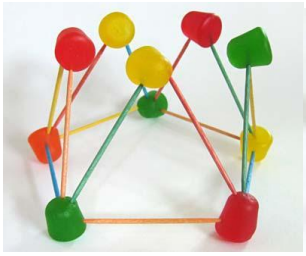
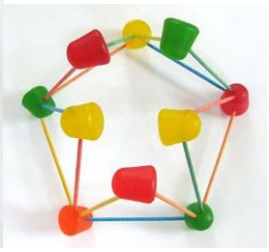
Instructions:

1. Attach five toothpicks together using the gumdrops to form a flat pentagon (five-pointed) shape. You should have a gumdrop at each point and a toothpick along each edge.

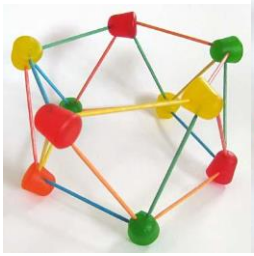
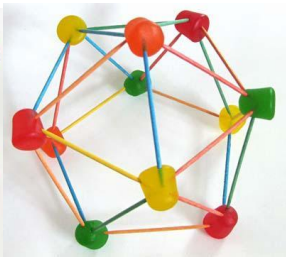
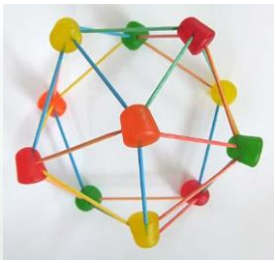


2. Poke two more toothpicks into each gumdrop, arranging the new toothpicks so that they are pointing up.

3. Take five new gumdrops and attach them to the top of the new toothpicks, putting two toothpicks into each gumdrop, to form triangles. (The pentagon should form the base of the triangle, and the new gumdrops should form the top point.) You should end up with five triangles this way.

4. Attach a toothpick between the top points of the triangles you just made, connecting the triangles together. This uses five toothpicks, and will create another pentagon shape, this time at the top of the dome.

5. Take five more toothpicks and poke one into each of the five gumdrops that make up the top pentagon. Arrange the new toothpicks so that they are pointing up. Then poke all five toothpicks into a gumdrop in the middle, and at the top, of the dome. Your geodesic dome is complete!

6. Gently press down on the top of your geodesic dome. If it does not break, try carefully pressing down on it a little more. This structure can help begin your model kibbutz!


Kippah Face Mask

Jewish value: Pikuach nefesh, the saving of a life, is the highest mitzvah one can do. It is so important that the mitzvah of saving a life actually supersedes Shabbat restrictions and almost every other mitzvah. The Talmud teaches us that to save a life is like saving an entire world. It is for this reason that wearing our face masks and engaging in sacred distancing is the height of living out our Jewish values.

This activity is simply a practical, uniquely Jewish way to contribute to our communities. Many Jewish families have unused Kippot available, and kippot are already shaped in a curve making them ideal starting materials to make face masks. Multiple synagogues in the world are using kippot to make face masks for their communities. So this activity is a wonderful way for our Jewish families to apply elements of our unique and wonderful culture to contribute to the world around us.

Materials:
Clean cloth kippot that you don't mind repurposing, ribbon/ clean shoelaces, elastic, etc, needle, and thread.

1. Fold the kippah along the bottom if necessary for the face you are making the mask for and sew the bottom to the spot you wish it to stay. You don't actually need many stitches, so don't worry about sewing all the way across.
2. If you would like to attach ribbon to the sides to be tied around the head or behind the ears then you'll need to cut and sew your ribbon, elastic, or string along the sides.
3. If you want to run your ribbon across the face, fold a small amount along the top, just wide enough with a little extra for the ribbon or string to go through leaving space on the sides to run the ribbon or string through. You also could include a twist tie or other wire to allow it to bend to the nose.
4. Run your ribbon through the openings and across. A safety pin attached to the end of your ribbon makes it easier to pull through.
5. Tie your ribbon around the ears or behind the head as preferred. Your Face mask is done!

Nature Scavenger Hunt!

https://sandiegoriver.org/docs/NearbyNature_ScavengerHunt.pdf

The PDF linked above is a scavenger hunt that can be completed almost anywhere in nature.

Jewish Value: The great rabbi Abraham Joshua Heschel taught that living with radical amazement is necessary to live a spiritual life. What is radical amazement? It is the ability to encounter the enormity of nature and be awed, wowed, inspired, and astounded. Encountering nature and feeling radical amazement helps us find gratitude in our souls and connect us to God.

Nature is awesome but how is it Jewish? This activity is in celebration of many Jewish Biologists, Naturalists, and Zoologists, including Lionel Walter Rothschild, Charles, and Miriam Rothschild. (The book Strange Creatures in our library and read aloud on our Torah school channel https://www.facebook.com/wwinger/videos/10158182035801000/ tells of how Lionel Walter Rothschild established his own natural history museum, studied and identified animals, and hired scientists to study and collect animals as well. Over 238 animal species are named after him because of his work.) Charles Rothschild, Lionel's brother, identified over 500 new species of flea. His daughter Miriam Rothschild showed the same love for animals and aptitude for biology. She studied zoology and made a name for herself studying molluscs, parasites, and fleas. Prior to World War II she pressed the British government to admit more Jewish refugees from Nazi Germany. During the war she worked at Bletchley Park on codebreaking. A leading authority on fleas she was the first person to work out their jumping mechanism. She wrote a book about parasites that was very successful as well as other books and published over 350 papers about natural science and biology. Having many gay friends in academia that were otherwise shunned by their colleagues Miriam defended them and fought to legalize homosexuality in Britian. She also started a charity to research and help people with mental illness, especially schizophrenia. https://en.wikipedia.org/wiki/Miriam_Rothschild

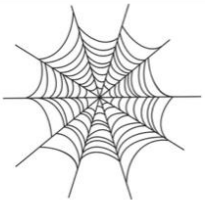
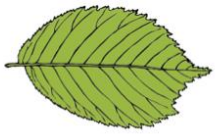
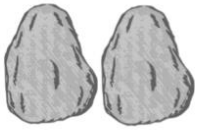
In honor of these and many other Jewish Biologists this activity is a nature scavenger hunt.

Miriam Rothschild

Lionel Walter Rothschild

Scavenger Hunt- *Nature Walk*

Can you find all 20?

 bird	 tree roots	 ant	 spiderweb
 green leaf	 acorn	 flower	 log
 two similar rocks	 mushroom	 squirrel	 tall grass
 stick that looks like a letter 'y'	 flying bug	 brown leaf	 cloud
 dandelion	 animal footprints	 wild berries	 pine cone

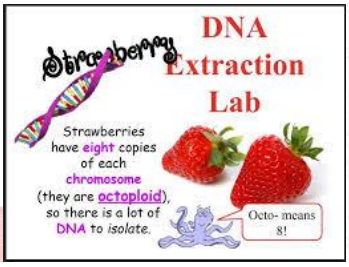
Strawberry DNA extraction

Celebrating Jewish female scientist, Rosalind Franklin, the British physical chemist that took the first images of DNA and whose vital research led to the understanding and discovery of the double helix... which earned a Nobel prize for Watson and Crick. This underappreciated but very impressive scientist was known for her detailed and meticulous scientific work, and for being an early feminist. Born July 25th, 1920 the 100th anniversary of her birth is approaching this summer!
https://jwa.org/encyclopedia/article/franklin-rosalind https://www.heyalma.com/5-female-jewish-scientists-you-should-have-learned-about-in-school/
Quick article of 5 Jewish Women Scientists. Rosalind Franklin is first.

With this strawberry DNA extraction science experiment, you can encourage the DNA strands to release from their cells and bind together into a format that's visible with the naked eye. You can do this experiment with any fruit or vegetable, but strawberries are one of the best fruits to use due to their high number of DNA strands per cell (8 versus an ordinary 4)! https://littlebinsforlittlehands.com/strawberry-dna-science/
https://www.stevespanglerscience.com/lab/experiments/strawberry-dna/
Strawberry DNA Extraction experiments

Materials: a Strawberry or two, Rubbing alcohol - chilled 5mL, Dish soap 2 tsp - 10mL, salt (1/4 tsp), zipper lock sandwich bag, coffee filter, small funnel, water 90mL, tweezers, glass container, mixing spoon

Instructions:
1. Put the rubbing alcohol in the freezer. It needs to be chilled and it won't freeze, so the freezer is fine.
2. Remove the green stems from the strawberries and add to the bag. Squish the strawberry into a pulp.
3. Add 1 tablespoon of dish soap, a teaspoon of salt, and 1/3 of a cup of water to the bag. Mix. This is your extraction mixture.
6. Pour the extraction mixture with the strawberry, press out the air, and seal.
7. Place your funnel over a small glass cup and line the funnel with a coffee filter.
8. Pour the resulting strawberry pulp and extraction mixture into the funnel and wait for it to filter.
9. Remove the funnel and add 1 tsp (5 ml) of the chilled isopropyl alcohol to the solution and hold the mixture at eye level. You're looking for a separation of material that shows up as a white layer on top. That's the DNA of the strawberry!
10. Use tweezers, a pipette, or even a toothpick to pick up some DNA strands that you can see. Grab a magnifying glass and check it out!


Strawberry
DNA Extraction Lab
Strawberries have eight copies of each chromosome (they are octoploid), so there is a lot of DNA to isolate.
Octo- means 8!

Invisible Ink

This project is in honor of Shulamit “Shula” Kishik-Cohen - “The Pearl” who was a Jewish mother living in Lebanon when she heard about a military action planned against Israel and wrote to let them know. They asked her to help with more. She smuggled persecuted Jewish families out of Lebanon into Israel and continued to warn Israel whenever she heard of any military and other violent actions that were aimed toward it. She wrote letters back and forth to them with invisible ink. In honor of brave Jewish mothers that risk their own lives to help Israel and other Jewish families, here’s an activity that’s exciting… invisible ink.
https://en.wikipedia.org/wiki/Shulamit_Kishik-Cohen

https://www.youtube.com/watch?v=9G7vYtKOu4A King of Random shows different kinds of Invisible Ink

Materials:A lemon, A bowl, Water, A spoon, A paint brush, A lamp, or other light bulb

The brief
Write your own secret message in an invisible ink solution.

The method
1. Squeeze lemon juice into the bowl and add a few drops of water. Stir with the spoon.
2. Dip the paint brush into the juice mixture and write a message on the paper.
3. Allow the paper to dry completely. Your message should become invisible.
4. Hold the paper very close to the light bulb to heat up the message area (adult supervision required). Watch your message appear.

How does it work? The lemon juice is an organic substance which reacts with oxygen in the surrounding air, oxidizes and turns brown. By placing the paper right next to the lamp we speed up the oxidization process. The heat from the lamp causes the chemical bonds to break down. Did you know? Oxidization affects lots of different surfaces, from metal to living tissue. A freshly-cut apple that turns brown, a bicycle that becomes rusty or a copper penny that turns green. Not all oxidation is bad – but think about choosing the right materials when designing a product for a particular use.

Colored Carnations

This project is in honor of Dr. Naomi Feinbrun-Dothan who emigrated from Russia after many pogroms caused her family to move to Israel before it was even a country. She was one of the first botanists to teach at the Hebrew University of Jerusalem and the first to teach genetics. She explored Israel cataloguing and identifying countless plant species. She wrote two volumes of books on the Flora of Palestine that are still in common use by plant biologists today. She was such an asset to the scientific community in israel that her colleagues even named many plant species after her. https://jwa.org/encyclopedia/article/feinbrun-dotan-naomi

https://www.youtube.com/watch?v=MHwEqjlwA2U whiz kid science shows a child performing this experiment

The brief
Create multi-colored flowers.

Materials White carnations or white daisies, Two colors of food dye, cups, Water, Scissors (with adult supervision)

The method
1. Use the scissors to cut the stem of the carnation in half lengthways.
2. Take two cups and fill them with water. Add a different colored food dye to each cup.
3. Put the split stems of the carnation into the cups and leave overnight.
4. The next morning you should find that your flower has changed color.
5. What do you notice about the petals?

How does it work? Plants need a transport system to move food, water and minerals around. There are two things that combine to move water through plants – transpiration and cohesion. Water evaporating from the leaves (transpiration) draws water up the stem of the plant to replace what is lost. This works in the same way as sucking on a straw. Water that evaporates from the leaves “pulls” (cohesion) other water behind it up to fill the space left by the evaporating water.

Measure the Speed of Light

“God said: ‘Let there be light’ and there was light. And God saw that the light was good.” -Genesis 1

No set of scientific projects celebrating Jewish scientists, engineers, etc would be complete without a nod to Albert Einstein. Albert Einstein (1879-1955) was a Jewish German Theoratical Physicist who developed the Theory of Relativity, one of the two pillars of modern physics (along with quantum mechanics). His equation E=mc^2, the mass-energy equivalence formula has been dubbed “the most famous equation”. He received the Nobel prize for Physics in 1921. We have multiple books about Einstein in the Biography section of our Juvenile stacks.
https://en.wikipedia.org/wiki/Albert_Einstein

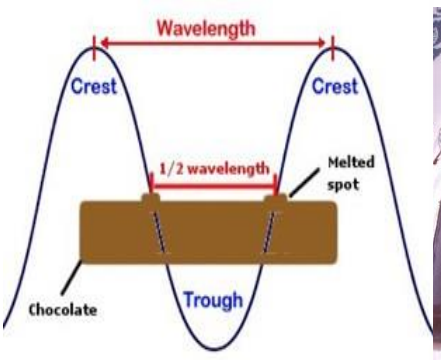
https://www.youtube.com/watch?v=q6ZRk8qM8EM
Kitchen physics video with an adorable little girl explaining the experiment

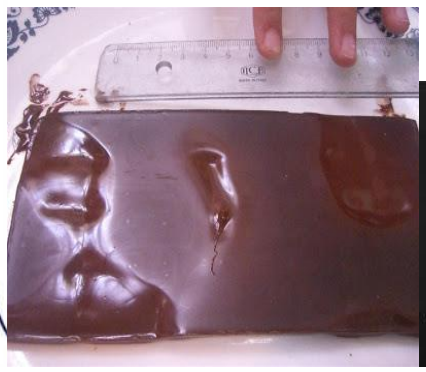
The brief
Measure the speed of light using chocolate and a microwave oven.

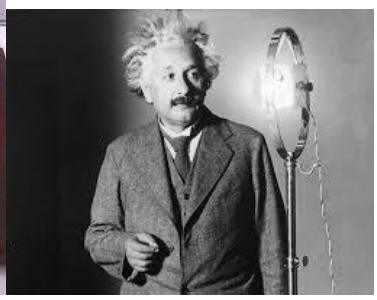
Materials: A large bar of chocolate, A microwave (with adult supervision), A large ceramic plate, A ruler

The method
1. Remove the glass plate in the base of the microwave and replace with an upturned ceramic plate. You want your chocolate to stay still in this experiment.
2. Place the chocolate in the middle of the plate.
3. Turn on the microwave and heat the chocolate until it melts in 2 or 3 places. This should take about 20 seconds.
4. Using gloves, and with adult supervision, carefully remove the plate from the microwave.
5. Measure the distance, in inches, between the melted spots on the chocolate bar.
6. The distance you measured is half a wavelength. Multiply this number by two and then by the frequency of the microwave you are using. This can be found on the outside of the machine. This number is the speed of light in inches per second.

How does it work? Microwaves work by creating standing waves inside the microwave oven. The water molecules in the chocolate try to align themselves with the rapidly changing standing wave, creating heat. The distance between the two melted spots is half a wavelength. You can now calculate the speed of light, because speed = wave length x frequency.







Floating Ping-Pong Balls

This experiment celebrates Jewish Hungarian/American aerospace engineer, mathematician, and physicist Theodore von Kármán (1881-1963). His family from Budapest, Hungary descends from the famous Rabbi Judah Loew ben Bezalel. His work in supersonic and hypersonic airflow led to breaking the sound barrier and to the American space program. One of the founders of the Jet Propulsion Laboratory he worked with NASA in the early days and contributed greatly to the early space race. https://en.wikipedia.org/wiki/Theodore_von_K%C3%A1rm%C3%A1n

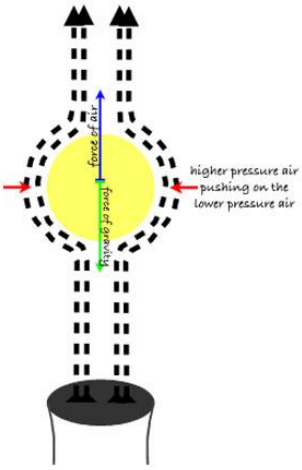
https://www.youtube.com/watch?v=ld5iW1JQPVQ demonstration video from cool science experiments

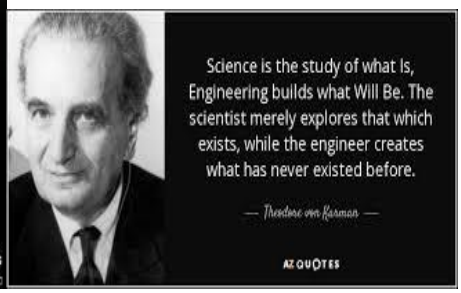
The brief
Make two ping-pong balls float in the air flow of a hair dryer at the same time, without hitting each other.

Materials: Two ping-pong balls, A hairdryer (on cool setting)

The Method
1. Switch on your hairdryer, making sure it is on the cool setting.
2. Hold it with the nozzle pointing upwards.
3. Place one of the ping-pong balls into the stream of air.
4. Try and place another ball into the same stream of air – on top of the first ball.

How does it work? The hair dryer produces a high velocity stream of air with low pressure. The surrounding air is at a higher pressure which keeps the ball inside the stream. When the upward force of the air equals the weight of the ping-pong ball the ball is said to be in 'equilibrium'. The theory at work here is Bernoulli's principle. This is an equation linking air pressure, velocity and density with particle weight.





Floating Paper Clip

This celebrates Jewish born Dr. Lise Meitner (1878-1968) who worked on radioactivity and nuclear physics. Her work, within a small team, first discovered nuclear fission of uranium. Because of her status as a Jewish woman in Europe during WWII she wasn't credited for this when the Nobel prize for this was given in 1944. She wrote a letter to the editor explaining the mechanics of the finding, likening the forces of the atomic nucleus to "surface tension of a water droplet". She did receive many posthumous honors (awards after her death) including the naming of an element on the periodic table of elements (109 meitnerium). https://en.wikipedia.org/wiki/Lise_Meitner

https://www.youtube.com/watch?v=-CNG-ZXJ7to demonstration video

The brief
Make a paper clip float on water.

Materials: Water, A bowl, Tissue paper, A paper clip, A pencil with an eraser on the end

The method
1. Fill the bowl with water.
2. Tear off some tissue paper (around 4in x 2in).
3. Gently place the tissue paper onto the surface of the water so that it floats.
4. Place the dry paper clip on top of the tissue.
5. Use the rubber end of the pencil to carefully poke until the tissue sinks and the paper clip is left floating.

How does it work? The paper clip is held afloat by the surface tension of the water. Water molecules are polar, so the molecules pull on each other. This creates a tension – like a thin, flexible membrane on the surface – which helps hold the paper clip afloat. The tissue paper allows you to lower the paper clip onto the water gently, without breaking the surface tension. Did you know? Insects such as water striders use water tension to appear to walk on water.

Build a Compass

This project celebrates the many Jewish cartographers (map makers) and compass makers of the school of Majorca, which is an island off the coast of Spain. The Majorcan Cartographic School was staffed by mostly Jewish scholars and became famous in the 13th - 15th centuries for providing some of the most beautiful and accurate maps of their time. Cartographers also commonly made and invented their own nautical instruments like compasses, star charts (for finding one's way at night) and other instruments. Since Jewish merchants participated in extensive trade by ship these maps were vital to keep ships on route without getting lost, since getting lost at sea could mean death for sailors, the accuracy of these maps saved lives. The cartographers had to have expertise in astronomy, geography, geometry, and time keeping (a difficult trade before accurate clocks were invented). The work of the cartographers of this school led to the needed innovations that allowed for long distance exploration, leading to the Age of Discovery when European ships traveled the world discovering the Americas and many other places. Their knowledge and work changed the world. Their school was closed in the 15th century when Spain expelled their Jewish population. https://en.wikipedia.org/wiki/Majorcan_cartographic_school

https://www.steampoweredfamily.com/activities/how-to-make-a-compass/ How to video

The brief

Build a compass.

Materials: Water, Straight bar magnet, a cork, needle

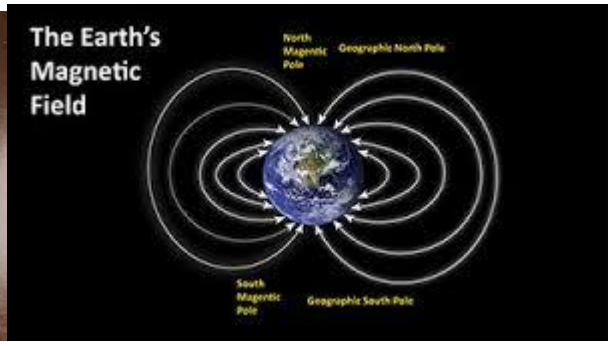
The method

1. Fill the bowl with water.

2. Magnetize the needle by stroking it over the bar magnet about 50 times. Make sure the needle is orientated with the needle pointing to the north of the bar magnet on each stroke.

3. Drop the needle onto the surface of the water – from as close as you can – to let it rest on the surface tension. If you have problems getting it to sit atop the water then take a cork cut flat like a disk, and set the need atop the cork.

How does it work? Once the needle is magnetized it naturally wants to align with the Earth's stronger magnetic field. This field, called the magnetosphere, is created by electrical currents that are generated by a churning molten iron core deep inside the planet. The Earth acts as if it has a bar magnet running through it with the magnet's south pole located near the planet's geographic north. Since opposites attract, the north pole of a magnetized needle is attracted to it.



Make a Periscope

This project celebrates John Norris Bahcall (1934 - 2005) who was a Jewish-American astrophysicist whose work led to the development of the Hubble Space Telescope and a better understanding of how energy radiates from stars. He started college wanting to become a Reform rabbi taking theology and philosophy courses on a tennis scholarship. He didn't take physics courses until grad school and fell in love with the philosophy of physics and the natural world. He received NASA's distinguished public service medal in 1992.
https://en.wikipedia.org/wiki/John_N._Bahcall

https://youtu.be/ra1HmKMXmGY

How to video Dyson Engineering

The brief

Design and build your own periscope to see around corners.

Materials: Shoebox, Two small mirrors, A pencil, Scissors (with adult supervision), Tape, glue

The method

1. Remove the box lid.

2. Place one mirror on the side and near the bottom of the shoebox and trace around it. Place the second mirror at the opposite end of the shoe box and trace around that too.

3. Cut out the traced sections to make a door flap. Slant the doors at 45 degree angles.

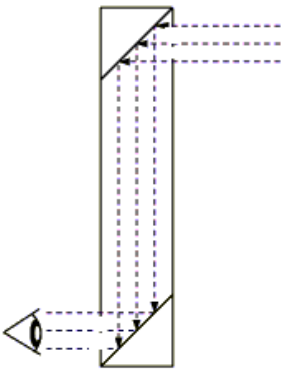
4. Tape the mirrors onto the slanted doors.

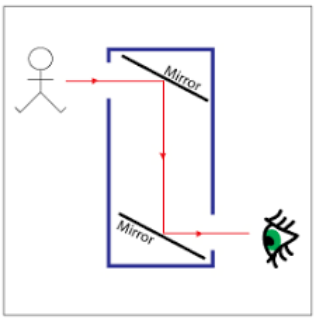
5. Adjust the mirrors. Keep moving them into place until you can see out of the top hole when you look in through the bottom hole.

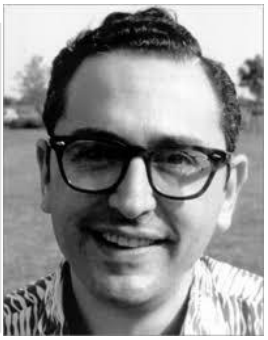
6. Seal the mirrors into place using glue.

7. Glue the shoebox lid back on.

How does it work? Light reflects away from a mirror at the same angle that it hits the mirror. In your periscope, light hits the top mirror at a 45 degree angle and reflects away at the same angle, which bounces it down to the bottom mirror. The reflected light hits the second mirror at a 45 degree angle and reflects away at the same angle, into your eye.







Balloon Car Race

This project celebrates French-Jewish race car driver Rene Dreyfus who raced cars when cars were still new, incredibly hot, hugely vibrating, with tires that didn't grip well, feeble brakes, often spraying leaking hot oil over drivers, and with no safety equipment at all making crashes often fatal. Rene Dreyfus' racing career peaked in 1938 when he won the Pau Grand Prix in an underpowered car racing against the German team driving German Silver Arrows, the most powerful and impressive race cars of their time. The Germans had been ordered to win this race to demonstrate Hitler's belief in a master race. Hitler was so dismayed about being beaten by the Jewish Dreyfus that when Germany occupied Paris they were ordered to destroy Dreyfus' race car and any records of Rene Dreyfus winning the race. Dreyfus immigrated to America and opened a French restaurant in New York that became very popular counting Walter Cronkite, William Faulkner, and Neil Armstrong among its regular customers.

https://www.spectator.co.uk/article/rene-dreyfus-the-racing-driver-detested-by-the-nazis

https://youtu.be/2x-ixR7E3xA Balloon Car Race Dyson Engineering video

The brief

Make and race a balloon powered car.

Materials: A balloon, A paper cup, Two plastic drinking straws, Four spools of thread (or drink lids with holes in them), Four small rubber bands, Scissors (with adult supervision), A pencil

The method

1. Using scissors, carefully cut the cup in half lengthways, to create the car body.

2. Using a pencil, poke two sets of holes through the length of the cup. One set near the top of the cup, and one set near the bottom. Poke another hole through the bottom of the cup.

3. Insert a straw through each set of holes. Then, slide the spools of thread or lid wheels on to each end of the straws.

4. Wrap a rubber band around the end of each straw; these will keep the wheels from sliding off.

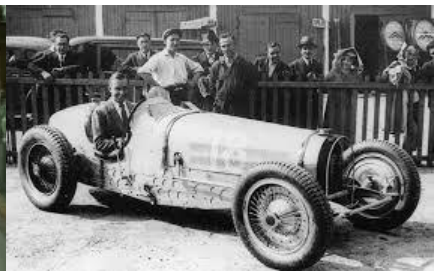
5. Push the neck of the balloon through the hole in the bottom of the cup. The balloon should be lying inside the cup. Make sure the hole is big enough to let the air out.

6. Blow up the balloon, place on a hard surface and release.

Make sure to make more than one car so you can race! Change up the design if you like to see which design is faster!

How does it work? The balloon powered car is a good example of Newton's Third Law. If object A pushes on object B, object B pushes back on object A with the same amount of force. The force of the air leaving the balloon pushes the car forward.


START
START
START



Design and Build a Helicopter

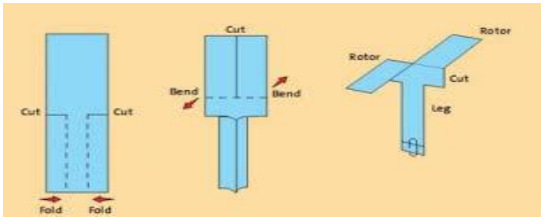
This project celebrates Jewish transgender helicopter pilot and reporter Zoey Tur. Zoey was the first at the Los Angeles News Service to use an AStar helicopter in a major city to cover breaking news as well as the first to televise a high-speed police chase. She also reported the Los Angeles riots in 1992, finding the crash site of Pacific Southwest Airlines Flight 1771, and was the first to broadcast O.J. Simpson's slow-speed car chase in June 1994. She remains a transgender activist to this day. https://en.wikipedia.org/wiki/Zoey_Tur

http://experimentexchange.com/physics_force-energy-motion/make-a-paper-helicopter-2/ How to video

The brief

Design and build a helicopter using only paper and paper clips.

Materials: A sheet of paper, Paper clips, Scissors (with adult supervision)

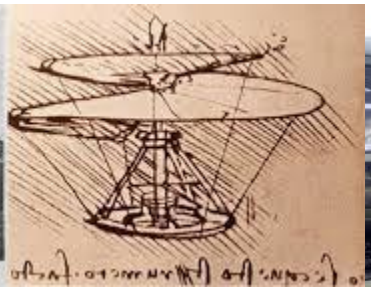


The method

1. Take a piece of paper and make three cuts as shown in the illustration. Then fold the paper in on itself at the bottom half – use a paperclip to keep the sides together.

2. Fold the two halves of the remaining paper away from each other, to form the helicopter blades.

3. Stand carefully on a chair and drop your helicopter, making sure it stays upright as you let go!



Juan de la Cierva's Cierva C.8. Leonardo da Vinci's Aerial Screw.

Gelatin and Oil

This project celebrates Japanese diplomat Chiune Sugihara who served at the Japanese embassy in Lithuania during WWII. Sugihara helped about 6,000 Jews flee Europe by Issuing transit visas to them so they could travel through Japanese territory, risking his job and the lives of his family. The fleeing Jews were refugees from Germany, Poland, the Soviet Union, and Lithuania. The state of Israel honored Sugihara as one of the Righteous Among the Nations for his actions, the only Japanese person to have been so honored. This year, 2020, is "The Year of Chiune Sugihara" in Lithuania. It has been estimated that as many as 100,000 people alive today are descendents of people saved by Sugihara's visas. The children's book Passage to Freedom: The Sugihara Story by Ken Mochizuki is available in the Juvenile stacks of our library in the Biography section. https://en.wikipedia.org/wiki/Chiune_Sugihara

https://www.youtube.com/watch?v=NDlTUNfAoik demonstration video of a teacher performing this experiment

The brief

Try to move gelatin cubes from one place to another using chopsticks.

Materials: Gelatin cubes, chopsticks, olive oil

The method

1. Try to move gelatin cubes from one place to another using chopsticks.
2. Now cover the cubes in oil and try again.

How does it work? In order to grip an object, you need friction. When a lubricant like oil or water blocks the force of friction it becomes very difficult for two objects to make contact with each other. Did you know? Oil is used in engines to allow moving parts to slide past one another with ease – avoiding wear and tear.

Give Me Your Tired, Your Poor,

This poetry project is in honor of Emma Lazarus (1849-1887) who wrote the sonnet, The New Colossus, which was installed on a bronze plaque at the foot of the Statue of Liberty. Emma Lazaraus was a part of the Jewish family descended from the first Jews to settle New York when it was New Amsterdam from Brazil. Fleeing from persecution in multiple places they settled in America before it was even America. Our library has the book, The Jews Settle in New Amsterdam 1654 by Samuel Grand detailing this for children in the history section of our Juvenile stacks. Emma Lazarus wrote articles, and poetry in support of political and religious causes. After hearing of the pogroms plaguing Jews in Russia, Emma advocated for the thousands of Ashkenazi Jewish refugees pouring into New York. She helped establish the Hebrew Technical Institute in New York, to provide vocational training to Jews. She volunteered at the Hebrew Emigrant Aid Society and founded the Society for the Improvement and Colonization of East European Jews. The book I Lift My Lamp: Emma Lazarus and the Statue of Liberty by Nancy Smiler Levinson is located in the Biography section of our library in the Juvenile stacks. https://en.wikipedia.org/wiki/Emma_Lazarus

https://www.youtube.com/watch?v=3YcB0bauwC8 a quick poetry tutorial for kids by poet Simon Mole

The brief

Write a poem

Materials: imagination, pencil, paper

Method

1. Think of a Topic.
2. Choose Words Carefully. Before you start writing your poem, make a list of words that describe your topic.
3. Write Your Poem. ...
4. Use Line Breaks Deliberately. ...
5. Revise. ...
6. For more inspiration, check out the New Colossus by Emma Lazarus below:

The New Colossus

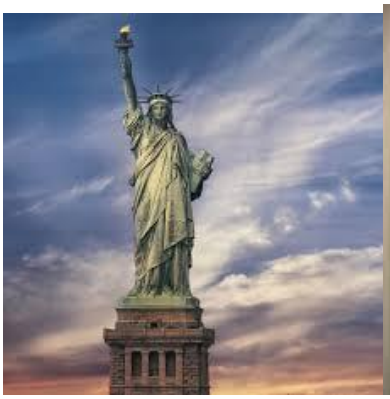
Not like the brazen giant of Greek Fame,
With conquering limbs astride from land to land,
Here at our sea-washed, sunset gates shall stand
A mighty woman with a torch, whose flame
Is the imprisoned lightning, and her name
Mother of Exiles. From her beacon-hand
Glows world-wide welcome; her mild eyes command
The air-bridged harbor that twin cities frame,
“Keep, ancient lands, your storied pomp!” cries she
With silent lips. “Give me you tired, your poor,

Your huddled masses yearning to breathe free,

The wretched refuse of your teeming shore.

Send these, the homeless, tempest-tost to me,

I lift my lamp beside the golden door!”



Underwater Volcano

This project celebrates the famous Polish, Belgian, French Jewish volcanologist (that's someone that studies volcanoes), geologist, and cinematographer Haroun Tazieff (1914-1998). Haroun studied geology and was one of the first to explore and describe the La Verna cave system in the French Pyrenees. He also descended into active volcanoes to film and to collect hot lava samples. The National Geographic film The Violent Earth was based on his expeditions. https://en.wikipedia.org/wiki/Haroun_Tazieff

https://www.youtube.com/watch?v=fEzPcexVUqc video of experiment with adorable kids.

The brief

Create a colorful underwater volcano.

Materials:String,Scissors (with adult supervision),An empty salt shaker,A large jar, Food coloring

The Method

1. Cut a two foot length of string with a pair of scissors. Tie a knot around the neck of a salt shaker with one end of the string. Double-knot it to ensure the knot is secure. Repeat this process with the other end of the string, resulting in a handle to lower your shaker.

2. Empty and clean a large jar. Fill the clean jar about three quarters full with cold water.

3. Fill the salt shaker with hot water (with adult supervision) – as hot as you can get from your tap – to just below the neck. Add three to four drops of red food coloring.

4. Hold your salt shaker over the mouth of the jar by the string handle. Slowly lower the salt shaker into the jar until the shaker is completely submerged and resting upright on the bottom of the jar. Observe how the colored water erupts from the shaker into the cold water.

How does it work? This shows how convection currents work. A convection current is the way that heat rises and falls in liquids and gases. Hot air balloons use convection currents. As hot air rises, so too does the balloon.

Make an Egg Fit Through an Impossibly Small Opening

This activity is a science activity that requires some preparation, but looks like a magic trick. So who better to honor than Harry Houdini? Harry Houdini (1874-1926) was a Hungarian Jewish illusionist and stunt performer. The son of a Reform Rabbi, Houdini grew up in Wisconsin after they emigrated from Hungary. He was very analytical and designed most of his own tricks and stunts. He was known for escaping from handcuffs, chains, ropes, a straightjacket, and even while holding his breath in a giant sealed container filled with water!
https://en.wikipedia.org/wiki/Harry_Houdini

The brief

Make an egg fit into a bottle without breaking it.

https://www.youtube.com/watch?v=M_eScIAl8Dg How to video from sick science

Materials: An uncooked egg A pot of boiling water (with adult supervision) A glass of vinegar A wide-mouthed glass bottle

The method

1. Submerge the egg in a glass of vinegar for two days: the shell will become rubbery, or hard boil and remove the shell. But it looks cool to leave the shell on as well.

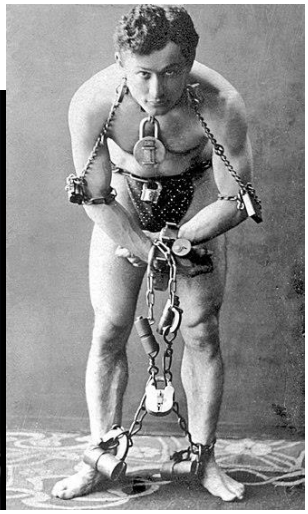
2. Heat the bottle in hot water – remember to use gloves or a tea towel when handling it.

3. Rest the egg on the neck of the bottle.

4. As the air inside the bottle cools down, it will contract and suck the egg down.

Top tip Try lubricating the egg with cooking oil or dish soap. If this egg was Houdini it would escape!

How does it work? Eggs are rich in protein. When heat is applied, chemical bonds within the protein molecules are broken, and new bonds are formed between adjacent molecules. This creates a network of inter-connected proteins which causes the egg to go hard. Vinegar contains acetic acid (CH_3COOH) that dissolves the calcium carbonate ($CaCO_3$) shell but leaves behind the egg's springy membrane.



Cartesian Diver

This project celebrates Jewish Oceanographer Walter Munk (1917-2019) who immigrated from Austria to the US in the 1930's studying oceanography at the University of California in La Jolla, which later became UCSD. He studied ocean waves, tides, geophysics, underwater acoustics, sea level rise, and climate change. During WWII he served in the Army and later as a researcher predicting tides conditions to advise in Naval operations. He published 181 scientific papers and wrote multiple books. He was awarded the National Medal of Science, the Kyoto prize, and was inducted to the French Legion of Honour. https://en.wikipedia.org/wiki/Walter_Munk

https://www.youtube.com/watch?v=s5eIRjmor1w How to video from Sick Science

The brief

Build a Cartesian diver.

Materials: Drinking straw cut to 1in in length plugged with Modeling clay or an eyedropper, A two liter bottle, A drinking glass, and water

The method

1. Put a small ball of modeling clay on the top of the straw to seal it.

2. Roll the modeling clay out into a log and wrap it around the bottom of the straw, leaving the bottom open. This is your diver. Or you could just use an eyedropper. You could also decorate this to make it look like a squid or such.

3. Now attempt to balance the diver so that it stays upright.

4. Place the diver vertically in the drinking glass. Add or remove weight from the base or top so that when you push it down, it just about bobs back up to the surface (and stays upright).

5. Once you are happy, place the completed diver in the two liter bottle filled to the top with water. Screw on the lid. Squeeze the bottle, and the diver will drop down to the bottom of the bottle. Release it and it floats back to the surface.

Submarines are surrounded by ballast tanks, which help control their buoyancy. When filled with water, the tanks increase the density of the submarine and it sinks. When the submarine needs to rise, the water in the ballast tanks is replaced with compressed air. How does it work? This is all about density. When the diver floats, there is a volume of air trapped inside, when the bottle is squeezed, the air is compressed but the water is not. The volume of air trapped decreases, and the displaced water reduces. The diver loses buoyancy, and sinks. When the pressure on the bottle is released, the air expands, displaces the water and the diver floats.