



Experts in Hands-On **STEM** Education



STEMist Activity Journal



What is a **STEMist**?

A **STEMist** observes the world around them to rethink and improve it using **STEAM** (Science, Technology, Engineering, Arts and Mathematics). STEMists are not afraid to ask questions, make mistakes or try something new.

STEMists, as you think through each activity, ask yourself:

- ? What is the transformation that's being described?
- ? How and why does it work?
- ? How else can I apply this observation to the world around me?



Become a **STEMist** superhero!



Draw yourself as a STEMist in the space below.

Which adjectives best describe you as a STEMist? Circle all that apply or add your own!

innovative

persistent

inquisitive

observant

cooperative

receptive

analytical



Brainstorm challenges you can solve as a STEMist superhero.

THINK: What have I observed that is in need of an innovative solution?



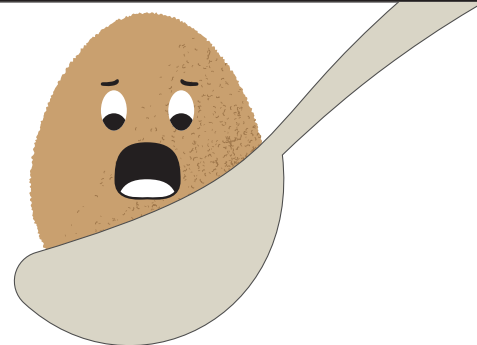
Design your own comic strip featuring you as a STEMist.

--	--	--	--	--

SCIENCE in the Kitchen

Potato Salad with Eggs

Would you mix in fresh eggs in your potato salad? Ew, probably not. A hardboiled egg is a much better choice. When an egg is boiled, a chemical transformation changes the fresh egg into a hard-boiled egg, making it a perfect ingredient for a yummy potato salad.

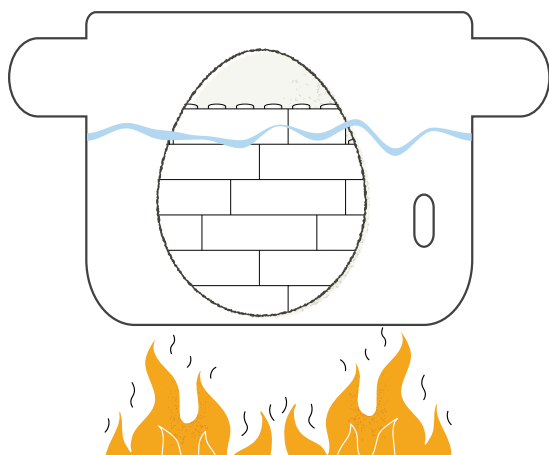


Let's review what happens to a fresh egg as it transforms into a hard-boiled egg. Imagine that the proteins in an egg are like Legos. When raw, the Legos are loose and can be moved around. When boiled, the heat causes the Legos to stick together. This makes the Legos form a strong structure that holds them together, just like a hard-boiled egg. But be careful, the more the proteins stick together, the harder the egg becomes. Eggs that have been boiled will stick together tightly and become hard. Once they're hard, it's easy to slice and mix them with the rest of the potato salad ingredients.

Your turn! Just like eggs need to be boiled to be mixed in a salad, choose a different ingredient that goes into your favorite dish and describe its transformation.

Name your favorite dish:

Which ingredient do you want to focus on?



Our Environmental Impact

If you knew that a choice you made today would affect our planet's future, would you do anything differently? Throughout history, scientists have constantly evaluated the health of our planet while developing methods to protect it.

Building homes and growing food requires space. Several products are made from materials found in forests. To meet these needs, humans have cut down acres of trees and depleted resources, often leading to deforestation. This destroys animals' homes, makes it difficult for plants to survive and often changes an ecosystem entirely. What's more, cutting down trees contributes to climate change. Carbon dioxide is harmful to the environment and trees do an excellent job pulling it out of our air supply. When we weaken a forest's ecosystem, it affects the whole planet.

Over to you! Share another example of something people do that affects the environment. Your example can show a positive or negative impact. Let's see how our actions can change the planet.

Humans affect the environment by ...

This action's impact is (circle one): positive or negative



Explain how the action you chose can change the planet:

The Evolution of Devices

Inventors create devices to help solve a problem or improve life in some way. The original design may change as technology develops or as people’s needs change in some way.

In the past few decades, telephones have gone through a dramatic transformation. Today, making calls and communicating easily with others is far from developers’ only goal. Cell phones need a reliable internet connection, quality cameras and apps that meet users’ many needs. Do we even use phones for calls anymore?

Give it a shot! Think of another device that’s been reworked over time. What changes did developers make to the device and why?

Choose a device:

List the changes developers made to the device:

Original Features	Updated Features

Describe how and why your chosen device evolved:



Robot Takeover!

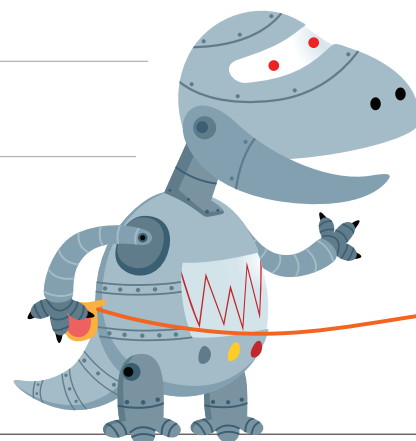
Robots are no longer a thing of the future. If you look around, you'll find them at your local store, hospitals, parks, you name it! These robots automate tasks, oftentimes making life simpler for humans in some way.

Tired of pushing a heavy vacuum around every corner of your room? Save your energy from the pain of manual cleaning with an energy-efficient robot vacuum that does the dirty work for you! Let this smart device take care of the mess, effortlessly collecting the dirt and dust you've left behind. You don't even need to be in your house to clean it! Schedule your robot vacuum to run regularly and enjoy your newfound free time.

You're up! Can you think of another example of a robot that now does tasks once done by humans? Write an ad script like the one above that persuades people to use a robot to get the job done.

Select a robot:

Brainstorm reasons why people should use the robot:





Project	DATE
E NGINEERING on the Streets	

Roadway Redesign

From major highways to simple crosswalks, engineers designed much of what you see out the window of your family car. They transformed big plots of land on every type of terrain to accommodate cars, pedestrians and wildlife.

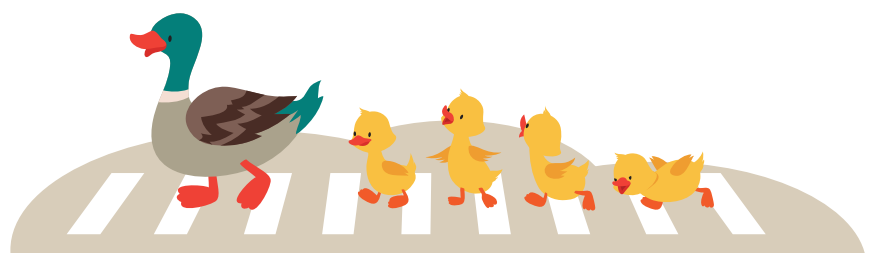
Let's take a closer look at crosswalks. Lines painted on a roadway have a powerful ability to bring cars to a stop. Whether or not you can read, hear or speak the language, you likely recognize the ladder-like design as a sign for pedestrian crossing. Crosswalks are a simple and effective way to help people cross the street safely.

STOP! Roadwork ahead! What structure, technology or feature have you noticed on roadways that make the road safer or more efficient? How does it work?

List ways in which roads are made safer or more efficient:

Choose one item from your list. Use this space to organize your thoughts:

Using the crosswalk example as a model, describe the structure, technology or feature you chose:



Project	DATE
E NGINEERING with Alternative Energy	

Transforming Energy into Power

With great power comes a great deal of engineering! Let's think about the many different ways engineers have learned to harness energy and transform it into usable power.

Hydropower generates electricity by harnessing the energy of flowing water. Imagine you have a giant water slide with an enormous pool of water at the very top. The water wants to rush down the slide, but a closed gate holds it all back. That's what a man-made dam can do! Typically built on rivers with high elevations, dams stop gravity from pulling water downward. Now back to your awesome water slide. When you open the gate just a little and water comes rushing down the slide. But there's a twist! A giant water wheel at the base begins to spin wildly thanks to the rush of water. Similarly, when river water spins a turbine propeller at the base of a dam, it sends energy to a generator that produces electricity.

Time to think! Describe another way engineers turn energy into power. What do you think you know about how that form of energy is generated?

Another way engineers turn energy into power is:

To visualize how this alternative energy method might work sketch a quick diagram:



Project	DATE
ART in the Wild	

Wildlife Shelters

Throughout history, humans and animals have used a variety of materials to construct shelters. Everything from mud and sticks to bricks and cement. We can learn a lot about turning raw materials into sturdy structures from observing those built by animals.

Beavers are known for their dams. They use branches, grass, rocks and mud to build long dams that stretch over a stream or river. They tightly weave these materials together, weighing down the bottom with heavy rocks and sealing them with mud. The dams are strong enough to slow the flow of water below and sturdy enough to protect them from predators.

Let's see what you can come up with! Think about other animals' shelters. What materials do they use to construct their structures? What other observations can you make?

Name an animal:

Consider the animal's habitat. Describe its shelter and the materials used to build it:

A cartoon illustration of a grey elephant with a large green leaf on its back, standing on a light blue background with horizontal lines. The elephant is facing left, with its trunk curled upwards. It has large ears and a small tail. The green leaf is positioned on its back, extending towards the right. The background consists of a light blue gradient with horizontal lines, suggesting a sky or a field.



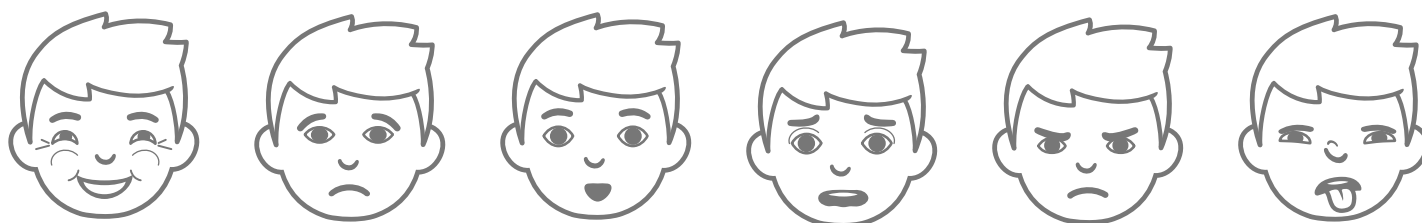
Project	DATE
ART in Our Emotions	

Changes in Mood and Emotion

When we create, observe or appreciate art, we feel a wave of emotions. These emotions can either stay with us for a long time or just be a passing feeling. Either way, art can influence and transform our existence.

When you're feeling down, do you ever turn on your favorite song to lift your mood? Music is so powerful. Listen to just a few notes, and you may experience a shift in your emotions. A song can spark joy, trigger memories, offer comfort, reduce stress or provide motivation.

You try! Think about how engaging with a different art form can affect how you feel. Write a journal entry sharing a personal experience that shows how art affected your emotions or mindset.



At first, I felt:

My emotions/mood changed because

Write a journal entry detailing how a work of art transformed your emotions or mindset:

Identifying Exponential Growth in Nature

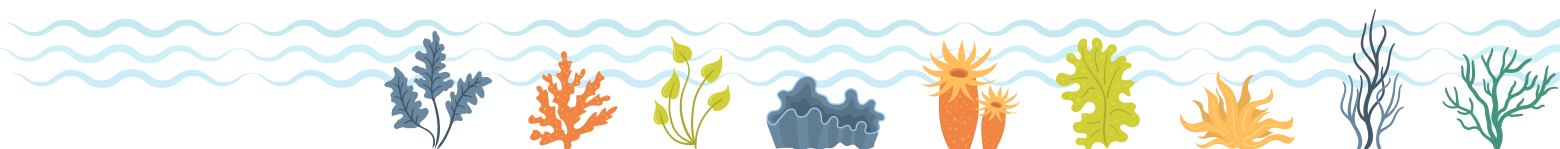
Exponential growth starts small and quickly grows larger over time. Picture this: You stand atop a hill, rolling a small snowball in your hands. Suddenly, you release it, and it begins rolling down the hill. With each passing second, it gathers more snow and grows larger and larger. When you see it rest at the base of the hill, you find yourself staring at an enormous snowball!

Did you know that trees grow from the tips of their roots and the tip of their shoots? As they grow, their tiny roots begin to develop under the ground. They creep deep beneath the soil and extend in search of water and nutrients. Up top, their branches continue to grow, expanding upward and branching out. This creates a seemingly endless and beautiful design under and above the ground.

Give it a try! Can you identify other examples of exponential growth? In other words, what is an example of something that starts small, but over time, transforms into something much larger?

An example of exponential growth in nature is: :

Sketch its transformation:





Identifying Patterns and Shapes

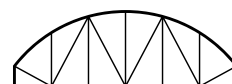
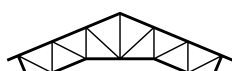
Architects' creative processes begin with patterns and shapes. Sometimes, they use decorative patterns and shapes to make structures visually appealing. Other times, however, these features are vital to the stability of a structure's design. By studying successful designs, architects can manipulate and adapt their own.

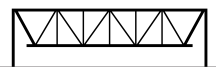
Bridges need to support quite a lot of weight each day. Imagine just how heavy a busload of people or a delivery truck must be! Architects and engineers noticed how strong triangles were in weight-bearing designs and began using a pattern of triangles in their bridge designs. Today, you'll find many different examples of these "truss bridges." They're all slightly different, but the repetition of triangles in their designs all provide strength and stability.

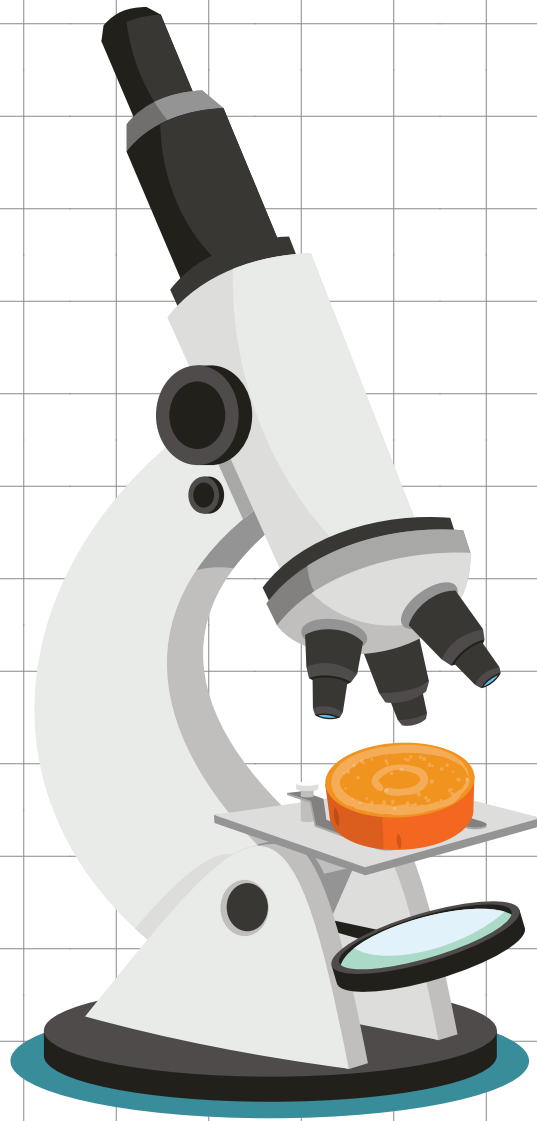
Ready, set, think! What additional shapes or patterns can you identify in the design of bridges, buildings, or other structures? How do the shapes or patterns affect the design's structure or appearance?

A shape or pattern I've noticed is:

This design is (circle one): structural or decorative







edventures.com

© 2023 PCS Edventures. All rights reserved.