

A shield-shaped logo with a light blue and yellow background. It features a microscope on the left, a pi symbol in the center, and gears at the bottom. The word 'STEM' is written across the top in large, colorful letters: S (green), T (blue), E (orange), and M (yellow).

S T E M

**Science, Technology,
Engineering and
Mathematics**

S. T. E. M. – Chemistry



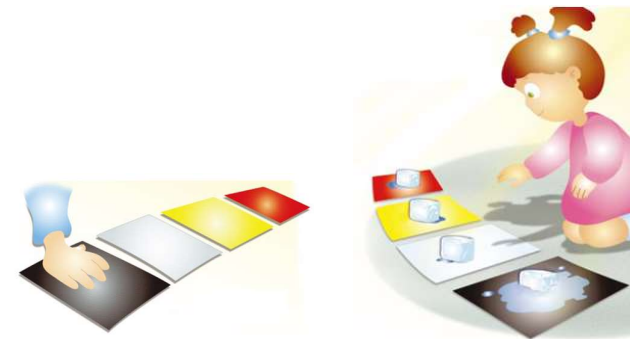
Experiment 1

Materials:

- 4 squares of cardboard or 10 x 10 cm of different colors (eg black, white, yellow, red)
- 4 ice cubes

Procedure:

- Measure the temperature values of each piece of paper every 5 minutes for 20 minutes.
- Place an ice cube on each of the squares.



S. T. E. M. – Chemistry



Experiment 1

The science behind it...

- Which cube melts in the first place? And last?
- Which colors reflect light? Which colors absorb light?
- Does the absorption or reflection of light play in temperature?
- Why do people wear light-colored clothing to play tennis in summer?
- Why dark-colored car seats can be so hot when the car has been sitting in the summer sun?
- Why air over land and water tends to be different temperatures?

S. T. E. M. – Chemistry



Experiment 2

Materials:

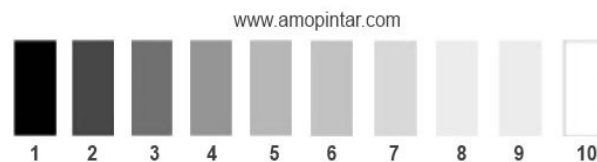
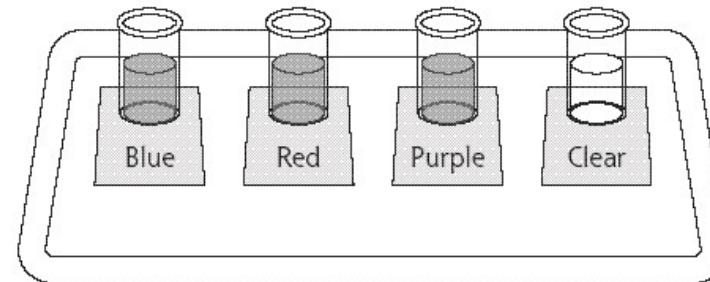
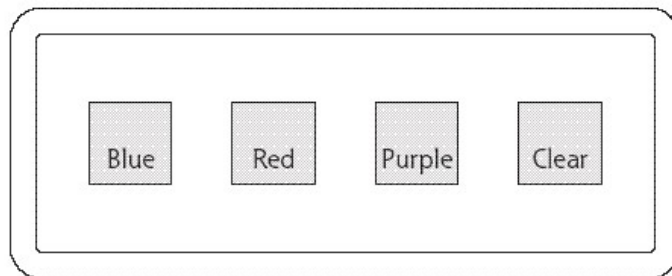
- 4 small juice glasses
- Measuring cup
- Water
- Red and blue food coloring
- Sunny spot outdoors
- Grayscale
- Towel
- 4 pieces of Sunprint paper*
- Tray
- Ballpoint pen
- Black-and-white photocopy machine

S. T. E. M. – Chemistry



Experiment 2

Procedure:



S. T. E. M. – Chemistry



Experiment 2

The science behind it...

- Ultraviolet light from the sun changes Sunprint paper from blue to white. Then the water reacts with the paper, causing the white (exposed to UV) areas to turn dark blue. Where UV is totally blocked, the paper turns white. Partial exposure to UV results in a shade of blue. The darker the blue, the more ultraviolet light got through to the paper.
- You can expand this experiment by making solutions with different intensity of the color and testing other colors.

S. T. E. M. – Chemistry



Experiment 3

Materials:

- Fluorescent spray paint
- Sunscreen
- White cardstock
- Black light (UV) lamp

Procedure:



S. T. E. M. – Chemistry



Experiment 3

The science behind it...

- Fluorescence is a phenomenon that occurs when certain compounds absorb the energy of incident light and emit lower energy light.
- Sunscreen contains substances that absorb ultraviolet radiation, acting as a filter that prevents these rays from reaching our skin.
- In places where the protector was applied the paint did not emit light when exposed to UV radiation. If UV rays cannot reach the ink, it does not fluoresce.

S. T. E. M. – Chemistry



Bibliography:

- <https://www.education.com/science-fair/article/measuring-albedo/>
- <https://www.education.com/science-fair/article/ultraviolet-light-pass-colors-more/>

S. T. E. M. – Physics



Experiment 1

Materials:

- Flat mirrors
- Pencil or another small object

Procedure:

- Explore da image created by one flat mirror and by two flat mirrors

S. T. E. M. – Physics



Experiment 1

Materials:

- Flat mirror
- Flashlight
- Post it
- Dark room

Procedure:

- Using a flashlight and a mirror, illuminate a post it stuck to the wall

S. T. E. M. – Physics



Experiment 1

The science behind it...

- How do mirrors and vision work?
- Does a single mirror flip the image? If you hold both mirrors with their edges joined horizontally, do they flip the image?

S. T. E. M. – Physics



Experiment 2

Materials:

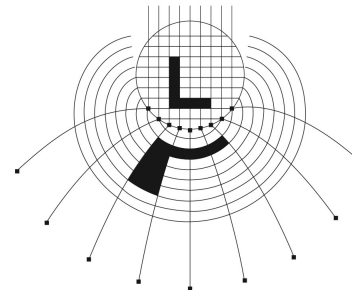
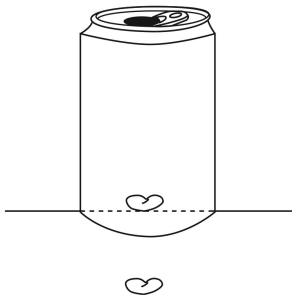
- Clean, empty soda can
- Mirrored Mylar paper
- Tape
- Distorted ("morphed") images
- "Place Can Here" page
- Anamorphic Grid diagram
- Cup of small dried beans
- Pencil

S. T. E. M. – Physics



Experiment 2

Procedure:



S. T. E. M. – Physics



Experiment 2

The science behind it...

- Flat mirrors make normal reflections that maintain the length and width ratio of whatever object you put in front of them. But a cylindrical mirror, like the one you make here, creates a compressed reflection of the things around it.

This kind of transformation of one shape into another shape is called anamorphosis, which means, literally, reshaping.

S. T. E. M. – Physics



Experiment 3

Materials:

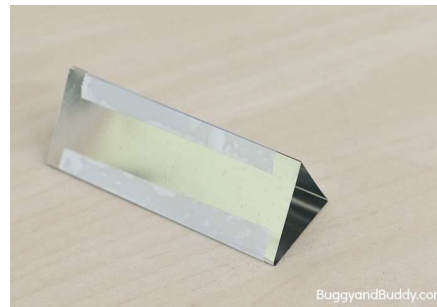
- Empty toilet paper roll
- Mylar sheets or mirrored sheets
- Scissors and/or paper cutter
- Tape
- White cardstock
- Bandy straw
- Markers, stickers, or other materials for decorating your spinning circle

S. T. E. M. – Physics



Experiment 3

Procedure:



S. T. E. M. – Physics



Bibliography:

- <https://www.education.com/science-fair/article/how-many-images-make-mirrors/>
- https://www.ciensacao.org/experimento_mao_na_massa/e5083p_exploringMirrors.html
- https://www.ciensacao.org/experimento_mao_na_massa/e5079p_mirrorInvert.html
- https://www.ciensacao.org/experimento_mao_na_massa/e5080p_mirrorTargeting.html
- https://www.ciensacao.org/experimento_mao_na_massa/e5081p_findingMirrorImage.html
- www.exploratorium.edu/snacks/soda-can-mirror
- <https://buggyandbuddy.com/science-for-kids-how-to-make-a-kaleidoscope/>

S. T. E. M. – Biology



Experiment 1 – DNA Detective

- Collection and processing of DNA evidence and its use in profiling to solve a crime.
- Designed for use on an interactive whiteboard (whole class) or with a data projector and a laptop/computer (small groups).



Bibliography:

<https://www.sciencelearn.org.nz/resources/211-dna-detective-day>

S. T. E. M. – Biology



Experiment 2 – Extraction of DNA

- Human DNA from saliva

Bibliography:

<https://www.manuandomundo.com.br/2013/06/como-ver-dna-humano-em-casa/>



S. T. E. M. – Biology



Experiment 2 – Extraction of DNA

- Human DNA from saliva
- DNA from strawberries

Bibliography:

https://www.sciencebuddies.org/science-fair-projects/project-ideas/BioChem_p015/biotechnology-techniques/strawberry-dna?from=Blog#summary



S. T. E. M. – Biology



Experiment 2 – Extraction of DNA

- Human DNA from saliva
- DNA from strawberries
- DNA from onion

Bibliography:

https://www.sciencebuddies.org/science-fair-projects/project-ideas/BioChem_p001/biotechnology-techniques/extracting-onion-dna?from=Blog



S. T. E. M. – Biology



Experiment 3 – Having fun with DNA

- Origami DNA

Bibliography:

<https://www.stem.org.uk/elibrary/resource/29637>

https://www.lgcgroup.com/media/1775/dna-sequencing-activities_worksheet.pdf



12 Admire your completed DNA double helix!

Only another 2,999,999,989 (or so) more to complete your whole genome!

S. T. E. M. – Biology



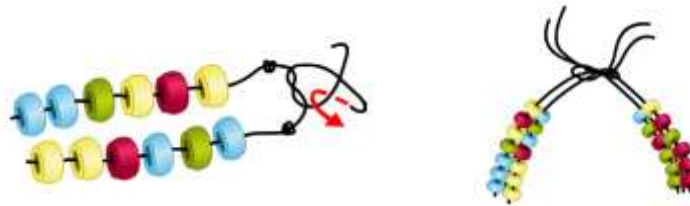
Experiment 3 – Having fun with DNA

- Origami DNA
- Sequence bracelets

Bibliography:

<https://www.yourgenome.org/activities/sequence-bracelets>

https://www.lgcgroup.com/media/1775/dna-sequencing-activities_worksheet.pdf



S. T. E. M. – Mathematics



Experiment 1 – Projectile motion

$$V_x = V_{0x} + a_x t$$

$$x = x_0 + V_{0x} t + \frac{1}{2} a_x t^2$$

Previous Answer: 201 feet



The path of a toy rocket fired into the air can be represented by the equation

$$h = -16t^2 + 75t$$

(where t = time in seconds and h = height in feet)

What is the height of the rocket after 3 seconds?

Bibliography:

<https://www.mathsisfun.com/geometry/parabola.html>

<https://phet.colorado.edu/en/simulation/projectile-motion>

<https://owlcation.com/stem/Solving-Projectile-Motion-Problems-Applying-Newtons-Equations-of-Motion-to-Ballistics>

S. T. E. M. – Mathematics



Experiment 1 – Projectile motion

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 h = height in feet)

What is the height of the rocket after 3 seconds?

Bibliography:

https://www.stem.org.uk/resources/search?f%5B1%5D=field_age_range%3A22&f%5B0%5D=field_subject%3A52&f%5B2%5D=field_age_range%3A83&f%5B3%5D=field_type%3A11&f%5B4%5D=field_type%3A62&f%5B5%5D=field_type%3A46&f%5B6%5D=field_type%3A113&f%5B7%5D=field_type%3A49&resource_query=functions&items_per_page=10&page=1

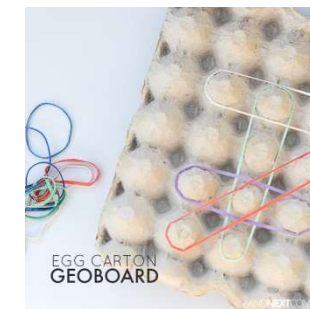
S. T. E. M. – Mathematics



Experiment 2 – Geoboard

Bibliography:

- <https://artfulparent.com/geoboard-activities/>
- <https://www.bloglovin.com/blogs/artful-parent-11777843/geoboard-art-design-for-kids-5833675005>
- <https://www.twinkl.com/resource/t-n-5355-geoboard-2d-shapes-challenge-cards>



S. T. E. M. – Mathematics



Experiment 2 – Geoboard

Procedure:

- *6 Art & Design Geoboard Activities for Kids*
 1. Create [representational pictures](#) with the rubber bands (on *The Artful Parent*)
 2. [Make geometric configurations](#) (on *hello, Wonderful*)
 3. Make [abstract geoboard art with found objects](#) (on *Picklebums*)
 4. [String art geometry](#) (on *Babble Dabble Do*)
 5. [Use geoboards to make stars and snowflakes](#) (on *Little Bins for Little Hands*)
 6. [Heart art](#) (on *Little Bins for Little Hands*)

S. T. E. M. – Mathematics



Experiment 2 – Geoboard

Procedure:

- *6 Geoboard Activities for Math & Science*
 1. [Make constellation geoboards](#) (on *Babble Dabble Do*)
 2. Learn about [3D shapes](#) (on *Maths with Geoboards*)
 3. Learn how to create [simple shapes](#) (on *How We Montessori*)
 4. Create [symmetrical snowflakes](#) (on *Frugal Fun for Boys & Girls*)
 5. [Learn about area and perimeter with geoboards](#) (on *Life Over C's*)
 6. Try [these multiplication circles](#)? (on *Lemon Lime Adventures*)

S. T. E. M. – Mathematics



Experiment 2 – Geoboard

Procedure:

- *2 Geoboard Activities for Literacy*
 1. Practice [number and letter sequencing](#) (on *An Everyday Story*)
 2. [Geoboard alphabet](#) (by *Cardboard Dad* on *PBS Kids*)

S. T. E. M. – Mathematics



Experiment 3 – Aluminium Foil Stained Glass Art

- The goal is to explore geometric concepts of translation, symmetry, rotation...



Bibliography:

<http://stefernandocorrea.blogspot.com/2010/11/projeto-construcao-de-vitrais-atraves.html>

<http://moodle.essg.pt/mod/page/view.php?id=1469>

<https://hiphomeschoolmoms.com/aluminum-foil-stained-glass-art/>

S. T. E. M. – History



Experiment 1 – Ancient egypt

Bibliography:

<https://www.stem.org.uk/resources/elibrary/resource/68502/cross-curricular-science-ideas-ancient-egypt>

Ancient Egypt – Science Ideas Web Age range: 5–7 years

Identifying things that are living, dead or never lived
Egypt is a hot country and there is not much rain. The river Nile provides a fertile oasis in the middle of great deserts and allowed ancient Egyptians to grow crops.
Ⓢ Look at some pictures, dried and artificial plants. Can you identify which plants are alive, which plants used to be alive, and which plants have never been alive? Ⓢ How can you tell? Ⓢ What is the difference between living and dead plants?

Food chains
There are big, dangerous crocodiles in the river Nile. Crocodiles prey on many animals, such as antelopes, zebras and even giraffes.
Ⓢ Can we create a food chain that includes a crocodile? Ⓢ Can we create another food chain that includes a different predator? Ⓢ Can we use drama to show how the food chain works?

Pushes and pulls
Ancient Egyptians had to move large limestone blocks to create the pyramids. The blocks were difficult to move because they were so big and the land was mostly sand.
Ⓢ What happens when we push a big stone on different surfaces? Ⓢ Which surfaces are easiest/hardest for us to push the stone on?

Observing and describing animals
The goddess Bastet, who looked like a woman with the head of a cat, was worshipped in ancient Egypt. Cats were sacred animals and worshipped because they looked like the goddess. Mummified cats were often buried in temples in honour of Bastet. Cats were also kept as pets.
Ⓢ Can we create a chart to show which pets the children in our class have? Ⓢ Which is the most popular pet in our class? Ⓢ What else can we find out from our chart?

Identifying and grouping everyday materials
Ancient Egyptians used metals for making containers and jewellery, and wood for making boats and tools.
Ⓢ Can we make a list of which materials the Egyptians used for some common things like combs, buttons, shoes and clothing? Ⓢ What are the same things made from today? Ⓢ Why do you think they used metals such as bronze to create mirrors? Ⓢ Can we make a mirror using metal? Ⓢ Which metals could we use?

Uses and properties of materials
Ancient Egyptians made boats to transport things on the river Nile. These boats had to be made of strong materials to be used on the water.
Ⓢ Let's look at an ancient Egyptian boat and a modern boat. Can you identify which materials are used to make the boats? Ⓢ Can we find out which of these materials floats best in water? Ⓢ Can we find out which of these materials is strongest?

Changes in materials
Ancient Egyptians made papyrus, a paper-like material, from a plant that grows on the banks of the Nile. The papyrus plant was also used for making sandals, ropes and baskets.
Ⓢ What do you think are the changes that happen when papyrus is made into paper? Ⓢ Can we create a sheet of paper using scraps of old paper? Ⓢ How does our paper compare with new paper?

PHYSICS
Light sources
The Egyptians worshipped the sun god, Ra. He was the most important god because he gave light and warmth.
Ⓢ What light sources can you identify, apart from the sun? Ⓢ Which is the brightest? Ⓢ The sun produces warmth as well as light. Do you think other light sources also produce warmth? Ⓢ Can you find some examples?

PHYSICS
Seasonal change
The river Nile flooded once a year between June and September. Ancient Egyptians believed that the floods happened because the goddess Isis was crying tears of sorrow over her dead husband Osiris. Now we know that the water comes from melting ice and heavy rain during the summer months in the Ethiopian mountains.
Ⓢ Why do you think the ice melts during summer? Ⓢ What do you think happened in the Ethiopian mountains during winter? Ⓢ Can we make a chart to show the differences between the summer and the winter where we live?

CHEMISTRY

Edited by: Millgate House Education

BY-NC-ND
Written by: Thomas Fleck

ROYAL SOCIETY OF CHEMISTRY

S. T. E. M. – History



Ancient civilizations

Bibliography:

<https://www.teacherspayteachers.com/Browse/Search:ancient>



S. T. E. M. – Climate

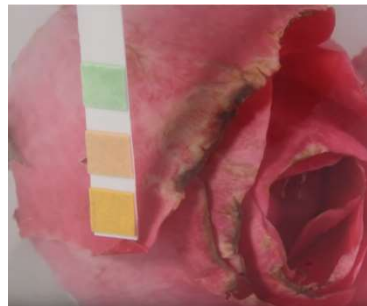


Experiment 1 – Acid rain

- Producing acid rain

Bibliography:

https://www.youtube.com/watch?v=IEMjO01xm_4



S. T. E. M. – Climate



Experiment 1 – Acid rain

- Producing acid rain
- Analyzing harmful effects of acid rain on living objects

Bibliography:

https://www.teachengineering.org/activities/view/cub_earth_lesson5_activity2

<https://www.sciencelearn.org.nz/resources/159-ocean-acidification-and-eggshells>



S. T. E. M. – Climate

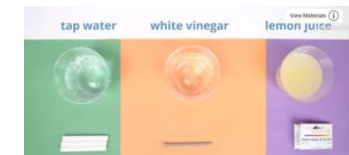


Experiment 1 – Acid rain

- Producing acid rain
- Analyzing harmful effects of acid rain on living objects
- Analyzing harmful effects of acid rain on non-living objects.

Bibliography:

https://www.teachengineering.org/activities/view/cub_earth_lesson5_activity2



S. T. E. M. & ART



Experiment 1 – Paper bomb

Bibliography:

- Haruki Nakamura
<https://www.megacurioso.com.br/artes-cultura/110017-karakuri-os-incriveis-origamis-mecanicos-que-se-transformam-com-um-toque.htm?img-1>
- <https://jennifermaker.com/penguin-paper-bomb/>





Experiment 1 – Paper bomb

Materials:

- Rubber band
- Scissors
- Ruler
- Printable version

S. T. E. M. & ART



Experiment 1 – Paper bomb

Procedure:

<https://www.youtube.com/watch?v=2GttUjGrV8c>

<https://www.youtube.com/watch?v=tTBH-pggvH0>

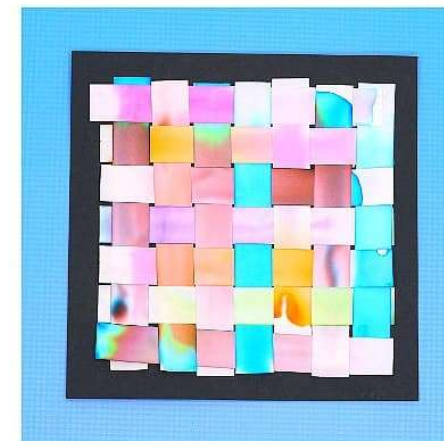
<https://www.extremepapercrafting.com/2009/11/rubber-band-pop-up-cube.html>



Experiment 3 – Chromatography

Bibliography:

- <https://buggyandbuddy.com/chromatography-art-project/>





Experiment 3 – Chromatography

Materials:

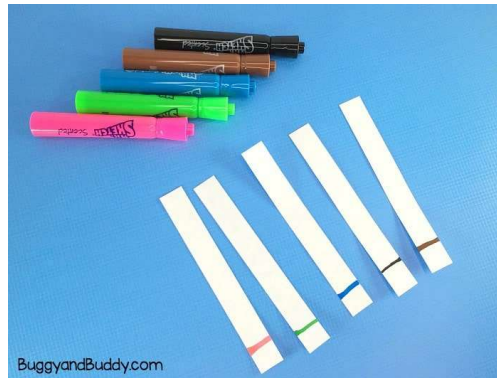
- Chromatography paper strips (or coffee filters)
- Small binder clips
- Plastic cups
- Water
- Ethyl alcohol
- Markers
- Newspaper or paper grocery bag
- Scissors
- Glue
- Black cardstock

S. T. E. M. & ART



Experiment 3 – Chromatography

Procedure:



S. T. E. M. & ART



More ideas:

- Sun prints <https://gardentherapy.ca/sun-print-cards/> OR <http://becomingpeculiar.com/how-to-make-sun-prints/>

Cyanotype kit (uses chemicals)

OR

Sun print paper



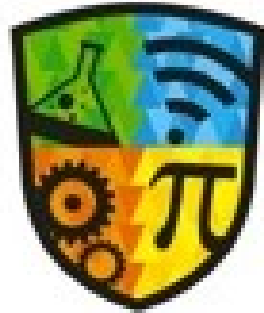
S. T. E. M. & ART



More ideas:

- Dragon moving head <https://psicoativo.com/2016/07/ilusao-do-dragao-3d-para-imprimir.html>





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