

STEAM

Science, Technology, Engineering, Arts, Mathematics

Matters

STEAM is an interdisciplinary approach that integrates

Science, Technology, Engineering, Arts, and Mathematics.

STEAM pervades every aspect of our lives. By exposing students to STEAM and giving them opportunities to explore STEAM-related concepts, we hope that learners are able to integrate these disciplines into a cohesive learning paradigm, and explore how these concepts are applicable in the real-world.

STEAM Matters aims to foster partnerships between educators, parents and learners in developing 21st century skills. STEAM Matters has been specially designed to stimulate creative and critical thinking skills, expose learners to real-world application, and to instil FUN! Each issue is packed with a broad variety of topics, striking images and stories, as well as interactive activities and quizzes!



Making STEAM come alive through PLAY

For more details, please e-mail contact@cpdsingapore.com

What's Inside?

Broad Variety of Topics

Science

Learning Objective: To recognise the ways in which plants reproduce.

TITAN ARUM

Spreads (the leaves) Coats (the leaf)

Titan Arum is the world's largest flower in the world! Due to its size, it is also called the "corpse flower" or "corpse plant". Titan Arum is also a flowering plant with the biggest unbranched group of flowers in the world. During blooming, the smell will come out of the same hole. The female flowers are strong enough to attract pollinators. After about 12 hours, it begins to wilt, and the plant will not be able to produce anymore.

Why do flowers have smell? Power propose different smells to attract different pollinators.

Learning Objective: To recognise broad groups of living things.

Flowering and Non-flowering plants

Flowering plants bear flowers. Their flowers develop into fruit containing seeds. Whereas non-flowering plants do not bear flowers at all. Give 3 examples of non-flowering plants.

How are these non-flowering plants reproduced?

Give 3 examples of non-flowering plants.

Pollination

Pollination is the transfer of pollen grains from the anther to the stigma.

Cross Pollination

Cross pollination occurs when pollen grains from the anther of one plant land on the stigma of another plant.

Self-Pollination

Cross pollination occurs when pollen grains are transferred from one anther to the stigma of the same flower or to another flower of the same plant.

What are the advantages and disadvantages of self-pollination?

Technology

CREATING ELECTRICITY

Scientists have discovered a new way to create electricity. They were inspired by the electric eel.

Like all the animals, eels use like pictures on the right.

Blue skin breakdown

Blue skin breakdown

Blue skin breakdown

Blue skin breakdown

Scientists have used this method to generate up to 100 volts. That is about as much current produced in standard electric wall outlet.

Mathematics

ZAPI!

Every second, about 100 lightning bolts strike the Earth.

How are lightning bolts formed?

At the top of the clouds, the temperature is below freezing. Water vapor turns into ice. When lots of small bits of ice form, they each carry a tiny negative charge. Positively charged particles are lighter. They form the top of the clouds. Negatively charged particles are heavier, and they sink to the bottom of the cloud. These oppositely charged particles create lightning.

Lightning Strikes

The bar graph below shows the number of lightning strikes in Singapore over 6 months.

Close to Ground Lightning, Singapore, Jan 2019 to Jun 2019

Arts

TRAPPING ELECTRICITY

A German physicist, Georg Christoph Wilhelm, figured out a way to "trap" lightning. He used an iron rod that was pointed towards the sky. The rod was connected to a wire that went down to the ground. This trapped the lightning's energy. When the door opens, electricity rushes out of all corners!

LICHTENBERG FIGURES

STEAM Integration into each Theme

Technology

DIALING FOR CLEAN WATER

Have you ever wondered where we get our drinking water? The water we drink comes from rivers, rivers, streams, lakes and even the ground. The water is taken from these places and treated, so that it is not made to us when we use it. Let us look at how Singapore treats its water!

Source: Public Utilities Board (PUB)

Arts

Engineering

Open-ended design: is used by engineers to require ideas and colours. When they start to solve a problem, they do not know what the best solution will be. Hence, ideas and colours are always changed! Engineers use an **open-ended** design to solve a problem. They then identify and understand the underlying problem, evaluate design objectives, and to receive feedback from others. They will then select the best solution. The best solution can be based on:

- costs
- reliability
- ease of use
- aesthetics
- social impact

Now, it's time to put on your thinking cap and think like an engineer!

SCENARIO 1: Family A collects water through wells. They live in an area that has a high level of precipitation rain and clouds. However, their water has been contaminated by pollution. Design a system to help them get clean drinking water.

SCENARIO 2: Family B's water well has completely run dry. Design this family a system that will help them get their water supply once again.

SCENARIO 3: Family C lives high in the mountains. Due to climate change, nearby ice glaciers have been melting. Increased water flow nearby means less clean drinking water. Design a system to help them get clean drinking water for the community.

SCENARIO 4: Family D lives in a region that has clean water sources nearby. However, there are just too many people living in the area. The water sources are not able to provide clean drinking water for everyone. They live near a saltwater ocean. Design a system for the community that can help them provide enough clean drinking water for the community.

3-Step Treatment

1. Coagulation: The first stage of the water treatment is known as coagulation (C). In this process, water is passed through a membrane to filter out suspended particles.

2. Reverse Osmosis: The second stage of the water treatment is called Reverse Osmosis (RO). Here, water from the first stage is passed through a semi-permeable membrane. Only the pure water can pass through.

3. UV Disinfection: In the final stage, ultraviolet light is used to ensure the purity of the water.

Science

RING!! RING!!

Have you ever heard a triggered security alarm? Does the alarm know when to ring when there is an intruder? Does it not feel out more!

Learning Objective: To understand that a current can only flow in a closed circuit.

When the switch is closed (ON position), the bulb will **glow**.

When the switch is opened (OFF position), the bulb will **not light up**.

There can be different arrangements of batteries and light bulbs!

Learning Objective: To understand that a current can only flow in a closed circuit.

When two batteries are connected in parallel, the electricity passing through the separate branches are equal.

When two bulbs are arranged in series, the amount of current passing is the same. The more the number of light bulbs in the circuit, the dimmer the light bulbs will be.

When two bulbs are arranged in parallel, each bulb forms a separate path with the batteries. Hence, the bulbs glow equally bright.

Engineering

MAKE YOUR OWN FLASHLIGHT

Electrical engineers designed the wiring of an alarm system to be in series. The door is a switch that acts as the switch. When the door is closed, the alarm circuit is closed. However, when someone breaks the door or window, the alarm circuit becomes open. This triggers the alarm to be triggered. "BEEP!!"

1. Describe the qualities of a good flashlight.

2. Label all you think are the parts of a flashlight. Label are their functions?

3. Draw a circuit diagram for your flashlight.

Hands-on Activities/ Quizzes/Puzzles/Jokes

Links to National Curriculum

Shocking sea animals

Electric Ray

The electric ray is also called a stinging ray. They have a unique organ called the electric organ. They have a unique organ called the electric organ. They have a unique organ called the electric organ. They have a unique organ called the electric organ.

Guiana Dolphin

Do you know dolphins? They are amazing animals and are known for their intelligence. They have a unique organ called the electric organ. They have a unique organ called the electric organ. They have a unique organ called the electric organ.

Sharks

Sharks are often thought of as a scary predator. They have a unique organ called the electric organ. They have a unique organ called the electric organ. They have a unique organ called the electric organ.

Shocking land animals

Echidna

The Echidna is also known as the spiny anteater. It has a unique organ called the electric organ. They have a unique organ called the electric organ. They have a unique organ called the electric organ.

Honeybee

Honeybees live in colonies. They are responsible for making honey. They have a unique organ called the electric organ. They have a unique organ called the electric organ. They have a unique organ called the electric organ.

Duck-billed Platypus

Duck-billed platypus has a flattened head and body. Another prominent feature is their tail that contains thousands of electrocytes. They have a unique organ called the electric organ. They have a unique organ called the electric organ. They have a unique organ called the electric organ.

Learning Objective:

To observe a variety of living things.

Eastern Skunk Cabbage

The Eastern Skunk Cabbage grows like a small plant. When it blooms, the flowers are white and green. They have a unique organ called the electric organ. They have a unique organ called the electric organ. They have a unique organ called the electric organ.

Rafflesia

The Rafflesia has no stem, leaves or roots. It is the largest flower in the world, measuring up to 100 cm in diameter and weighing up to 12 kg. Like Titan Arum, Rafflesia is also called "corpse flower" due to its odour.

Hydnora Africana

This is a strange plant as it does not have any leaves and does not photosynthesize. It is found in Southern Africa. This plant grows underground, except for its fleshy flower.

Dead Horse Arum Lily

Don't be deceived by the looks of this beautiful and elegant flower!

On the first day of pollination, the female part will open and receive pollen. However, the male parts are not mature yet. The plant emits a stench that attracts flies to land on the female part. When the male parts are mature, they will be helped by the flies for a day.

On the second day of pollination, the male part is able to produce pollen. All the pollen just delivered up. (The process is self-pollination). The trapped flies are able to exit the plant and carry the pollen product.

Words Matter!

Stories Come Alive!

Learn to Code!

AM I HAPPY OR SAD?

1. Visit <https://scratch.mit.edu>

2. Start Coding!

Create stories, games, and animations with others around the world.

3. Delete the cat and select paint.

4. At the left side, the "Costumes" tab will appear. Draw your face without any emotions.

5. Right click and duplicate the face 2 more times. Name the first face "Smiley", second face "Happy", and the third face "Sad". Draw the faces according to the named emotions.

6. Fill in the code according to the picture below.

Create more emotions!